

From: J..R..Pendleton@f851.n102.z1.fidonet.org (J. R. Pendleton)  
Sender: NewsMeister@mcws.fidonet.org  
Newsgroups: rec.radio.amateur.misc  
Subject: Yes there is a 1750 Meter band  
Date: Sun, 07 Jun 1992 21:30:26 -0700  
Lines: 145

Organization: Employer not involved in this.

As requested by several people, here is a collection of highlights of the replies I recieved to "Does 1750 meters really exist". It looks like one of the replies was from a FAQ list, but since I got several requests to summarize, I'll go ahead and consume the bandwidth.

Many thanks to all that took the time to reply. And many thanks to all those who caught the error in my .sig. I guess I'll go listen to the tapes some more :-).

Thanks again.

73s,  
jerry@key.amdahl.com  
KC6RTO

-----  
>From alan@dtd.es.com Wed Jun 3 06:43:44 1992  
(K6X0)

...yes, Virginia, there is a real citizen's band between 160 and 190 KHz. The limitations are: one watt output power, and the antenna can be no longer than 50 feet including the feedline. There are some serious experimenters using the band for propagation studies and so on, but there is lots of room for CW signals. You may hear several beacons operating there 24 hours a day. There is a newsletter, but I do not know who publishes it. Other than the power and antenna restrictions, as far as I know anything goes. To my knowledge there is no commercially made equipment available for this band - virtually everyone builds their own transmitters, and most of the modern receivers will tune down on that band. I listen there once in a while with my TS-930 but have never been interested in transmitting there. Good luck.

\*\*\*\*\*  
(KC6WUG)

...FCC part 15 (no license) 1750 meter band: 160-190 KHz. 1 watt max input power. 15 meter maximum length of antenna + feedline. With those power and antenna restrictions you don't get much range.

\*\*\*\*\*  
>From jkearman@arrl.org Fri Jun 5 07:55:06 1992  
(KR1S) ^^^^

|----- (AhHA! - So much for the benign neglect theory --

JRP)

JP: Well, shucks. We have run articles about this band in the past. I guess we should do it again. The band runs from 160-190 kHz. You're allowed 1-watt output, total length/height of antenna including feed line is 50 ft (max allowed by law). Most folks put the xmtr right at the base of the antenna.

You can join the Longwave Club of America, which was organized in 1974 to promote DXing and experimentation on frequencies below 550 kHz and activity on the 1750 meter band. Membership in the LWCA and a one-year subscription to The LOWDOWN is \$12.00 by First Class Mail. Please make all remittances payable to the Longwave Club, and mail to LWCA, 45 Wildflower Rd., Levittown, PA 19057. [Direct quote from the LOWDOWN]

(See, we READ it here!)

The LOWDOWN is published monthly. Good luck and 73,

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>From: pdh@netcom.com (Phil Howard )  
(KA9WGN)

Depending on your effective bandwidth, you can extend it. I've read about very slow digital going something like 1000 to 2000 km.

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As promised, here's the summary of the information I requested from the net a couple weeks ago regarding the 1750 meter band.

Does one need a license to operate on this band? No. This means that you can choose your own callsign although callsigns are not required.

What is this band for? Experimentation mainly. It is especially fun to attempt QRP operation and one respondent said that given the right type of modulation and antenna setup, signals can travel 1000 miles or more with just under one watt output! Lots of folks use CW beacons and there is a radio club called The Lowfers (Low Frequency Users, presumedly). Be aware that this IS NOT a ham band although several LF receiver manufacturers boast that their units can "receive the 1750-meter ham band". You will not find discussion of this band in the ARRL publications BECAUSE it is not a ham band. Perhaps some of the confusion here arises from the use by LF operators of ham radio callsigns. Many hams also operate in this band and use their own calls for identification, even though, as mentioned above, a callsign is not required here.

What is the frequency limits of this band? The 1750 meter band spans from 160 to 190 KHz.

What types of modulation may be employed? You may use CW and AM voice. You may be allowed others (FM, RTTY, etc). But the data I was able to gether was sketchy on this point. One person though said that there are no restrictions on modulation methods.

What are the legal power limits and other transmitter-related restrictions? Transmitter power is limited to somewhat less than one watt output. The maximum power INPUT to the final should not exceed one watt. The length of the antenna added to the length of the feedline MAY NOT exceed 50 feet. Spurious emissions outside the band must be 60db below the signal strength at the carrier frequency.

Who may use the band? Anyone, so long as they comply with the above regulations.

Where can I get more definitive and detailed information on this band? The band is discussed in Part 15 of the Code of Federal Regulations which you can pick up at your local library (assuming it is a fairly big library), or you can order it from the nearest US Government Bookstore. If anyone knows where such a store is, please post its location. I'd like to snag a copy of Part 15 myself.

Thanks to alan@dtd.es.com, kludge@grissom.larc.nasa.gov, kc2wz!bob%fdurt1@uunet.UU.NET, brown@hpspkla.spk.hp.com, markz@ssc.wa.com, and gary@ke4zv.uucp for all the information they provided.

Happy Lowfering! :-)

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-- --- .7. ... . -.7. --- 7.. . .7.. .. --- . ... .7.7.-

--... --- -- 7.. . -.7 7.7. 7..... .7. - ---

\* Origin: gated usenet/mcws.fidonet.org (818)352-2993 (1:102/851)



Subject: AMPRNet IP address coordinators as of 15 December 1992

Corrections and updates to brian@ucsd.edu.

Note: the people listed here have volunteered to issue IP addresses for their areas. They are not paid to do this service; please understand that they are perfectly at ease to deal with coordination responses at a reasonably lower priority than the things that matter more, such as job and family. Please be patient when requesting an address.

44.002	Bob Meyer	K6RTV	Calif: Sacramento
44.004	Douglas Thom	N6OYU	Calif: Silicon
Valley - San Francisco			
44.006	Don Jacob	WB5EKU	Calif: Santa Barbara/Ventura
44.008	Brian Kantor	WB6CYT	Calif: San Diego
44.010	Terry Neal	AA6TN	Calif: Orange County
44.012	Steven King	KD7RO	Eastern Washington, Idaho
44.014	John Shalamskas	KJ9U	Hawaii & Pacific
Islands			
44.016	Jeff Angus	WA6FWI	Calif: Los Angeles - S F
Valley			
44.017	Dana Myers	KK6JQ	Calif: Antelope Valley/Kern
County			
44.018	Geoffrey Joy	KE6QH	Calif: San
Bernardino & Riverside			
44.020	Fred Schneider	K0YUM	Colorado:
Northeast			
44.022	John Stannard	KL7JL	Alaska
44.024	Dennis Goodwin	KB7DZ	Washington state:
Western (Puget Sound)			
44.026	Ron Henderson	WA7TAS	Oregon
44.028	Don Adkins	KD5QN	Texas: North
44.030	J Gary Bender	WS5N	New Mexico
44.032	Bdale Garbee	N3EUA	Colorado:
Southeast			
44.034	Jeff Pierce	WD4NMQ	Tennessee
44.036	Doug Drye	KD4NC	Georgia
44.038	Mike Abbott	N4QXV	South Carolina
44.040	Jeff Jacobsen	WA7MBL	Utah
44.042	Phil Akers	WA4DDE	Mississippi
44.044	Bob Wilson	KA1XN	Massachusetts: western
44.046	William Simmons	WB0ROT	Missouri
44.048	Jacques Kubley	KA9FJS	Indiana
44.050	Ron Breitwisch	KC0OX	Iowa
44.052	Gary Grebus	K8LT	New Hampshire
44.054	Ralph Stetson	KD1R	Vermont
44.056	Don Hughes	KA1MF	Eastern&Central Mass
44.058	Rich Clemens	KB8AOB	West Virginia
44.060	Howard Leadmon	WB3FFV	Maryland
44.062	Jim DeArras	WA4ONG	Virginia
44.062	Jon Gefaell	KD4CQY	Virginia (Charlottesville
Area)			
44.064	Dave Trulli	NN2Z	New Jersey: northern
44.065	Bob Applegate	WA2ZZX	New Jersey:
southern			
44.066	John DeGood	NU3E	Delaware

44.068.1-32	Bob Foxworth		K2EUH	New York: NYC &
Long Island				
44.068.64+	Bob Bellini	N2IGU		New York: ENY
44.069	Paul Gerwitz		WA2WPI	New York: WNY
44.070	Gary Sanders		N8EMR	Ohio
44.072	Ken Stritzel		WA9AEK	Chicago - North
Ill.				
44.073	Chuck Henderson		WB9UUS	South/Central Ill.
44.074	James Curran		KA4OJN	North Carolina
(east)				
44.075	Charles Layno		WB4WOR	North Carolina
(west)				
44.076	Kurt Freiburger		WB5BBW	Texas: south
44.077	Rod Huckabay		KA5EJX	Texas: west
44.078	Joe Buswell	K5JB		Oklahoma
44.080	John Gayman	WA3WBU		Pennsylvania: eastern
44.082	Steven Elwood		N7GXP	Montana
44.084	Bob Ludtke	K9MWM		Colorado: Western
44.086	Reid Fletcher		WB7CJO	Wyoming
44.088	Jon Bloom	KE3Z		Connecticut
44.090	Mike Nickolaus		NF0N	Nebraska
44.092	Pat Davis	KD9UU		Wisconsin, upper peninsula
Michigan				
44.094	Gary Sharp	WD0HEB		Minnesota
44.096	Don Bennett	K4NGC		District of Columbia
44.098	Bruce ??	WD4HIM		Florida
44.100	Richard Elling		KB4HB	Alabama
44.102	Jeff King	WB8WKA		Michigan (lower peninsula)
44.104	Charles Greene		W1CG	Rhode Island
44.106	Tyler Barnett		N4TY	Kentucky
44.108	James Dugal	N5KNX		Louisiana
44.110	Richard Duncan		WD5B	Arkansas
44.112	Bob Hoffman	N3CVL		Pennsylvania: western
44.114	Steven Elwood		N7GXP	N&S Dakota
44.116	Tom Kloos	WS7S		Oregon: NW&Portland,Vancouver
WA				
44.118	Jon Andrews	WA2YVL		Maine
44.120	unassigned			
44.122	Dale Puckett		K0HYD	Kansas
44.124	David Dodell		WB7TPY	Arizona
44.125.0-126	Earl Petersen			KF7TI Southern
Nevada				
44.125.128-254	Bill Healy		?	Northern Nevada
44.126	Karl Wagner	KP4QG		Puerto Rico
#				
#	44.128 is reserved for testing. Do not use for operational networks.			
#	You may safely assume that any packets with 44.128 addresses are bogons			
#	unless you are using them for some sort of testing			
#				
44.128	TEST			
#				
#	International subnet coordinators by country			
#				
44.129	Japan	JG1SLY		Tak Kushida, JH3XCU Joly
Kanbayashi				
44.130	Germany	DL4TA		Ralf D Kloth
44.131	United Kingdom	G6PWY		Chris Baron

44.132	Indonesia	YB1BG	Robby Soebiakto	
44.133	Spain		EA4DQX	Jose Antonio Garcia. Madrid.
	(EA4DQX @ EA4DQX)			
44.134	Italy		I2KFX	
44.135	Canada		VE3GYQ	David Toth
44.136	Australia	VK2ZXQ	John Tanner	
44.137	Holland		PA0GRI	Gerard Van Der Grinten
44.138	Israel		4X1GP	Peleg Lapid
44.139	Finland		OH1MQK	Matti Aarnio
44.140	Sweden		SM0IES	Lennart
44.141	Norway		LA4JL	Per Eotang
44.142	Switzerland	HB9CAT	Marco Zollinger	
44.143	Austria		OE1KDA	Krzysztof Dabrowski
44.144	Belgium		ON7LE	
44.145	Denmark		OZ1EUI	
44.146	Phillipines	DU1UJ	Eddie Manolo	
44.147	New Zealand			
44.148	Ecuador		HC5K	Ted
44.149	Hong Kong	VS6EL		
44.150	Slovenija	S53FK	Iztok Saje	
44.151	France		FC1BQP	Pierre-Francois Monet
44.152	Venezuela	OA4KO/YV5	Luis Suarez	
44.153	Argentina	LU7ABF	Pedro Converso	
44.154	Greece		SV1UY	Demetre Valaris
44.155	Ireland		EI9GL	Paul Healy
44.156	Hungary		HA5DI	Bela Markus
44.157	Chile		CE6EZB	Raul Burgos
44.158	Portugal	CT1DIA	Artur Gomes	
44.159	Thailand	HS1JC	Kunchit Charmaraman	
44.160	South Africa		ZS6BHD	John
44.161	Luxembourg	LX1YZ	Erny Tontlinger	
44.162	Cyprus		5B4TX	C. Costis
44.163	Central America		TI3DJT	Chuck Hast
44.164	Surinam		PZ2AC	Otto Morroy
44.165	Poland		SP5WCA	Andrzej K. Brandt
44.166	Korea		HL9TG	Gary ?
44.167	India		VU2LBW	Lakshman ("Lucky") Bijanki
44.168	Taiwan		BV5AF	Bolon
44.169	Nigeria		5N00BA	Kunle
44.170	Croatia		??	Sinisa Novosel
44.171	Serbia		(nobody volunteered yet)	
44.172	Sri Lanka	4S7EF	Ekendra	
44.173	Mexico		XE????	(no one has volunteered yet)
44.174	Brazil		PP5AQ	Luiz F. Catalan
44.175	Cuba		CO2JA	Jose Amador
44.193	Outer Space-AMSAT		W3IWI	Tom Clark





Subject: QST Bibliography of Antenna Articles

Note: There is a lot of antenna information contained in the following ARRL publications:

The ARRL Antenna Book  
The ARRL Handbook  
W1FB's Antenna Notebook  
Antenna Compendium  
HF Antennas for All Locations  
Yagi Antenna Design

The Antenna Book contains a chapter on apartment antennas.

QST Bibliography on apartment or limited-space antennas:

1960	March	QST	p. 49
		Long Antenna for a Short Lot (80M H&K)	1 page
	October	QST	p. 23
		A Limited-Space Antenna (80 & 40 M)	3 pages
1962	August	QST	p. 34
		Retrievable Antennas (Flag. & Gnd-flr)	2 pages
1965	November	QST	p. 87
		Invisible Antennas (Invisible Wire)	2 pages
1967	April	QST	p. 20
		An Antenna for the Traveling Man	2 pages
	May	QST	p. 47
		No Room for an Antenna? (75, 20, 10 M) (H&K)	1 page
	June	QST	p. 42
		A Window-Sill Semivertical (80, 40, 20 Meters)	3 pages
	July	QST	p. 51
		Whip Antenna (TC)	1 page
		QST	p. 49
		Alternative Whip for Window-Sill Antenna (TC)	1 page
	September	QST	p. 45
		Indoor Dipole (10, 15, 20, 40 M) (TC)	1 page
1969	February	QST	p. 24
		Limited-Space Antennas & Methods of Coupling	4 pages
	March	QST	p. 34
		Antennas for Travel Trailers & Campers	5 pages
1970	April	QST	p. 56
		1.6 Contacts per Square Foot of Real Estate	2 pages
	August	QST	p.
		Short Antennas for the Lower Frequencies (Part I-Loading & the Use of Traps)	5 pages
	September	QST	p.
		Short Antennas for the Lower Frequencies (Part II-Trap Construction & Adjustment)	2 pages
1971	October	QST	p. 34
		The Apartment Dwellers Dilemma	3 pages

1972	March	QST	p. 30
		The Renter's Delight (Antenna Mount)	3 pages
	December	QST	p. 47
		A Quick-Change Plug for the Apartment Dweller's Dilemma (H&K)	1 page
1973	September	QST	p. 11
		A Bite Size Beam	4 pages
1974	March	QST	p. 48
		A Cliff Dwellers' Answer to the Antenna Dilemma (H&K)	2 pages
	September	QST	p. 28
		Off-Center-Loaded Dipole Antennas	7 pages
	October	QST	p. 22
		Apartment Dwellers Slinky Jr. Antenna	2 pages
	December	QST	p. 15
		The Minooka Special	6 pages
		QST	p. 48
		Some Ideas on Antenna Couplers	5 pages
1975	January	QST	p. 44
		Apartment Dweller's Antenna (H&K)	1 page
	May	QST	p. 15
		The City Slicker	4 pages
1976	March	QST	p. 41
		Another Cliff-Dweller Antenna (H&K)	1 page
1977	March	QST	p. 42
		A Short Antenna for your Apartment-House Balcony	1 page
	April	QST	p. 32
		The Inverted-L Antenna	3 pages
		QST	p. 37
		Efficient Short Radiators	3 pages
	May	QST	p. 49
		Continuously Loaded Helical (H&K)	1 page
	June	QST	p. 46
		Dual-Band Operation With A 33-Foot Vertical (H&K)	1 page
	October	QST	p. 15
		Optomizing Vertical Antenna Performance	3 pages
	December	QST	p. 45
		Small-Space 160 Meter Antenna (H&K)	1 page
1978	January	QST	p. 40
		Coil Improvement for Off-Center Loaded Antenna (H&K)	1 page
	February	QST	p. 36
		An Inexpensive Antenna Tuner (H&K)	1 page
	March	QST	p. 29
		The Flagpole Deluxe	
	April	QST	p. 30
		Short Ground-Radial Systems for Short Verticals	4 pages
	June	QST	p. 16
		Build This Novice Four-Band Verticle	3 pages
	August	QST	p. 26
		Antennas - Keeping Them Up	2 pages
	September	QST	p. 19
		Designing a Vertical Antenna	3 pages
	October	QST	p. 35

	On "Build This Novice Four-Band Vertical" (TC)	1 page
1979 February	QST	p. 33
	A 40-Meter Midget	
April	QST	p. 33
	A Big Signal from a Small Lot	3 pages
October	QST	p. 18
	Better Results with Indoor Antennas	4 pages
1980 September	QST	p. 23
	The Shooter - A 3-Band Portable Antenna	3 pages
October	QST	p. 28
	A Traveling Ham's Trap Vertical	4 pages
	QST	p. 38
	A Deluxe RV 5-Band Antenna	3 pages
December	QST	p. 40
	Antennas and Grounds for Apartments	
1981 February	QST	p. 15
	Antennas for Those Who Can't Have Antennas	3 pages
1986 June	QST	p. 33
	Small, High Efficiency Loop Antennas	4 pages
1988 March	QST	p. 33
	Hidden Antennas - One Ham's Solution	

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Ed Hare, KA1CV		ehare%arrlhq.UUCP@uhasun.hartford.edu
American Radio Relay League		uhasun!arrlhq!ehare
225 Main St.		
Newington, CT 06111		There is no limit to what
(203) 666-1541 - voice		you can accomplish
(203) 665-7531 - FAX		if you don't care
ARRL Laboratory Engineer		who gets the credit. - origin
RFI, QRP, mobile,		unknown.
transmitter and receiver testing		

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Subject: ARRL Appointment Descriptions

The following "job descriptions" (guidelines, if you will) are descriptive of the volunteer appointments most likely available in YOUR area of the USA.

For appointment applications or further information, contact the Field Services Department, ARRL HQ, 225 Main St. Newington CT.

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#### TECHNICAL COORDINATOR

The ARRL Technical Coordinator (TC) is a section-level official appointed by the Section Manager to coordinate all technical activities within the section. The Technical Coordinator must be an ARRL full member holding a Novice class (or higher) amateur license. The Technical Coordinator reports to the Section Manager and is expected to maintain contact with other section-level appointees as appropriate to insure a unified ARRL Field Organization within the section. The duties of the Technical Coordinator are as follows:

1. Supervise and coordinate the work of the section's Technical Specialists.
2. Encourage amateurs in the section to share their technical achievements with others through the pages of QST, and at club meetings, hamfests and conventions.
3. Promote technical advances and experimentation at vhf/uhf and with specialized modes, and work closely with enthusiasts in these fields within the section.
4. Serve as an advisor to radio clubs that sponsor training programs for obtaining amateur licenses or upgraded licenses in cooperation with the ARRL Affiliated Club Coordinator.
5. In times of emergency or disaster, function as the coordinator for establishing an array of equipment for communications use and be available to supply technical expertise to government and relief agencies to set up emergency communications networks, in cooperation with the ARRL Section Emergency Coordinator.
6. Refer amateurs in the section who need technical advice to local Technical Specialists.
7. Encourage TSs to serve on RFI and TVI committees in the section for the purpose of rendering technical assistance as needed, in cooperation with the ARRL OO/Coordinator.
8. Be available to assist local technical program committees in arranging suitable programs for ARRL hamfests and conventions.
9. Convey the views of section amateurs and TSs about the technical contents of QST and ARRL books to ARRL Hq. Suggestions for improvements should also be called to the attention of the ARRL Hq. technical staff.

10. Work with the appointed ARRL TAs (technical advisors) when called upon.

11. Be available to give technical talks at club meetings, hamfests and conventions in the section.

Recruitment of new hams and League members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

FSD-109

(191)

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#### OFFICIAL OBSERVER

The Official Observer program has been sponsored by the League for over 50 years to help amateurs help each other. Official Observer appointees have aided thousands of amateurs to maintain their transmitting equipment and operating procedures in compliance with the regulations. The object of the OO program is to notify amateurs by mail of operating/technical irregularities before they come to the attention of the FCC.

The OO is also the backbone of the Amateur Auxiliary to the FCC's Field Operations Bureau. OOs are certified in the Auxiliary by passing a mandatory written examination.

The OO performs his function by listening rather than transmitting, keeping an ear out for such things as frequency instability, harmonics, hum, key clicks, broad signals, distorted audio, overdeviation, out-of-band operation, etc. The OO completes his task once the notification card is sent.

In hard-core rules violations cases, OOs refer problems to higher echelons of the Amateur Auxiliary, and may be requested to gather evidence for possible FCC enforcement actions.

Requirements follow:

1. Must take and pass examination to be certified as a member of the Amateur Auxiliary, an FCC requirement, based on study of the ARRL's Amateur Auxiliary Training Manual.
2. Must be an ARRL Full Member and have been a licensee of Technician Class or higher for at least four years.
3. Must report to the OO Coordinator regularly on FSD-23.
4. Maintain regular activity in sending out advisory notices as needed.

The OO program is one of the most important functions of the League. A sincere dedication to helping our brother and sister amateurs is required for appointment.

Recruitment of new hams and League members is an integral part of the

job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

FSD-110  
(1288)

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#### AFFILIATED CLUB COORDINATOR

The ACC is the primary contact and resource person for each Amateur Radio club in the section, specializing in motivating, providing assistance and coordinating joint activities of radio clubs. The ACC is appointed by, and reports to, the Section Manager. Duties and qualifications of the ACC include the following:

1. Volunteer a great deal of time in getting to know the Amateur Radio clubs' members and officers person to person in his section. Learn their needs, strengths and interests and work with them to make club effective resources in their communities and more enjoyable for their members.
2. Encourage affiliated clubs in the section to become more active and, if the club is already healthy and effective, to apply as a Special Service Club (SSC).
3. Supply interested clubs with SSC application forms.
4. Assist clubs in completing SSC application forms, if requested.
5. Help clubs establish workable programs to use as SSCs.
6. Approve SSC application forms and pass them to the SM.
7. Work with other section leadership officials (Section Emergency Coordinator, Public Information Coordinator, Technical Coordinator, State Government Liaison, etc.) to insure that clubs are involved in the mainstream of ARRL Field Organization activities.
8. Encourage new clubs to become ARRL affiliated.
9. Ensure that annual progress reports (updated officers, liaison mailing addresses etc.) are forthcoming from all affiliated clubs.
10. Novice Class license; ARRL membership required.

Recruitment of new hams and League members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

FSD-201  
(1288)

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## EMERGENCY COORDINATOR

The ARRL Emergency Coordinator is a key team player in ARES on the local emergency communications scene. Working with the Section Emergency Coordinator, the DEC and Official Emergency Stations, the EC prepares for, and engages in management of communications needs in disasters. EC duties include:

1. Promote and enhance the activities of the Amateur Radio Emergency Service (ARES) for the benefit of the public as a voluntary, non-commercial communications service.

2. Manage and coordinate the training, organization and emergency participation of interested amateurs working in support of the communities, agencies or functions designated by the Section Emergency Coordinator/Section Manager.

3. Establish an emergency communications plan for the communities and agencies that will effectively utilize ARES members to cover the needs for tactical and formal Welfare message traffic.

4. Establish a viable working relationship with all federal, state, county, city governmental and private agencies in the ARES jurisdictional area which might need the services of ARES in emergencies.

5. Establish local communications networks run on a regular basis and periodically test those networks by conducting realistic drills.

6. Establish an emergency traffic plan, with Welfare traffic inclusive, utilizing the National Traffic System as one active component for traffic handling. Establish an operational liaison with local and section nets, particularly for handling Welfare traffic in an emergency situation.

7. In times of disaster, evaluate the communications needs of the jurisdiction and respond quickly to those needs. The EC will assume authority and responsibility for emergency response and performance by ARES personnel under his jurisdiction.

8. Do all that is possible to further the favorable image of Amateur Radio by dedication to purpose and a thorough understanding of the mission of Amateur Radio.

Requirements: Technician or higher class license; Full ARRL membership.

Recruitment of new hams and League members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.



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#### NET MANAGER

For coordinating and supervising traffic handling activities in the section, the SM may appoint one or more Net Managers, usually on recommendation of the Section Traffic Manager. The number of NMs appointed may depend on a section's geographical size, the number of nets operating in the section, or other factors having to do with the way the section is organized. In some cases, there may be only one net manager in charge of the one section net, or one NM for the phone net, one for the cw net. In larger or more traffic-active sections there may be several, including NMs for the vhf net or nets, for the RTTY net, or NTS local nets not controlled by ECs. All ARRL NMs should work under the STM in a coordinated section traffic plan.

Some nets cover more than one section but operate in NTS at the section level. In this case, the Net Manager is selected by agreement among the STMs concerned and the NM appointment conferred on him by his resident SM.

NMs may conduct any testing of candidates for ORS appointment (see below) that they consider necessary before making appointment recommendations to the STM. Net Managers also have the function of requiring that all traffic handling in ARRL recognized nets is conducted in proper ARRL form.

Requirements: Novice class license or higher; Full ARRL membership.

Recruitment of new hams and League members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

FSD-1  
(1288)

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#### OFFICIAL BULLETIN STATION

Rapid dissemination of information is the lifeblood of an active, progressive organization. The ARRL Official Bulletin Station network provides a vital communications link for informing the amateur community of the latest developments in Amateur Radio and the League. ARRL bulletins, containing up-to-the-minute news and information of Amateur Radio, are issued by League Headquarters as soon as such news "breaks." These bulletins are transmitted on a regular schedule by ARRL Headquarters station W1AW.

The primary mission of OBS appointees is to copy these bulletins directly off the air from W1AW -- on voice, cw or RTTY/ASCII -- and retransmit them locally for the benefit of amateurs in the particular coverage area, many of whom may not be equipped to receive bulletins directly from W1AW.

ARRL bulletins of major importance or of wide-ranging scope are mailed from Headquarters to each Bulletin Manager and OBS appointee. However, some bulletins, such as the ARRL DX Bulletin (transmitted on Fridays UTC), are disseminated only by W1AW because of time value. Thus it is advantageous for each OBS to copy W1AW directly. In some sections, the Bulletin Manager may assume the responsibility of copying the bulletins from W1AW; therefore, individual OBSs should be sure to meet the Bulletin Manager on a regular, agreed-upon schedule to receive the latest bulletins.

Inasmuch as W1AW operates on all bands (160-2 meters), the need for OBSs on hf has lessened somewhat in recent times. However, OBS appointments for hf operation can be conferred by the Section Manager (or the Bulletin Manager, depending on how the SM organizes the section) if the need is apparent. More importantly, to serve the greatest possible "audience," OBS appointees who can send ARRL bulletins over vhf repeaters, and via uploading to packet bulletin board systems (PBBS) are of maximum usefulness and are much in demand. If possible, an OBS who can copy bulletins directly from W1AW (or the Bulletin Manager) should be assigned to each major repeater in the section. Bulletins should be transmitted regularly, perhaps in conjunction with a vhf repeater net, on a repeater "bulletin board" (tone-accessed recorded announcements for repeater club members), or via a RTTY or packet (computer) mailbox, if one is functioning locally. Duties and requirements of the OBS include the following:

1. OBS candidates must have a Novice class license or higher.
2. Retransmission of ARRL bulletins must be made at least once per week to maintain appointment.
3. OBS candidates are appointed by the Section Manager (or by the Bulletin Manager, if the SM so desires) and must adhere to a schedule that is mutually agreeable.
4. OBS appointees should send a monthly activity report (such as FSD-210 under "Schedules and Net Affiliations") to the Bulletin Manager, indicating bulletin transmissions made and generally updating the Bulletin Manager to any OBS-related activities. This reporting arrangement may be modified by the Bulletin Manager as he/she sees fit.
5. As directed by the Bulletin Manager, OBSs will include in their bulletin transmissions news of local, section and regional interest.

Recruitment of new hams and League members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

FSD-7  
(987)

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OFFICIAL EMERGENCY STATION

Amateur operators of Novice Class and above may be appointed OES by their SEC or SM at the recommendation of their ECs or DECs (if no EC). The OES must be an ARRL member and set high standards of emergency preparedness and operating. In addition to OES's operating within their own local EC jurisdictional areas, they should be able to respond in "off shore" emergencies, such as those which frequently occur in foreign countries. Here are the standard qualifications and functions of this appointment:

1. Possession of full ARRL membership and a Novice Class license or higher.
2. Regular participation in the local ARES, if any, including all drills and tests, emergency nets and, of course, real emergency situations.
3. Ability to operate independent of commercial mains including at least one-band mobile capability.
4. Must be fully acquainted with standard ARRL message form and capable of using it in handling any third-party messages.
5. Report monthly to the EC/DEC or SEC.

Recruitment of new hams and League members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

FSD-108  
(1288)

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OFFICIAL RELAY STATION

This is a traffic-handling appointment that is open to all classes of license. This appointment applies equally to all modes and all parts of the spectrum. It is for traffic-handlers, regardless of mode employed or part of the spectrum used.

The potential value of the skilled operator with traffic know-how to his country and community is enhanced by his ability and the readiness of his station to function in the community interest in case of emergency. Traffic awareness and experience are often the signs by which mature amateurs may be distinguished.

Traditionally, there have been considerable differences between procedures for traffic handling by cw, phone, RTTY,

ASCII, packet and other modes. Appointment requirements for ORS do not deal with these, but with factors equally applicable to all modes. The appointed ORS may confine activities to one mode or one part of the spectrum if he wishes. There is no versatility requirement, although versatility does indeed make it possible for anyone to perform a more complete public service. There is, however, the expectation that the ORS will set the example in traffic handling however it is done. To the extent that he is deficient in performing traffic functions by any mode, to that extent he does not meet the qualifications for the appointment. Here are the basic requirements:

1. Full ARRL membership and Novice Class license or higher.
2. Code and/or voice transmission capability.
3. Transmissions, by whatever mode, must be of the highest quality, both technically and operationally. For example, cw signals must be pure, chirpless, clickless, code sending must be well spaced and properly formed. Voice transmission must be of proper modulation percentage or deviation, precisely enunciated with minimum distortion. RTTY must be clickless, proper shift, etc.
4. All ORS are expected to follow standard ARRL operating practices (message form, ending signals, abbreviations or prowords, courtesy, etc.).
5. Regular participation in traffic activities, either free-lance or ARRL-sponsored. The latter is encouraged, but not required.
6. Handle all record communications speedily and reliably and set the example in efficient operating procedures. All traffic is relayed or delivered promptly after receipt.
7. Report monthly to the STM, including a breakdown of traffic handled during the past calendar month.

FSD-107  
(1288)

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From: jbbloom@arrl.org (Jon Bloom)  
Newsgroups: rec.radio.amateur.misc,rec.radio.amateur.packet  
Subject: ARRL Information Service (info@arrl.org)  
Summary: Info by Email  
Date: 13 Oct 92 11:57:22 EDT  
Organization: American Radio Relay League  
Lines: 59

We're trying out a new service. We've made available a number of text files containing information about various facets of Amateur Radio. You can retrieve these files selectively by sending an email message to ARRL HQ. Each file you request is then mailed to you automatically, usually within a few hours.

Here are copies of the current "help" and "index" responses of the info mail server. They should get you started. Enjoy!

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INFO is a service of ARRL HQ. To use it, mail messages to:  
info@arrl.org

Each line of the message should contain a command as shown below. You may place as many commands in a message as you want. Each file you request will be sent to you in a separate message. Only ASCII text files are supported at present.

Valid INFO commands:

help	Sends this help file
index	Sends an index of the files available from INFO
send file	Sends the specified file
quit	Terminates the transaction (use this if you have a signature or other text at the end of the message.)

73 de ARRL HQ

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Files available from INFO:

FILENAME	DESCRIPTION
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bioeffects	Information about RF safety
email	List of HQ Email addresses
emi-gen	How to solve an EMI/RFI problem
emi-catvi	Info about cable TVI
emi-source	Where to buy filters, EMI-proof telephones, etc.
fcc-comm	How to obtain an FCC commercial license
ham-plates	How to get a ham-radio license plate by state
hbk-fcounter	Where to get parts for ARRL Handbook frequency counter
kits	List of companies that sell kits
manuals	Sources for equipment manuals, schematics
parts-source	List of companies that sell electronic parts
pc-boards	Where to get prototype PC boards and supplies
product-review	Bibliography of QST Product Reviews - 45K
prospect	How to get your Amateur Radio license
qsl-in	Instructions for incoming QSL bureau
qsl-out	Instructions for outgoing QSL bureau
sstv-info	Info about slow-scan television
tis-list	List of paper files available from ARRL TIS

topo-maps           Where to buy topographical maps  
usa-counties       List of USA counties - for county hunters  
wire-current       Current rating of wire by AWG size  
yell-sheets        Address of Ham Trader Yellow Sheets

\*\*\* EOF \*\*\*

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Jon Bloom, KE3Z                   |   jbbloom@arrl.org  
American Radio Relay League   |       Justice is being allowed to do whatever  
225 Main St.                    |       I like.  Injustice is whatever prevents  
Newington, CT 06111            |       my doing so.  -- Samuel Johnson





Subject: California Police Radio Frequencies

Hello fellow communications enthusiasts. The frequencies in this text file should be very accurate. They were edited by myself for use in a dBASE III+ database. I have copied them to this text file in a delimited mode so you can do with them what you will. The delimiter breaks are defined as follows:

LOCATION : AGENCY : DESCRIPTION : FREQUENCY : CALL SIGN : USAGE : STATE :  
GEOGRAPHICAL AREA

The call sign field is not complete but the ones that are there should be accurate.

I am interested in accurate text-file listings from all other states to add to my database. I am very interested in Nevada. Leave me E-mail

THANKS AND ENJOY

Dave Hardy 76517,3550  
University of California  
Hastings College of the Law  
Dept. of Public Safety  
S.F. CA

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here-----

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:ALHAMBRA:,:ALHAMBRA FIRE:,:F1 FIRE PRIMARY:,:153.9950,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY FIRE:,:F1 KIRKWOOD VFD:,:153.8000,::,:FIRE:,:CA:,:ALPINE COUNTY:  
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:ALPINE COUNTY:,:ALPINE COUNTY FIRE:,:F3 FIRE MUTUAL AID:,:154.2800,::,:FIRE:,:CA:,:ALPINE COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY FIRE:,:F4 KIRKWOOD SKI AREA:,:151.9250,::,:FIRE:,:CA:,:ALPINE COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY EMS:,:HOSPITALS & TRAUMA CENTERS:,:155.1600,::,:MEDICAL:,:CA:,:ALPINE COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY EMS:,:SEARCH AND RESCUE:,:158.8350,::,:OTHER:,:CA:,:ALPINE COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY SHERIFFS DEPARTMENT:,:F3 SHERIFF DOUGLAS COUNTY NV:,:154.8900,::,:POLICE:,:CA:,:ALPINE COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY SHERIFFS DEPARTMENT:,:F1 PUBLIC SAFETY REPEATER:,:153.8000,::,:POLICE:,:CA:,:ALPINE COUNTY:  
:ALPINE COUNTY:,:ALPINE COUNTY SHERIFFS DEPARTMENT:,:F4 POLICE MUTUAL AID:,:154.9200,::,:POLICE:,:CA:,:ALPINE COUNTY:  
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FPD, :DISPATCH, 46.0800, :, :FIRE, :CA, :PLACER COUNTY:  
:ALTA, :ALTA FPD, :DISPATCH (CB CHANNEL 9), 27.0650, :, :FIRE, :CA, :PLACER  
COUNTY:  
:ALTA LOMA, :CHAFFEY COMMUNITY COLLEGE  
PD, :DISPATCH, 154.6500, :, :POLICE, :CA, :SAN BERNARDINO COUNTY:  
:ALTURAS, :ALTURAS FIRE, :FIRE DEPARTMENT, 154.4000, :, :FIRE, :CA, :MODOC  
COUNTY:  
:ALTURAS, :ALTURAS POLICE, :F1 POLICE - CHP  
BLUE, 42.3400, :, :POLICE, :CA, :MODOC COUNTY:  
:ALTURAS, :ALTURAS POLICE, :F2 POLICE DIRECT, 42.1200, :, :POLICE, :CA, :MODOC  
COUNTY:  
:ALTURAS, :CALIFORNIA HIGHWAY PATROL, :BLUE MOBILE OFFICE #  
60, 42.1800, :KA4993, :POLICE, :CA, :  
:ALTURAS, :CALIFORNIA HIGHWAY PATROL, :BLUE BASE OFFICE #  
60, 42.3400, :KDG271, :POLICE, :CA, :  
:ALTURAS, :CALIFORNIA HIGHWAY PATROL, :RED BASE OFFICE #  
60, 42.4400, :KDG271, :POLICE, :CA, :  
:ALTURAS, :CALIFORNIA HIGHWAY PATROL, :RED MOBILE OFFICE #  
60, 42.2800, :KA4993, :POLICE, :CA, :  
:AMADOR (SUTTER CREEK), :CALIFORNIA HIGHWAY PATROL, :WHITE BASE OFFICE #  
94, 42.5600, :KME285, :POLICE, :CA, :  
:AMADOR (SUTTER CREEK), :CALIFORNIA HIGHWAY PATROL, :WHITE MOBILE OFFICE #  
94, 42.7200, :KA4993, :POLICE, :CA, :  
:AMADOR COUNTY, :AMADOR COUNTY SHERIFF, :POLICE -  
SHERIFF, 45.6000, :, :POLICE, :CA, :AMADOR COUNTY:  
:AMADOR COUNTY, :AMADOR COUNTY FIRE DEPARTMENT, :AMADOR CFD - CDF  
DISPATCH, 151.1900, :, :FIRE, :CA, :AMADOR COUNTY:  
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PRIMARY, 45.6000, :, :POLICE, :CA, :AMADOR COUNTY:  
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COMMON, 45.5400, :, :POLICE, :CA, :AMADOR COUNTY:  
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SECONDARY, 45.7400, :, :POLICE, :CA, :AMADOR COUNTY:  
:AMADOR COUNTY, :AMADOR COUNTY SHERIFFS DEPARTMENT, :POLICE MOBILE  
EXTENDERS, 155.5950, :, :POLICE, :CA, :AMADOR COUNTY:  
:ANAHEIM, :ANAHEIM POLICE, :SEARCH & RESCUE, 155.1600, :, :POLICE, :CA, :ORANGE  
COUNTY:  
:ANAHEIM, :ANAHEIM FIRE, :F3 FIRE MUTUAL  
AID, 154.2950, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM POLICE, :POLICE MOBILE  
DATA, 855.4875, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM CITY, :ANIMAL CONTROL, 45.4400, :, :POLICE, :CA, :ORANGE  
COUNTY:  
:ANAHEIM, :ANAHEIM POLICE, :POLICE NORTH SECONDARY ORANGE  
NORTH, 460.4000, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM CITY, :CONVENTION CENTER/STADIUM  
OPS, 461.5125, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM POLICE, :POLICE PRIMARY  
GREEN, 460.0500, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM CITY, :CONVENTION CENTER/STADIUM  
OPS, 461.2750, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM POLICE, :POLICE EXPLORER  
POST, 46.0400, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM FIRE, :F2 FIRE MUTUAL  
AID, 154.2650, :, :POLICE, :CA, :ORANGE COUNTY:  
:ANAHEIM, :ANAHEIM FIRE, :F1 FIRE MUTUAL  
AID, 154.2800, :, :POLICE, :CA, :ORANGE COUNTY:

:ANAHIEM:,:ANAHIEM POLICE:,:DISPATCH  
PRIMARY:,:460.0500,:KUN399:,:POLICE:,:CA:,:ORANGE COUNTY:  
:ANDERSON:,:ANDERSON FIRE:,:FIRE & MEDIC:,:154.4300,:,:FIRE:,:CA:,:SHASTA  
COUNTY:  
:ANDERSON:,:ANDERSON POLICE:,:F1 POLICE  
PRIMARY:,:156.0300,:,:POLICE:,:CA:,:SHASTA COUNTY:  
:ANDERSON:,:ANDERSON POLICE:,:F3 POLICE  
COMMON:,:155.7000,:,:POLICE:,:CA:,:SHASTA COUNTY:  
:ANDERSON:,:ANDERSON POLICE:,:F2 POLICE MUTUAL  
AID:,:154.9200,:,:POLICE:,:CA:,:SHASTA COUNTY:  
:ANDERSON:,:ANDERSON POLICE:,:F4 POLICE  
TACTICAL:,:155.0550,:,:POLICE:,:CA:,:SHASTA COUNTY:  
:ANGELS CAMP:,:ANGELS CAMP FIRE:,:FIRE  
PRIMARY:,:154.2350,:,:FIRE:,:CA:,:CALAVERAS COUNTY:  
:ANGELS CAMP:,:ANGELS CAMP POLICE:,:POLICE  
TACTICAL:,:158.9100,:,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:ANGELS CAMP:,:ANGELS CAMP POLICE:,:F2 POLICE  
COMMON:,:45.5400,:,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:ANGELS CAMP:,:ANGELS CAMP POLICE:,:POLICE SHERIFF PRIMARY  
F4:,:45.3200,:,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:ANGELS CAMP:,:ANGELS CAMP POLICE:,:F1 POLICE  
PRIMARY:,:45.1400,:,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:ANTIOCH:,:DU PONT CO FIRE  
DEPARTMENT:,:DISPATCH:,:153.2900,:,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
:ANTIOCH:,:DELTA MEMORIAL  
HOSPITAL:,:DISPATCH:,:155.4000,:,:MEDICAL:,:CA:,:CONTRA COSTA COUNTY:  
:ANTIOCH:,:ANTIOCH POLICE:,:F1 POLICE  
PRIMARY:,:460.3750,:,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:ANTIOCH:,:ANTIOCH POLICE:,:F2 POLICE  
TACTICAL:,:460.1750,:,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:ANTIOCH:,:ANTIOCH FIRE:,:FIRE - RIVERVIEW  
FPD:,:154.3850,:,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:APPLE VALLEY:,:APPLE VALLEY FIRE:,:FIRE PROTECTION  
DISTRICT:,:154.2050,:,:FIRE:,:CA:,:SAN BERNARDINO COUNTY:  
:APPLE VALLEY:,:APPLE VALLEY POLICE:,:POLICE - SHERIFF  
CONTRACT:,:155.5650,:,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:ARCADIA:,:ARCADIA FIRE:,:F3 FIREGROUND  
EXTENDER:,:154.3700,:KMF662:,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:ARCADIA:,:ARCADIA FIRE:,:F1 FIRE & MEDICS:,:154.3700,:KMF662:,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:ARCADIA:,:ARCADIA FIRE:,:FIRE SECONDARY FROM  
VERDUGO:,:153.8900,:,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:ARCADIA:,:ARCADIA FIRE:,:F4 FIRE EL MONTE FD:,:154.0850,:,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:ARCADIA:,:ARCADIA FIRE:,:F2 FIRE MUTUAL AID:,:154.2800,:,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
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ANGELES COUNTY:  
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PRIMARY:,:507.0625,:KXC723:,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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SECONDARY:,:506.5625,:KXC723:,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:ARCADIA:,:ARCADIA POLICE:,:MONROVIA SIERRA MADRE  
PD:,:158.7300,:KMA769:,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:ARCATA:,:ARCATA FIRE:,:FIRE PROTECTION DISTRICT  
F1:,:154.1300,:,:FIRE:,:CA:,:HUMBOLDT COUNTY:  
:ARCATA:,:ARCATA POLICE:,:POLICE TACTICAL TAC

3:,155.0700,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:ARCATA:,ARCATA POLICE:,POLICE TACTICAL TAC  
2:,155.2500,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:ARCATA:,ARCATA POLICE:,F1 POLICE  
PRIMARY:,155.4300,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:ARROYO GRANDE:,ARROYO GRANDE FIRE:,F1 FIRE  
PRIMARY:,154.0100,::,FIRE:,CA:,SAN LUIS OBISBO COUNTY:  
:ARROYO GRANDE:,ARROYO GRANDE FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN LUIS OBISBO COUNTY:  
:ARROYO GRANDE:,ARROYO GRANDE POLICE:,F4 WHITE POLICE MUTUAL  
AID:,460.0250,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ARROYO GRANDE:,ARROYO GRANDE POLICE:,F2 GREEN POLICE GROVER  
CITY:,460.1750,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ARROYO GRANDE:,ARROYO GRANDE POLICE:,F1 ORANGE POLICE  
PRIMARY:,460.5000,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ARROYO GRANDE:,ARROYO GRANDE POLICE:,F3 RED POLICE  
EMERGENCY:,460.0500,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ARTESIA:,ARTESIA FIRE:,FIRE & MEDICS - LACOFD:,154.4300,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:ARTESIA:,ARCADIA-MONROVIA  
AMBULANCE:,DISPATCH:,47.6200,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
:ARTESIA:,ARTESIA POLICE:,POLICE - F14 LACOSD  
CONTRACT:,483.1375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:ARVIN:,ARVIN POLICE:,F1 POLICE PRIMARY:,158.8500,::,POLICE:,CA:,KERN  
COUNTY:  
:ARVIN:,ARVIN POLICE:,F2 POLICE MUTUAL AID:,154.9200,::,POLICE:,CA:,KERN  
COUNTY:  
:ARVIN:,ARVIN FIRE:,FIRE - KERN COUNTY FD STATION  
54:,453.3000,::,POLICE:,CA:,KERN COUNTY:  
:ATASCADERO:,ATASCADERO FIRE:,F3 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,CALIFORNIA STATE HOSPITAL  
FD:,DISPATCH:,154.3850,::,FIRE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,ATASCADERO FIRE:,F1 FIRE & MEDIC  
PRIMARY:,154.3700,::,FIRE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,ATASCADERO FIRE:,F2 FIRE COUNTY  
FIRE:,154.3850,::,FIRE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,ATASCADERO POLICE:,F1 GREEN POLICE  
PRIMARY:,460.4250,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,ATASCADERO POLICE:,F2 YELLOW POLICE  
SECONDARY:,460.4750,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,ATASCADERO POLICE:,F3 RED POLICE  
EMERGENCY:,460.0500,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATASCADERO:,ATASCADERO POLICE:,F4 WHITE POLICE MUTUAL  
AID:,460.0250,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:ATHERTON:,ATHERTON POLICE:,F1 POLICE  
PRIMARY:,489.0875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:ATHERTON:,ATHERTON POLICE:,F2 POLICE TACTICAL  
3:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:ATHERTON:,ATHERTON POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:ATHERTON:,ATHERTON POLICE:,F4 POLICE TACTICAL  
2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:ATHERTON:,ATHERTON POLICE:,F5 POLICE MENLO PARK  
PD:,488.3375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:ATHERTON:,ATHERTON POLICE:,POLICE MOBILE  
DATA:,857.2125,::,POLICE:,CA:,SAN MATEO COUNTY:

:ATHERTON:,:ATHERTON FIRE:,:FIRE - MENLO PARK  
FPD:,154.3700,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:ATWATER:,:ATWATER FIRE:,:F1 FIRE PRIMARY:,154.0100,::,:FIRE:,:CA:,:MERCED  
COUNTY:  
:ATWATER:,:ATWATER FIRE:,:F2 FIRE SECONDARY:,154.3400,::,:FIRE:,:CA:,:MERCED  
COUNTY:  
:ATWATER:,:ATWATER POLICE:,:F3 POLICE  
SHERIFF:,154.8900,::,:POLICE:,:CA:,:MERCED COUNTY:  
:ATWATER:,:ATWATER POLICE:,:F2 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:MERCED COUNTY:  
:ATWATER:,:ATWATER POLICE:,:F1 POLICE  
PRIMARY:,154.7250,::,:POLICE:,:CA:,:MERCED COUNTY:  
:AUBURN:,:AUBURN FIRE:,:FIRE PRIMARY:,154.3550,::,:FIRE:,:CA:,:PLACER COUNTY:  
:AUBURN:,:EMERGENCY TRANSPORT  
SERVICE:,:DISPATCH:,155.1600,::,:MEDICAL:,:CA:,:PLACER COUNTY:  
:AUBURN:,:AUBURN POLICE:,:F3 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:PLACER COUNTY:  
:AUBURN:,:AUBURN POLICE:,:F2 POLICE  
ROSEVILLE:,155.5650,::,:POLICE:,:CA:,:PLACER COUNTY:  
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COUNTY:  
:AUBURN (NEWCASTLE):,:CALIFORNIA HIGHWAY PATROL:,:GREEN BASE OFFICE #  
45:,42.5400,:KMD835:,:POLICE:,:CA:,:  
:AUBURN (NEWCASTLE):,:CALIFORNIA HIGHWAY PATROL:,:GREEN MOBILE OFFICE #  
45:,42.2400,:KA4993:,:POLICE:,:CA:,:  
:AVALON:,:AVALON FIRE:,:FIRE DEPARTMENT (1-9):,46.3600,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:AVALON:,:AVALON POLICE:,:F7 POLICE - LACOSD  
CONTRACT:,484.0375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:AVENAL:,:AVENAL FIRE:,:FIRE - COUNTY FIRE:,460.6000,::,:FIRE:,:CA:,:KINGS  
COUNTY:  
:AVENAL:,:AVENAL POLICE:,:POLICE - SHERIFF  
CONTRACT:,460.1250,::,:POLICE:,:CA:,:KINGS COUNTY:  
:AVILA BEACH:,:AVILA BEACH FPD:,:DISPATCH:,158.9400,::,:FIRE:,:CA:,:SAN LUIS  
OBISBO COUNTY:  
:AZUSA:,:AZUSA FIRE:,:FIRE & MEDICS - LACOFD:,154.3400,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:AZUSA:,:AMERICAN MEDICAL  
ENTERPRISES:,:DISPATCH:,47.5400,::,:MEDICAL:,:CA:,:LOS ANGELES COUNTY:  
:AZUSA:,:AZUSA POLICE:,:F1 POLICE PRIMARY:,154.8450,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:AZUSA:,:AZUSA POLICE:,:F2 POLICE SECONDARY:,155.4900,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:AZUSA:,:AZUSA POLICE:,:F2 EMERGENCY SERVICES:,155.1600,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:AZUSA:,:AZUSA POLICE:,:F1 EMERGENCY SERVICES:,155.1750,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:AZUSA:,:AZUSA POLICE:,:F3 POLICE MUTUAL AID:,154.9200,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:BAKERSFIELD:,:BAKERSFIELD FIRE:,:F4 FIRE PRIMARY  
DIRECT:,154.0700,::,:FIRE:,:CA:,:KERN COUNTY:  
:BAKERSFIELD:,:BAKERSFIELD POLICE:,:F8 POLICE VICE  
DETAIL:,158.9700,::,:POLICE:,:CA:,:KERN COUNTY:  
:BAKERSFIELD:,:BAKERSFIELD FIRE:,:FIRE COORDINATION METRO  
2:,153.9500,::,:FIRE:,:CA:,:KERN COUNTY:  
:BAKERSFIELD:,:BAKERSFIELD POLICE:,:F6 POLICE VICE  
DETAIL:,154.7850,::,:POLICE:,:CA:,:KERN COUNTY:



:BAKERSFIELD:, :BAKERSFIELD FIRE:, :FIREGROUND  
F11:, 154.2650, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F4 POLICE  
TACTICAL:, 155.5500, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :F1 FIRE & MEDIC  
PRIMARY:, 154.0700, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F1 POLICE  
PRIMARY:, 155.3100, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :F12  
FIREGROUND:, 154.2950, ::, :FIRE:, :CA:, :KERN COUNTY:  
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DETAIL:, 154.7550, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :F8 FIRE ARSON  
DETAIL:, 154.7400, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F10 POLICE MUTUAL  
AID:, 155.4750, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :MERCY MEDICAL  
CENTER:, :DISPATCH:, 155.3850, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F3 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :SAN JOAQUIN MEDICAL  
CENTER:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
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DETAIL:, 155.0100, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F16 POLICE  
PRIMARY:, 155.3100, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F14 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F9 POLICE VICE  
DETAIL:, 159.0900, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :CALIFORNIA HIGHWAY PATROL:, :BROWN MOBILE OFFICE #  
69:, 42.8200, :KA4993:, :POLICE:, :CA:, ::  
:BAKERSFIELD:, :BAKERSFIELD POLICE:, :F2 POLICE  
SECONDARY:, 155.1900, ::, :POLICE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :CALIFORNIA HIGHWAY PATROL:, :BROWN BASE OFFICE #  
69:, 42.5000, :KAY236:, :POLICE:, :CA:, ::  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :F5 FIRE PRIMARY  
DIRECT:, 154.0700, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :F7 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :FIRE KCFD  
COORDINATION:, 453.7250, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD COMMUNITY  
HOSPITAL:, :DISPATCH:, 155.3400, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :KERN MEDICAL  
CENTER:, :DISPATCH:, 153.8300, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
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TACTICAL:, 155.5500, ::, :POLICE:, :CA:, :KERN COUNTY:  
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SECONDARY:, 155.1900, ::, :POLICE:, :CA:, :KERN COUNTY:  
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AID:, 154.2800, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BAKERSFIELD:, :BAKERSFIELD FIRE:, :F6 FIRE INTERCOMM  
DIRECT:, 153.9500, ::, :FIRE:, :CA:, :KERN COUNTY:  
:BALDWIN PARK:, :BALDWIN PARK FIRE:, :FIRE -  
LACOFD:, 154.3400, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:BALDWIN PARK:, :BALDWIN PARK POLICE:, :F1 POLICE

SECONDARY:,155.7900,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BALDWIN PARK:,BALDWIN PARK POLICE:,F2 POLICE  
PRIMARY:,155.6250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BALDWIN PARK:,BALDWIN PARK POLICE:,SCHOOL DISTRICT  
POLICE:,460.5500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BALDWIN PARK:,BALDWIN PARK USD POLICE:,460.5500,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:BANNING:,BANNING FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING FIRE:,F3 FIREGROUND:,154.0100,::,FIRE:,CA:,RIVERSIDE  
COUNTY:  
:BANNING:,BANNING FIRE:,F1 FIRE  
SECONDARY:,154.4450,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING FIRE:,FIRE PRIMARY -  
CDF:,151.3850,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING POLICE:,F4 POLICE PRIMARY  
(U):,158.8200,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING POLICE:,F5 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING POLICE:,F6 POLICE  
CWMA:,158.9250,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING POLICE:,F2 POLICE  
SECONDARY:,158.7450,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING POLICE:,F3 POLICE  
TACTICAL:,158.9700,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BANNING:,BANNING POLICE:,F1 POLICE SHERIFF  
1:,158.8500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BARSTOW:,FORT IRWIN FD:,FIRE DISPATCH:,141.0500,::,FIRE:,CA:,SAN  
BERNARDINO COUNTY:  
:BARSTOW:,BARSTOW FIRE:,FIRE & MEDIC:,154.0700,::,FIRE:,CA:,SAN  
BERNARDINO COUNTY:  
:BARSTOW:,BARSTOW FIRE:,DESERT RESCUE SQUAD:,47.4600,::,FIRE:,CA:,SAN  
BERNARDINO COUNTY:  
:BARSTOW:,BARSTOW FIRE:,F1 RESCUE 3:,33.0800,::,FIRE:,CA:,SAN BERNARDINO  
COUNTY:  
:BARSTOW:,BARSTOW FIRE:,F2 RESCUE 3:,33.1000,::,FIRE:,CA:,SAN BERNARDINO  
COUNTY:  
:BARSTOW:,BARSTOW POLICE:,F3 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:BARSTOW:,BARSTOW POLICE:,F1 POLICE PRIMARY:,155.5950,::,POLICE:,CA:,SAN  
BERNARDINO COUNTY:  
:BARSTOW:,BARSTOW POLICE:,F2 POLICE  
SECONDARY:,155.7300,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:BEAUMONT:,BEAUMONT FIRE:,F1 FIRE  
SECONDARY:,154.4450,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:BEAUMONT:,BEAUMONT FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:BEAUMONT:,BEAUMONT FIRE:,FIRE PRIMARY -  
CDF:,151.3850,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:BEAUMONT:,BEAUMONT POLICE:,F1 POLICE SHERIFF  
1:,158.8500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BEAUMONT:,BEAUMONT POLICE:,F2 POLICE  
SECONDARY:,158.9550,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BEAUMONT:,BEAUMONT POLICE:,F5 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:BEAUMONT:,BEAUMONT POLICE:,F6 POLICE  
CWMA:,158.9250,::,POLICE:,CA:,RIVERSIDE COUNTY:

:BEAUMONT:,:BEAUMONT POLICE:,:F3 POLICE  
TACTICAL:,:158.9700,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BEAUMONT:,:BEAUMONT POLICE:,:F4 POLICE PRIMARY  
(Z):,:158.8200,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BELL:,:BELL FIRE:,:FIRE & MEDICS LACOFD:,:154.4300,::,:FIRE:,:CA:,:LOS ANGELES  
COUNTY:  
:BELL:,:BELL POLICE:,:F1 POLICE PRIMARY:,:155.1900,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:BELL:,:BELL POLICE:,:F2 POLICE MUTUAL AID:,:154.9200,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:BELL GARDENS:,:BELL GARDENS FIRE:,:FIRE -  
LACOFD:,:154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BELL GARDENS:,:BELL GARDENS POLICE:,:POLICE  
PRIMARY:,:453.9250,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BELLFLOWER:,:BELLFLOWER FIRE:,:FIRE - LACOFD:,:154.4300,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:BELLFLOWER:,:BELLFLOWER POLICE:,:F14 POLICE - LACOSD  
CONTRACT:,:483.1375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BELMONT:,:BELMONT POLICE:,:F1 POLICE PRIMARY:,:488.4875,::,:POLICE:,:CA:,:SAN  
MATEO COUNTY:  
:BELMONT:,:BELMONT POLICE:,:F2 POLICE TACTICAL  
2:,:488.7125,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BELMONT:,:BELMONT POLICE:,:F3 POLICE COUNTYWIDE MUTUAL  
AID:,:488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BELMONT:,:BELMONT POLICE:,:F4 POLICE TACTICAL  
3:,:488.5375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BELMONT:,:BELMONT POLICE:,:F5 POLICE PRIMARY  
DIRECT:,:488.4875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BELMONT:,:BELMONT FIRE:,:F1 FIRE - SOUTH COUNTY  
FPD:,:153.8900,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:BELMONT:,:BELMONT FIRE:,:F2 FIRE MUTUAL AID:,:154.2800,::,:FIRE:,:CA:,:SAN  
MATEO COUNTY:  
:BELVEDERE:,:BELVEDERE FIRE:,:F1 FIRE - TIBURON  
FD:,:46.5000,::,:FIRE:,:CA:,:MARIN COUNTY:  
:BELVEDERE:,:BELVEDERE FIRE:,:F2 FIRE COUNTYWIDE MUTUAL  
AID:,:46.1200,::,:FIRE:,:CA:,:MARIN COUNTY:  
:BELVEDERE:,:BELVEDERE POLICE:,:F1 POLICE  
PRIMARY:,:39.7400,::,:POLICE:,:CA:,:MARIN COUNTY:  
:BELVEDERE:,:BELVEDERE POLICE:,:F2 POLICE COUNTYWIDE MUTUAL  
AID:,:39.5200,::,:POLICE:,:CA:,:MARIN COUNTY:  
:BELVEDERE:,:BELVEDERE POLICE:,:F3 POLICE  
TACTICAL:,:39.8800,::,:POLICE:,:CA:,:MARIN COUNTY:  
:BENICIA:,:BENICIA FIRE:,:F2 FIREGROUND GREEN:,:154.3400,::,:FIRE:,:CA:,:SOLANO  
COUNTY:  
:BENICIA:,:BENICIA POLICE:,:F1 POLICE - SHERIFF  
1:,:155.4900,::,:POLICE:,:CA:,:SOLANO COUNTY:  
:BENICIA:,:BENICIA POLICE:,:F3 POLICE PRIMARY  
(4):,:155.7750,::,:POLICE:,:CA:,:SOLANO COUNTY:  
:BENICIA:,:BENICIA POLICE:,:F4 POLICE  
SECONDARY:,:155.0850,::,:POLICE:,:CA:,:SOLANO COUNTY:  
:BENICIA:,:BENICIA FIRE:,:F1 FIRE - COUNTY  
BLUE:,:156.0000,::,:FIRE:,:CA:,:SOLANO COUNTY:  
:BENICIA:,:BENICIA POLICE:,:F2 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:SOLANO COUNTY:  
:BENICIA:,:BENICIA FIRE:,:F3 FIRE MUTUAL AID  
WHITE:,:154.2800,::,:FIRE:,:CA:,:SOLANO COUNTY:  
:BENICIA:,:BENICIA FIRE:,:F4 FIRE & MEDICS

RED:,155.9400,::,FIRE:,CA:,SOLANO COUNTY:  
:BERKELEY:,BERKELY FIRE:,FIRE & MEDICS  
(10):,154.1900,KFO541:,FIRE:,CA:,ALAMEDA COUNTY:  
:BERKELEY:,HERRICK-ALTA BATES  
HOSPITAL:,,461.9250,::,MEDICAL:,CA:,ALAMEDA COUNTY:  
:BERKELEY:,BERKELEY POLICE:,POLICE  
PRIMARY:,460.1750,KSL359:,POLICE:,CA:,ALAMEDA COUNTY:  
:BERKELEY:,BERKELEY POLICE:,POLICE RECORDS  
INQUIRY:,460.0500,KSL359:,POLICE:,CA:,ALAMEDA COUNTY:  
:BERKELEY:,BERKELEY POLICE:,POLICE  
SECONDARY:,460.2500,KSL359:,POLICE:,CA:,ALAMEDA COUNTY:  
:BERKELEY:,BERKELEY POLICE:,PRIMARY  
DISPATCH:,460.1750,KSL359:,POLICE:,CA:,ALAMEDA COUNTY:  
:BEVERLY HILLS:,BEVERLY HILLS FIRE:,F2 FIRE  
SECONDARY:,460.5750,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:BEVERLY HILLS:,BEVERLY HILLS FIRE:,F1 FIRE &  
MEDICS:,460.6250,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:BEVERLY HILLS:,BEVERLY HILLS POLICE:,POLICE  
PRIMARY:,453.5250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BEVERLY HILLS:,BEVERLY HILLS POLICE:,POLICE  
TACTICAL:,453.2250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BEVERLY HILLS:,BEVERLY HILLS POLICE:,POLICE  
SECONDARY:,453.6500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,F2 FIRE COUNTYWIDE MUTUAL  
AID:,154.3250,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,F1 FIRE  
PRIMARY:,154.1900,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,TAC 4 FIRE MUTUAL  
AID:,154.2950,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,TAC 5 FIRE DESERT  
DISTRICTS:,154.0700,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,TAC 6 FIRE  
COMMAND:,154.2650,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,F12 HOSPITAL  
EMERGENCY:,155.3400,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,F3 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,F11 BEAR VALLEY  
MEDICS:,155.4000,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE FIRE:,SEARCH &  
RESCUE:,155.1600,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE POLICE:,F7 SHERIFF BIG BEAR  
LAKE:,154.7400,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE POLICE:,F4 POLICE - SHERIFF  
CONTRACT:,154.7400,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:BIG BEAR LAKE:,BIG BEAR LAKE POLICE:,F10 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:BIGGS:,BIGGS FIRE DEPARTMENT:,DISPATCH:,154.1900,::,FIRE:,CA:,BUTTE  
COUNTY:  
:BIGGS:,BIGGS POLICE:,F1 POLICE PRIMARY:,155.1150,::,POLICE:,CA:,BUTTE  
COUNTY:  
:BIGGS:,BIGGS POLICE:,F2 POLICE SHERIFF  
REPEATER:,154.7250,::,POLICE:,CA:,BUTTE COUNTY:  
:BISHOP:,BISHOP FIRE:,F2 FIRE COUNTY FIRE  
PRIMARY:,154.4300,::,FIRE:,CA:,INYO COUNTY:  
:BISHOP:,BISHOP FIRE:,F1 FIRE PRIMARY:,154.1450,::,FIRE:,CA:,INYO COUNTY:  
:BISHOP:,BISHOP POLICE:,F1 POLICE PRIMARY:,155.0100,::,POLICE:,CA:,INYO

COUNTY:  
:BISHOP:,:BISHOP POLICE:,:F2 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:INYO COUNTY:  
:HUMBOLDT COUNTY:,:HUMBOLDT COUNTY SHERIFF:,:POLICE -  
SHERIFF:,:155.7900,::,:POLICE:,:CA:,:HUMBOLDT COUNTY:  
:BLYTHE:,:BLYTHE FIRE:,:F2 FIRE MUTUAL AID:,154.2800,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:BLYTHE:,:BLYTHE FIRE:,:FIRE EHRENBERG AZ  
FD:,155.2200,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE FIRE:,:F1 FIRE & MEDIC  
PRIMARY:,154.3400,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:F1 POLICE SHERIFF  
LIAISON:,159.0900,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:F2 POLICE PRIMARY  
(X):,:158.7600,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:F5 POLICE COUNTYWIDE  
TACTICAL:,158.7600,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:F4 POLICE  
ALTERNATE:,158.8200,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:F6 POLICE COUNTYWIDE MUTUAL  
AID:,158.9250,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:POLICE LA PAZ COUNTY  
AZ:,:39.1800,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BLYTHE:,:BLYTHE POLICE:,:F3 POLICE  
TACTICAL:,158.9700,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:BOHEMIAN GROVE:,:BOHEMIAN GROVE  
SECURITY:,:OPERATIONS:,:464.4750,::,:OTHER:,:CA:,:SONOMA COUNTY:  
:BRADBURY:,:BRADBURY FIRE:,:FIRE - LACOFD:,154.3400,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:BRADBURY:,:BRADBURY POLICE:,:F11 POLICE - LACOSD  
CONTRACT:,482.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BRAWLEY:,:BRAWLEY FIRE:,:F1 FIRE PRIMARY  
GREEN:,154.0100,::,:FIRE:,:CA:,:IMPERIAL COUNTY:  
:BRAWLEY:,:BRAWLEY POLICE:,:F3 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:BRAWLEY:,:BRAWLEY POLICE:,:F1 POLICE PRIMARY (STATION  
9):,:155.0100,::,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:BRAWLEY:,:BRAWLEY POLICE:,:F2 POLICE  
COMMON:,155.1300,::,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:BREA:,:BREA POLICE:,:POLICE FIRE MOBILE  
DATA:,855.2375,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:BREA:,:BREA POLICE:,:POLICE PRIMARY GREEN:,:460.1000,::,:POLICE:,:CA:,:ORANGE  
COUNTY:  
:BREA:,:BREA POLICE:,:POLICE SECONDARY ORANGE  
NORTH:,:460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:BRENTWOOD:,:BRENTWOOD FIRE:,:FIRE - EAST DIABLO  
FPD:,46.1800,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
:BRENTWOOD:,:BRENTWOOD POLICE:,:F2 POLICE  
TACTICAL:,154.9200,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:BRENTWOOD:,:BRENTWOOD POLICE:,:F3 POLICE  
TACTICAL:,155.5500,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:BRENTWOOD:,:BRENTWOOD POLICE:,:F1 POLICE  
PRIMARY:,155.3100,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:BRIDGEPORT:,:CALIFORNIA HIGHWAY PATROL:,:BLUE MOBILE OFFICE #  
71:,:42.1800,,:KA4993:,:POLICE:,:CA:,::  
:BRIDGEPORT:,:CALIFORNIA HIGHWAY PATROL:,:BLUE BASE OFFICE #  
71:,:42.3400,,:KME593:,:POLICE:,:CA:,::

:BRISBANE:,:BRISBANE POLICE:,:F1 POLICE  
PRIMARY: ,488.3875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BRISBANE:,:BRISBANE POLICE:,:F2 POLICE TACTICAL  
1: ,488.8625,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BRISBANE:,:BRISBANE POLICE:,:F3 POLICE COUNTYWIDE MUTUAL  
AID: ,488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BRISBANE:,:BRISBANE POLICE:,:F4 POLICE TACTICAL  
2: ,488.7125,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BRISBANE:,:BRISBANE POLICE:,:F5 SHERIFF  
PRIMARY: ,488.9875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BRISBANE:,:BRISBANE POLICE:,:F6 POLICE PRIMARY  
DIRECT: ,488.3875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BRISBANE:,:BRISBANE FIRE:,:F1 FIRE PRIMARY: ,154.0100,::,:FIRE:,:CA:,:SAN  
MATEO COUNTY:  
:BRISBANE:,:BRISBANE FIRE:,:F2 FIRE MUTUAL AID: ,154.2800,::,:FIRE:,:CA:,:SAN  
MATEO COUNTY:  
:BROADMOOR VILLAGE:,:BROADMOOR POLICE PROTECTION DISTRICT:,:F1 POLICE  
PRIMARY: ,488.4875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BROADMOOR VILLAGE:,:BROADMOOR POLICE PROTECTION DISTRICT:,:F3 POLICE  
COUNTYWIDE MUTUAL AID: ,488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BROADMOOR VILLAGE:,:BROADMOOR POLICE PROTECTION DISTRICT:,:F2 POLICE TACTICAL  
1: ,488.8625,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:BUENA PARK:,:BUENA PARK POLICE:,:POLICE PRIMARY  
GREEN: ,460.2500,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:BUENA PARK:,:BUENA PARK POLICE:,:POLICE SECONDARY ORANGE  
NORTH: ,460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:BURBANK:,:BURBANK FIRE:,:FIRE & MEDICS ALT/COMMAND TAC  
3: ,153.7700,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK FIRE:,:FIRE & MEDICS PRIMARY TAC  
1: ,153.8900,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK AIRPORT FIRE VERDUGO:,:F3  
DISPATCH: ,153.8900,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK FIRE:,:TAC4 FIRE MUTUAL AID WHITE  
1: ,154.2800,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK FIRE:,:FIRE DATA: ,859.2375,::,:FIRE:,:CA:,:LOS ANGELES  
COUNTY:  
:BURBANK:,:BURBANK FIRE:,:F1 FIRE - VERDUGO FIRE  
DISPATCH: ,46.1000,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK FIRE:,:TAC2 FIRE & MEDICS  
SECONDARY: ,154.2050,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK FIRE:,:TAC5 FIRE MUTUAL AID WHITE  
2: ,154.2650,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK AIRPORT FIRE LOCKHEED FD:,:F2  
FIRE: ,158.2950,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK FIRE:,:TAC6 FIRE MUTUAL AID WHITE  
3: ,154.2950,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK AIRPORT POLICE:,:F1  
DISPATCH: ,155.6550,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK AIRPORT AUTHORITY:,:F2  
DISPATCH: ,155.0250,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK POLICE:,:F8 AREA COMMON INCIDENT 1 PLANNED  
F8: ,470.0125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK POLICE:,:F5 PUBLIC SERVICE 1  
PLANNED: ,470.1375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK POLICE:,:F2 POLICE PATROL TACTICAL  
PLANNED: ,470.2375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:BURBANK:,:BURBANK POLICE:,:F6 PUBLIC WORKS 1

PLANNED:,470.1625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F6 POLICE MUTUAL  
AID:,155.4750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F1 POLICE PRIMARY  
PLANNED:,470.2125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F3 POLICE DETECTIVES  
PLANNED:,470.2625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F7 PUBLIC WORKS 2  
PLANNED:,470.1875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F4 POLICE TACTICAL VICE  
PORTABLES:,154.7400,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK FIRE:,TAC7 LA COUNTY FD  
VALLEY:,154.3400,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F3 POLICE LOCAL GOVERNMENT  
COMMON:,155.7600,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F4 POLICE NARCOTICS (SECURE DIGITAL)  
PLANNED:,470.2875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F10 GLENDALE POLICE NARCOTICS?  
PLANNED:,470.0625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F5 POLICE MUTUAL AID  
F5:,154.9200,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F2 POLICE SECONDARY  
F2:,155.9100,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F1 POLICE PRIMARY  
F1:,156.2100,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURBANK:,BURBANK POLICE:,F9 AREA COMMON INCIDENT 2  
PLANNED:,473.0125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F4 POLICE TACTICAL  
1:,488.8625,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F1 POLICE  
PRIMARY:,489.0875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F2 POLICE TACTICAL  
2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F7 POLICE HILLSBOROUGH  
PD:,488.3375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME FIRE:,F1 FIRE & MEDICS  
PRIMARY:,153.9500,::,FIRE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F6 POLICE SAN MATEO  
PD:,488.3125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F5 POLICE PRIMARY  
DIRECT:,489.0875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BURLINGAME:,BURLINGAME POLICE:,F8 POLICE MILLBRAE  
PD:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:BUTTE COUNTY:,BUTTE COUNTY FIRE DEPARTMENT:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,BUTTE COUNTY:  
:BUTTE COUNTY:,BUTTE COUNTY FIRE DEPARTMENT:,F1 COUNTY FIRE & MEDIC  
PRIMARY:,154.1900,::,FIRE:,CA:,BUTTE COUNTY:  
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DISPATCH:,151.4000,::,FIRE:,CA:,BUTTE COUNTY:  
:BUTTE COUNTY:,BUTTE COUNTY EMS:,MED 4 BUTTE HALL CSU  
CHICO:,463.0750,::,MEDICAL:,CA:,BUTTE COUNTY:  
:BUTTE COUNTY:,BUTTE COUNTY EMS:,MED 8 BLOOMER  
HILL:,463.1750,::,MEDICAL:,CA:,BUTTE COUNTY:

:BUTTE COUNTY:,:BUTTE COUNTY SHERIFFS DEPARTMENT:,:COMM CENTER INTERAGENCY  
HOTLINE: ,45.9200,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:BUTTE COUNTY:,:BUTTE COUNTY SHERIFFS DEPARTMENT:,:F1 OPERATIONS  
PRIMARY: ,154.7250,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:BUTTE COUNTY:,:BUTTE COUNTY SHERIFFS DEPARTMENT:,:F8 SEARCH & RESCUE  
OPERATIONS: ,155.1600,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:BUTTE COUNTY:,:BUTTE COUNTY SHERIFFS DEPARTMENT:,:F6 POLICE MUTUAL  
AID: ,155.4750,::,:POLICE:,:CA:,:BUTTE COUNTY:  
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TACTICAL: ,155.9100,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:BUTTE COUNTY:,:BUTTE COUNTY SHERIFFS DEPARTMENT:,:F3 POLICE MUTUAL  
AID: ,154.9200,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:BUTTE COUNTY:,:BUTTE COUNTY SHERIFFS DEPARTMENT:,:COUNTY JAIL DETENTION  
SECURITY: ,155.0100,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:BUTTONWILLOW (PLANNED):,:CALIFORNIA HIGHWAY PATROL:,:BROWN BASE OFFICE #  
117: ,42.5000,::,:POLICE:,:CA:,::  
:BUTTONWILLOW (PLANNED):,:CALIFORNIA HIGHWAY PATROL:,:BROWN MOBILE OFFICE #  
117: ,42.8200, :KA4993:,:POLICE:,:CA:,::  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY FIRE DEPARTMENTS:,:F8 CDF  
1: ,151.3550,::,:FIRE:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY FIRE DEPARTMENTS:,:F1 CALAVERAS CFPD -  
CDF DISPATCH: ,151.1750,::,:FIRE:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY FIRE DEPARTMENTS:,:F3 BCDF  
2: ,151.2650,::,:FIRE:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:COMANCHE REGIONAL PARK:,:FIRE AND  
ADMIN. ,153.8150,::,:OTHER:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY EMS:,:F1 MARK TWAIN MEDIC  
DISPATCH: ,155.3250,::,:POLICE:,:CA:,:CALAVERAS COUNTY:  
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COMMON: ,45.5400,::,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY EMS:,:ALPINE MOTHER LODGE SAN JOAQUIN EMS  
MED 3: ,463.0500,::,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY EMS:,:MED 9 FOWLER PEAK  
DISPATCH: ,462.9500,::,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:CALAVERAS COUNTY:,:CALAVERAS COUNTY SHERIFFS DEPARTMENT:,:OPERATIONS  
PRIMARY: ,45.3200,::,:POLICE:,:CA:,:CALAVERAS COUNTY:  
:CALEXICO:,:CALEXICO FIRE:,:F1 FIRE & MEDICS  
ORANGE: ,154.3700,::,:FIRE:,:CA:,:IMPERIAL COUNTY:  
:CALEXICO:,:CALEXICO POLICE:,:F2 POLICE  
COMMON: ,155.1300,::,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:CALEXICO:,:CALEXICO POLICE:,:F3 POLICE MUTUAL  
AID: ,154.9200,::,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:CALEXICO:,:CALEXICO POLICE:,:F1 POLICE  
PRIMARY: ,154.7250,::,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:CALIFORNIA CITY:,:CALIFORNIA CITY FIRE:,:FIRE  
DEPARTMENT: ,460.6000,::,:FIRE:,:CA:,:KERN COUNTY:  
:CALIFORNIA CITY:,:F1 CALIFORNIA CITY POLICE:,:POLICE &  
FIRE: ,453.7500,::,:POLICE:,:CA:,:KERN COUNTY:  
:CALIFORNIA CITY:,:F3 CALIFORNIA CITY POLICE:,:POLICE & FIRE CWMA  
DIRECT: ,453.2250,::,:POLICE:,:CA:,:KERN COUNTY:  
:CALIFORNIA CITY:,:F2 CALIFORNIA CITY POLICE:,:POLICE & FIRE  
CWMA: ,453.2250,::,:POLICE:,:CA:,:KERN COUNTY:  
:CALIPATRIA:,:CALIPATRIA FIRE:,:F2  
FIREGROUND: ,154.2500,::,:FIRE:,:CA:,:IMPERIAL COUNTY:  
:CALIPATRIA:,:CALIPATRIA FIRE:,:COUNTY FIRE: ,154.3700,::,:FIRE:,:CA:,:IMPERIAL  
COUNTY:  
:CALIPATRIA:,:CALIPATRIA FIRE:,:F1 FIRE PRIMARY



GREEN:,154.0100,::,FIRE:,CA:,IMPERIAL COUNTY:  
:CALIPATRIA:,CALIPATRIA POLICE:,F1 POLICE PRIMARY BRAWLEY  
DISPATCH:,155.0100,::,POLICE:,CA:,IMPERIAL COUNTY:  
:CALIPATRIA:,CALIPATRIA POLICE:,F2 POLICE  
COMMON:,155.1300,::,POLICE:,CA:,IMPERIAL COUNTY:  
:CALIPATRIA:,CALIPATRIA POLICE:,F3 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,IMPERIAL COUNTY:  
:CALISTOGA:,CALISTOGA FIRE:,FIRE PRIMARY:,154.4150,::,FIRE:,CA:,NAPA  
COUNTY:  
:CALISTOGA:,CALISTOGA POLICE:,POLICE ST HELENA  
PD:,155.5200,::,POLICE:,CA:,NAPA COUNTY:  
:CALISTOGA:,CALISTOGA POLICE:,POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,NAPA COUNTY:  
:CALISTOGA:,CALISTOGA POLICE:,POLICE  
PRIMARY:,153.7850,::,POLICE:,CA:,NAPA COUNTY:  
:CALISTOGA:,CALISTOGA POLICE:,POLICE SHERIFF  
LIAISON:,155.4300,::,POLICE:,CA:,NAPA COUNTY:  
:CAMBRIA:,CAMBRIA FPD & MEDICS:,F1 DISPATCH:,154.3850,::,FIRE:,CA:,SAN  
LUIS OBISBO COUNTY:  
:CAMBRIA:,CAMBRIA FPD FIREGROUND:,F2 DISPATCH:,154.1150,::,FIRE:,CA:,SAN  
LUIS OBISBO COUNTY:  
:CAMPBELL:,CAMPBELL FIRE:,F4 FIRE COUNTYWIDE MUTUAL  
AID:,153.8450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:CAMPBELL:,CAMPBELL POLICE:,F1 POLICE  
PRIMARY:,482.4625,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CAMPBELL:,CAMPBELL FIRE:,F3 FIRE MUTUAL AID:,154.2950,::,FIRE:,CA:,SANTA  
CLARA COUNTY:  
:CAMPBELL:,CAMPBELL FIRE:,F2 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SANTA  
CLARA COUNTY:  
:CAMPBELL:,CAMPBELL POLICE:,F4 POLICE SECONDARY  
DIRECT:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CAMPBELL:,CAMPBELL FIRE:,F1 FIRE & MEDICS:,153.9050,::,FIRE:,CA:,SANTA  
CLARA COUNTY:  
:CAMPBELL:,CAMPBELL POLICE:,F3 POLICE PRIMARY  
DIRECT:,482.4625,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CAMPBELL:,CAMPBELL POLICE:,F2 POLICE  
SECONDARY:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CAPITOLA:,CAPITOLA POLICE:,F4 POLICE COUNTYWIDE MUTUAL AID  
RED:,154.9500,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA POLICE:,F1 POLICE PRIMARY  
BLUE:,155.6250,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA FIRE:,F3 FIREGROUND COASTAL  
BLUE:,154.4150,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA POLICE:,F3 POLICE MUTUAL AID  
WHITE:,154.9200,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA FIRE:,F1 FIRE - CENTRAL FPD  
RED:,154.3250,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA POLICE:,F2 POLICE TACTICAL  
YELLOW:,153.9950,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA FIRE:,F4 FIRE MUTUAL AID  
WHITE:,154.9200,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
:CAPITOLA:,CAPITOLA FIRE:,F2 FIREGROUND VALLEY  
YELLOW:,154.1900,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
:CARLSBAD:,CARLSBAD FIRE:,F2 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:CARLSBAD:,CARLSBAD FIRE:,FIRE ALTERNATE:,46.0800,::,FIRE:,CA:,SAN DIEGO  
COUNTY:

:CARLSBAD:,:CARLSBAD FIRE:,:F1 FIRE & MEDIC:,:154.3850,::,:FIRE:,:CA:,:SAN  
DIEGO COUNTY:  
:CARLSBAD:,:CARLSBAD POLICE:,:F1 POLICE PRIMARY STATION  
C:,:156.0300,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:CARLSBAD:,:CARLSBAD POLICE:,:F2 POLICE  
SECONDARY:,:155.8350,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:CARLSBAD:,:CARLSBAD POLICE:,:F3 POLICE COUNTYWIDE MUTUAL  
AID:,:153.9950,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:CARLSBAD:,:CARLSBAD POLICE:,:F4 POLICE OCEANSIDE  
PD:,:155.0550,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:CARLSBAD:,:CARLSBAD POLICE:,:F5 POLICE PRIMARY  
DIRECT:,:156.0300,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:CARMEL:,:CARMEL FIRE:,:F1 FIRE PRIMARY:,:154.3700,::,:FIRE:,:CA:,:MONTEREY  
COUNTY:  
:CARMEL:,:CARMEL FIRE:,:F2 FIRE SECONDARY:,:154.1750,::,:FIRE:,:CA:,:MONTEREY  
COUNTY:  
:CARMEL:,:CARMEL POLICE:,:F3 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:CARMEL:,:CARMEL POLICE:,:F4 POLICE  
PRIMARY:,:154.7100,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:CARMEL:,:CARMEL POLICE:,:F2 POLICE MONTEREY  
PD:,:155.4900,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:CARMEL:,:CARMEL POLICE:,:F1 POLICE PACIFIC GROVE  
PD:,:155.5350,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:CARPINTERIA:,:CARPINTERIA FIRE:,:FIRE PROTECTION  
DISTRICT:,:154.1900,::,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:CARPINTERIA:,:CARPINTERIA POLICE:,:F3 POLICE EMERGENCY  
RED:,:460.0500,::,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:CARPINTERIA:,:CARPINTERIA POLICE:,:F1 POLICE PRIMARY  
GREEN:,:460.1750,::,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:CARPINTERIA:,:CARPINTERIA POLICE:,:F2 POLICE SECONDARY  
YELLOW:,:460.3250,::,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:CARPINTERIA:,:CARPINTERIA POLICE:,:F4 POLICE MUTUAL AID  
WHITE:,:460.0250,::,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:CARSON:,:CARSON FIRE:,:LACOFD:,:154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:CARSON:,:CARSON POLICE:,:F9 POLICE - LACOSD  
CONTRACT:,:484.1625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:CASTRO VALLEY:,:EDEN HOSPITAL:,:DISPATCH:,:155.2200,::,:MEDICAL:,:CA:,:ALAMEDA  
COUNTY:  
:CATHEDRAL CITY:,:CATHEDRAL CITY FIRE:,:FIRE  
PRIMARY:,:154.4150,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:CATHEDRAL CITY:,:CATHEDRAL CITY POLICE:,:F2 POLICE MUTUAL  
AID:,:460.0250,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:CATHEDRAL CITY:,:CATHEDRAL CITY POLICE:,:F1 POLICE  
PRIMARY:,:460.1000,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:CAYUCOS:,:CAYUCOS PAGERS & FIREGROUND:,:F2  
DISPATCH:,:154.1450,::,:FIRE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:CAYUCOS:,:CAYUCOS FPD:,:F1 DISPATCH:,:154.3850,::,:FIRE:,:CA:,:SAN LUIS OBISBO  
COUNTY:  
:CERES:,:CERES FIRE:,:F1 FIRE PRIMARY:,:154.4300,::,:FIRE:,:CA:,:STANISLAUS  
COUNTY:  
:CERES:,:CERES FIRE:,:F2 FIRE COUNTY FIRE:,:153.7700,::,:FIRE:,:CA:,:STANISLAUS  
COUNTY:  
:CERES:,:CERES POLICE:,:F2 POLICE  
SHERIFF:,:158.7300,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
:CERES:,:CERES POLICE:,:F1 POLICE  
PRIMARY:,:158.8050,::,:POLICE:,:CA:,:STANISLAUS COUNTY:

:CERRITOS:,:CERRITOS FIRE:,:FIRE - LACOFD:,154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:CERRITOS:,:CERRITOS POLICE:,:F14 POLICE - LACOSD  
CONTRACT:,483.1375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:CHESTER:,:CHESTER FPD:,:DISPATCH:,154.1900,::,:FIRE:,:CA:,:PLUMAS COUNTY:  
:CHICO:,:CHICO FIRE:,:F1 FIRE PRIMARY DISPATCH:,453.7500,::,:FIRE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CHICO FIRE:,:F3 FIREGROUND:,453.5500,::,:FIRE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CHICO FIRE:,:FIREGROUND MOBILE EXTENDERS  
FA:,153.8300,::,:FIRE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CHICO POLICE:,:F1 POLICE PRIMARY:,154.8750,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CHICO POLICE:,:F4 POLICE NARCOTICS  
DETAIL:,155.1900,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CHICO POLICE:,:F2 POLICE SHERIFF  
REPEATER:,154.7250,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CHICO POLICE:,:F3 POLICE MUTUAL AID  
TACTICAL:,154.9200,::,:POLICE:,:CA:,:BUTTE COUNTY:  
:CHICO:,:CALIFORNIA HIGHWAY PATROL:,:BROWN BASE OFFICE #  
104:,42.5000,,:KMH963:,:POLICE:,:CA:,:  
:CHICO:,:CALIFORNIA HIGHWAY PATROL:,:BROWN MOBILE OFFICE #  
104:,42.8200,,:KA4993:,:POLICE:,:CA:,:  
:CHINO:,:CHINO FIRE:,:FIRE & MEDICS:,154.0250,::,:FIRE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHINO:,:CALIFORNIA INSTITUTE FOR MEN:,:FIRE  
DISPATCH:,155.5050,::,:FIRE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHINO:,:CHINO POLICE:,:SCHOOL DISTRICT POLICE:,453.5000,::,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHINO:,:CHINO POLICE:,:F2 POLICE MONTCLAIR PD:,155.5950,::,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHINO:,:CHINO POLICE:,:F3 POLICE MUTUAL AID &  
TACTICAL:,154.9200,::,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHINO:,:CHINO POLICE:,:F1 POLICE PRIMARY:,155.0400,::,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHINO:,:CHINO POLICE:,:F4 POLICE RECORDS:,154.8600,::,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:CHOWCHILLA:,:CHOWCHILLA FIRE:,:FIRE VFD - CDF  
DISPATCH:,151.4600,::,:FIRE:,:CA:,:MADERA COUNTY:  
:CHOWCHILLA:,:CHOWCHILLA DISTRICT  
HOSPITAL:,:DISPATCH:,462.9500,::,:MEDICAL:,:CA:,:MADERA COUNTY:  
:CHOWCHILLA:,:CHOWCHILLA POLICE:,:POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:MADERA COUNTY:  
:CHOWCHILLA:,:CHOWCHILLA POLICE:,:POLICE MOBILE DATA  
TERMINALS:,460.5250,::,:POLICE:,:CA:,:MADERA COUNTY:  
:CHOWCHILLA:,:CHOWCHILLA POLICE:,:F1 POLICE  
PRIMARY:,45.7400,::,:POLICE:,:CA:,:MADERA COUNTY:  
:CHOWCHILLA:,:CHOWCHILLA POLICE:,:F2 POLICE  
SECONDARY:,45.7800,::,:POLICE:,:CA:,:MADERA COUNTY:  
:CHULA VISTA:,:CHULA VISTA FIRE:,:F3 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:CHULA VISTA:,:CHULA VISTA FIRE:,:F2 FIREGROUND:,153.8900,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:CHULA VISTA:,:CHULA VISTA FIRE:,:F1 FIRE &  
MEDICS:,154.4150,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:CHULA VISTA:,:ROHR INDUSTRIES FD:,:DISPATCH:,153.3200,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:CHULA VISTA:,:CHULA VISTA POLICE:,:F6 POLICE

ALTERNATE:,155.6400,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CHULA VISTA:,CHULA VISTA POLICE:,F3 POLICE  
ALTERNATE:,158.9250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CHULA VISTA:,CHULA VISTA POLICE:,F1 PUBLIC SAFETY STATION  
C:,154.8150,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CHULA VISTA:,CHULA VISTA POLICE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CHULA VISTA:,CHULA VISTA POLICE:,CITY SCHOOLS  
POLICE:,155.6250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CHULA VISTA:,CHULA VISTA POLICE:,F5 POLICE COUNTYWIDE MUTUAL  
AID:,153.9950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CHULA VISTA:,CHULA VISTA POLICE:,F4 POLICE  
SECONDARY:,155.5950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CLAREMONT:,CLAREMONT FIRE:,FIRE - LACOFD:,154.3400,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:CLAREMONT:,CLAREMONT POLICE:,F1 POLICE PRIMARY  
BLACK:,155.4900,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:CLAREMONT:,CLAREMONT POLICE:,F2 POLICE MUTUAL AID  
GOLD:,154.9200,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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COUNTY:  
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OPERATIONS:,453.9000,::,POLICE:,CA:,FRESNO COUNTY:  
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88:,42.7600,KA4993:,POLICE:,CA:,:  
:COALINGA:,CALIFORNIA HIGHWAY PATROL:,PINK BASE OFFICE #  
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COUNTY:  
:COLMA:,COLMA FIRE:,F3 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SAN MATEO  
COUNTY:  
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DIRECT:,488.4625,::,POLICE:,CA:,SAN MATEO COUNTY:  
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COUNTY:  
:COLTON:,COLTON POLICE:,F5 POLICE MUTUAL AID:,154.9200,::,POLICE:,CA:,SAN  
BERNARDINO COUNTY:  
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HOSPITAL:,:DISPATCH:,155.2350,::,:MEDICAL:,:CA:,:COLUSA COUNTY:  
:COLUSA:,:GOLDEN STATE  
AMBULANCE:,:DISPATCH:,461.9500,::,:MEDICAL:,:CA:,:COLUSA COUNTY:  
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COSTA COUNTY:  
:CONCORD:, :MOUNT DIABLO MEDICAL  
CENTER:, :DISPATCH:, 155.4000, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
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COMMON:, 460.1000, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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B:, 155.4750, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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SECONDARY:, 460.2500, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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PRIMARY:, 460.1500, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:CONTRA COSTA (MARTINEZ):, :CALIFORNIA HIGHWAY PATROL:, :PURPLE BASE OFFICE #  
19:, 42.4000, :KMB442:, :POLICE:, :CA:, :  
:CONTRA COSTA (MARTINEZ):, :CALIFORNIA HIGHWAY PATROL:, :PURPLE MOBILE OFFICE #  
19:, 42.1600, :KA4993:, :POLICE:, :CA:, :  
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WEST:, 46.0600, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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COUNTYWIDE:, 46.3800, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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EAST:, 46.1800, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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WEST:, 46.4200, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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WEST:, 154.3850, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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CWMA:, 46.1000, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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CENTRAL:, 46.3200, :KMF371:, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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SOUTH:, 45.8800, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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SOUTH:, 46.3400, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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NORTH:, 46.4800, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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NORTH:, 46.1600, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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CENTRAL:, 46.2200, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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EAST:, 154.2050, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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(RADIAX):, 154.2950, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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DATA:, 47.5000, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
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TACTICAL:, 155.0400, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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OPERATIONS:, 47.4600, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:

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:CONTRA COSTA COUNTY:, :CONTRA COSTA COUNTY SHERIFF:, :WEST:, 460.0250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:CONTRA COSTA COUNTY:, :BAY AREA RAPID TRANSIT DISTRICT:, :F3 POLICE SURVEILLANCE:, 453.4250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:CONTRA COSTA COUNTY:, :REGIONAL AMBULANCE-MEDICS:, :F1 YELLOW:, 935.6875, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
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OPERATIONS:,484.4625,::,OTHER:,CA:,CONTRA COSTA COUNTY:  
:CONTRA COSTA COUNTY:,CONTRA COSTA COUNTY SHERIFF:,F2 POLICE  
OPERATIONS:,155.6400,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
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TACTICAL:,154.9500,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
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:CORCORAN:,CORCORAN FIRE:,FIRE DEPARTMENT - COUNTY  
CONTRACT:,460.6000,::,FIRE:,CA:,KINGS COUNTY:  
:CORCORAN:,MOBILE LIFE SUPPORT:,155.1750,::,MEDICAL:,CA:,KINGS COUNTY:  
:CORCORAN:,CORCORAN POLICE:,F1 POLICE - SHERIFF  
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PRIMARY:,460.3000,::,POLICE:,CA:,KINGS COUNTY:  
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AID:,460.0250,::,POLICE:,CA:,KINGS COUNTY:  
:CORCORAN:,CORCORAN POLICE:,F4 POLICE MUTUAL  
AID:,460.0250,::,POLICE:,CA:,KINGS COUNTY:  
:CORONA:,CORONA POLICE:,F1 POLICE  
PRIMARY:,154.7550,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:CORONA:,CORONA FIRE:,F1 FIRE PRIMARY:,154.2350,::,FIRE:,CA:,RIVERSIDE  
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:CORONA:,CORONA FIRE:,F4 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,RIVERSIDE  
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:CORONA:,CORONA FIRE:,F3 FIRE MUTUAL AID:,154.2650,::,FIRE:,CA:,RIVERSIDE  
COUNTY:  
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:CORONA:,CORONA POLICE:,F4 POLICE SHERIFF  
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:CORONA:,CORONA POLICE:,F3 POLICE CWMA:,158.9250,::,POLICE:,CA:,RIVERSIDE  
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:CORONA:,CORONA POLICE:,F2 POLICE MUTUAL  
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:CORONA:,CORONA FIRE:,F2 FIRE MUTUAL AID:,154.2950,::,FIRE:,CA:,RIVERSIDE  
COUNTY:  
:CORONADO:,CORONADO FIRE:,F1 FIRE & MEDICS:,154.4150,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:CORONADO:,CORONADO FIRE:,F2 CITY SERVICES COMMON  
FIREGROUND:,154.1150,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:CORONADO:,CORONADO POLICE:,F1 POLICE PRIMARY STATION  
D:,154.8450,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CORONADO:,CORONADO POLICE:,F3 CITY SERVICES  
COMMON:,154.1150,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CORONADO:,CORONADO POLICE:,F4 POLICE COUNTYWIDE MUTUAL  
AID:,153.9950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CORONADO:,CORONADO POLICE:,F2 POLICE SECONDARY  
LIFEGUARD:,155.2500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:CORTE MADERA:,CORTE MADERA FIRE:,F2 FIRE COUNTYWIDE MUTUAL  
AID:,46.1200,::,FIRE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA FIRE:,F3 FIRE  
DISTRICTS:,46.5000,KRB414:,FIRE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA FIRE:,F1 FIRE  
PRIMARY:,46.4000,::,FIRE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA POLICE:,F5 POLICE SHERIFF

LIAISON:,39.2400,::,POLICE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA POLICE:,F2 POLICE COUNTYWIDE MUTUAL  
AID:,39.5200,::,POLICE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA POLICE:,F3 POLICE DETECTIVES TACTICAL  
1:,39.8000,::,POLICE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA POLICE:,F4 POLICE PATROL TACTICAL  
2:,39.7800,::,POLICE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA POLICE:,F1 POLICE TWIN CITIES  
PD:,39.2800,::,POLICE:,CA:,MARIN COUNTY:  
:CORTE MADERA:,CORTE MADERA POLICE:,F6 POLICE ZONE 1 DISPATCH  
F6:,39.7200,::,POLICE:,CA:,MARIN COUNTY:  
:COSTA MESA:,COSTA MESA POLICE:,POLICE SUPERVISORS &  
HELICOPTER:,45.0800,::,POLICE:,CA:,ORANGE COUNTY:  
:COSTA MESA:,COSTA MESA POLICE:,POLICE PRIMARY  
GREEN:,460.0750,::,POLICE:,CA:,ORANGE COUNTY:  
:COSTA MESA:,COSTA MESA POLICE:,POLICE SECONDARY ORANGE  
SOUTH:,460.2000,::,POLICE:,CA:,ORANGE COUNTY:  
:COSTA MESA:,COSTA MESA POLICE:,POLICE & FIRE  
MDT:,855.9875,::,POLICE:,CA:,ORANGE COUNTY:  
:COSTA MESA:,COSTA MESA POLICE:,POLICE CHANNEL  
3:,857.2625,::,POLICE:,CA:,ORANGE COUNTY:  
:COTATI:,COTATI POLICE:,F3 POLICE  
SECONDARY:,153.9650,::,POLICE:,CA:,SONOMA COUNTY:  
:COTATI:,COTATI POLICE:,F1 POLICE PRIMARY:,154.8900,::,POLICE:,CA:,SONOMA  
COUNTY:  
:COTATI:,COTATI POLICE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SONOMA COUNTY:  
:COTATI:,COTATI FIRE:,FIRE PRIMARY:,154.3100,::,FIRE:,CA:,SONOMA COUNTY:  
:COULTERVILLE:,RIGGS AMBULANCE:,AMB 32-  
33:,852.6125,::,MEDICAL:,CA:,MARIPOSA COUNTY:  
:COVINA:,COVINA FIRE:,F2 FIREGROUND:,154.3100,::,FIRE:,CA:,LOS ANGELES  
COUNTY:  
:COVINA:,COVINA FIRE:,F4 FIRE MUTUAL AID:,154.2950,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:COVINA:,COVINA FIRE:,F3 FIRE MUTUAL AID WHITE:,154.2800,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:COVINA:,COVINA FIRE:,FIRE PRIMARY RED:,154.0700,::,FIRE:,CA:,LOS ANGELES  
COUNTY:  
:COVINA:,CRIPPEN AMBULANCE:,DISPATCH:,47.6200,::,MEDICAL:,CA:,LOS ANGELES  
COUNTY:  
:COVINA:,COVINA POLICE:,F4 POLICE TACTICAL:,153.8600,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:COVINA:,COVINA POLICE:,F1 POLICE PRIMARY:,154.7250,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:COVINA:,COVINA POLICE:,F2 POLICE SECONDARY:,155.4900,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:COVINA:,COVINA POLICE:,F3 POLICE MUTUAL AID:,154.9200,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:COYOTE:,UNITED TECHNOLOGIES CSD  
FD:,DISPATCH:,153.0950,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:CRESCENT CITY:,CALIFORNIA HIGHWAY PATROL:,GREEN BASE OFFICE #  
95:,42.5400,KME385:,POLICE:,CA:,  
:CRESCENT CITY:,AIR/MED-EVAC:,AIR/MED  
DISPATCH:,155.2200,::,MEDICAL:,CA:,DEL NORTE COUNTY:  
:CRESCENT CITY:,SUTTER COAST  
HOSPITAL:,DISPATCH:,155.1750,::,MEDICAL:,CA:,DEL NORTE COUNTY:  
:CRESCENT CITY:,CRESCENT CITY POLICE:,F3 POLICE MUTUAL

AID:,155.4750,::,POLICE:,CA:,DEL NORTE COUNTY:  
:CRESCENT CITY:,CRESCENT CITY FIRE:,FIRE  
PRIMARY:,154.2500,::,POLICE:,CA:,DEL NORTE COUNTY:  
:CRESCENT CITY:,CRESCENT CITY POLICE:,F1 POLICE  
PRIMARY:,153.9800,::,POLICE:,CA:,DEL NORTE COUNTY:  
:CRESCENT CITY:,CRESCENT CITY POLICE:,F2 POLICE  
REPEATER:,153.9800,::,POLICE:,CA:,DEL NORTE COUNTY:  
:CRESCENT CITY:,CRESCENT CITY POLICE:,F4 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,DEL NORTE COUNTY:  
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95:,42.2400,KA4993:,POLICE:,CA:,  
:CRESCENT CITY:,DEL NORTE AMBULANCE  
(R814):,DISPATCH:,155.1750,::,MEDICAL:,CA:,DEL NORTE COUNTY:  
:CROCKETT:,C & H SUGAR CO FIRE  
DEPARTMENT:,DISPATCH:,153.3500,::,FIRE:,CA:,CONTRA COSTA COUNTY:  
:CUDAHY:,CUDAHY FIRE:,FIRE & MEDICS - LACOFD:,154.4300,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:CUDAHY:,CUDAHY POLICE:,POLICE - BELL PD:,155.1900,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY FIRE:,F1 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY FIRE:,F1 FIRE  
PRIMARY:,482.3625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY FIRE:,F2 FIRE MUTUAL  
AID:,154.2650,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY FIRE:,F2 FIRE  
SECONDARY:,482.5625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY FIRE:,F3 FIRE MUTUAL  
AID:,154.2950,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY POLICE:,F1 POLICE  
PRIMARY:,482.2625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:CULVER CITY:,CULVER CITY POLICE:,F2 POLICE  
SECONDARY:,482.4625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:CUPERTINO:,CUPERTINO POLICE:,POLICE -  
SHERIFF:,155.7000,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CUPERTINO:,CUPERTINO FIRE:,FIRE - CENTRAL  
FPD:,154.2500,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:CUPERTINO:,FOOTHILL DEANZA COLLEGE:,F1 FOOTHILL  
DPS:,154.8300,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CUPERTINO:,FOOTHILL DEANZA COLLEGE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CUPERTINO:,FOOTHILL DEANZA COLLEGE:,F3 SHERIFF  
LIAISON:,156.2100,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CUPERTINO:,FOOTHILL DEANZA COLLEGE:,F4 DEANZA  
DPS:,151.9550,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:CYPRESS:,CYPRESS POLICE:,POLICE SECONDARY ORANGE  
NORTH:,460.4000,::,POLICE:,CA:,ORANGE COUNTY:  
:CYPRESS:,CYPRESS POLICE:,POLICE PRIMARY  
GREEN:,460.4750,::,POLICE:,CA:,ORANGE COUNTY:  
:DALY CITY:,SETON MEDICAL CENTER:,DISPATCH:,155.2200,::,MEDICAL:,CA:,SAN  
FRANCISCO COUNTY:  
:DALY CITY:,DALY CITY FIRE:,F2 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:DALY CITY:,DALY CITY POLICE:,F4 POLICE TACTICAL  
2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:DALY CITY:,DALY CITY FIRE:,F4 FIRE MUTUAL AID:,154.2950,::,FIRE:,CA:,SAN  
MATEO COUNTY:

:DALY CITY:, :DALY CITY POLICE:, :F5 POLICE PRIMARY  
DIRECT:, 488.9375, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:DALY CITY:, :DALY CITY POLICE:, :F3 POLICE COUNTYWIDE MUTUAL  
AID:, 488.8875, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:DALY CITY:, :DALY CITY POLICE:, :F2 POLICE TACTICAL  
1:, 488.8625, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:DALY CITY:, :DALY CITY POLICE:, :F1 POLICE  
PRIMARY:, 488.9375, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:DALY CITY:, :DALY CITY FIRE:, :F1 FIRE & MEDIC  
PRIMARY:, 154.1000, ::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:DALY CITY:, :DALY CITY FIRE:, :F3 FIRE MUTUAL AID:, 154.2650, ::, :FIRE:, :CA:, :SAN  
MATEO COUNTY:  
:DANA POINT:, :DANA POINT POLICE:, :POLICE - SHERIFF BEAT 34-39  
YELLOW:, 460.4250, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
:DANVILLE:, :DANVILLE FIRE:, :FIRE - SAN RAMON VALLEY  
FPD:, 46.4400, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
:DANVILLE:, :DANVILLE POLICE (CCSO CONTRACT):, :F1 POLICE -  
SHERIFF:, 155.6400, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:DANVILLE:, :DANVILLE POLICE (CCSO CONTRACT):, :F2 POLICE  
TACTICAL:, 155.7900, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:DANVILLE:, :DANVILLE PD (CCSO CONTRACT):, :F8 POLICE  
TACTICAL:, 155.7900, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:DANVILLE:, :DANVILLE POLICE (CCSO CONTRACT):, :F5 POLICE  
TACTICAL:, 155.0400, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:DANVILLE:, :DANVILLE POLICE (CCSO CONTRACT):, :F6 POLICE  
SECONDARY:, 154.9500, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:DEL MAR:, :DEL MAR FIRE:, :FIRE PRIMARY:, 154.3850, ::, :FIRE:, :CA:, :SAN DIEGO  
COUNTY:  
:DEL MAR:, :DEL MAR FIRE:, :FIRE LOCAL:, 46.4600, ::, :FIRE:, :CA:, :SAN DIEGO  
COUNTY:  
:DEL MAR:, :DEL MAR POLICE:, :POLICE - SHERIFF  
CONTRACT:, 453.7500, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY FIRE:, :F2 COUNTY FIRE  
SECONDARY:, 154.4450, ::, :FIRE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY FIRE:, :F1 COUNTY FIRE  
PRIMARY:, 154.2500, ::, :FIRE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY FIRE:, :F3 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY EMS:, :MED 1 CAMP  
6:, 463.0000, ::, :MEDICAL:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY EMS:, :MED 3 RODGERS  
PEAK:, 463.0500, ::, :MEDICAL:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY EMS:, :MED 2 HORSE  
MOUNTAIN:, 463.0250, ::, :MEDICAL:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY EMS:, :MED 5 SUTTER COAST  
HOSPITAL:, 463.1000, ::, :MEDICAL:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY EMS:, :MEDCOMM MOBILE  
EXTENDERS:, 458.0250, ::, :MEDICAL:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY SHERIFFS DEPARTMENT:, :F6 CA FISH &  
GAME:, 151.4150, ::, :POLICE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY SHERIFFS DEPARTMENT:, :F8 POLICE MUTUAL  
AID:, 155.4750, ::, :POLICE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY SHERIFFS DEPARTMENT:, :F4 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY SHERIFFS DEPARTMENT:, :F1 OPERATIONS &  
POLICE:, 153.9800, ::, :POLICE:, :CA:, :DEL NORTE COUNTY:  
:DEL NORTE COUNTY:, :DEL NORTE COUNTY SHERIFFS DEPARTMENT:, :F2 GASQUET RESIDENT

DEPUTY:,153.9800,::,POLICE:,CA:,DEL NORTE COUNTY:  
:DEL NORTE COUNTY:,DEL NORTE COUNTY SHERIFFS DEPARTMENT:,F5 DEL NORTE  
AMBULANCE:,155.1750,::,POLICE:,CA:,DEL NORTE COUNTY:  
:DEL NORTE COUNTY:,DEL NORTE COUNTY SHERIFFS DEPARTMENT:,F3 KLAMATH RESIDENT  
DEPUTY:,153.9800,::,POLICE:,CA:,DEL NORTE COUNTY:  
:DEL NORTE COUNTY:,DEL NORTE COUNTY SHERIFFS DEPARTMENT:,F7 SHERIFF CURRY  
COUNTY OR:,155.0100,::,POLICE:,CA:,DEL NORTE COUNTY:  
:DEL REY OAKS:,DEL REY OAKS FIRE:,FIRE - MONTEREY  
FD:,153.8900,::,FIRE:,CA:,MONTEREY COUNTY:  
:DEL REY OAKS:,DEL REY OAKS POLICE:,F3 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,MONTEREY COUNTY:  
:DEL REY OAKS:,DEL REY OAKS POLICE:,F1 POLICE PACIFIC GROVE  
PD:,155.5350,::,POLICE:,CA:,MONTEREY COUNTY:  
:DEL REY OAKS:,DEL REY OAKS POLICE:,F2 POLICE  
PRIMARY:,155.4900,::,POLICE:,CA:,MONTEREY COUNTY:  
:DEL REY OAKS:,DEL REY OAKS POLICE:,F10 POLICE  
TACTICAL:,153.9650,::,POLICE:,CA:,MONTEREY COUNTY:  
:DELANO:,DELANO FIRE:,FIRE - KERN COUNTY FD:,453.3000,::,FIRE:,CA:,KERN  
COUNTY:  
:DELANO:,DELANO POLICE:,POLICE PRIMARY:,154.7700,::,POLICE:,CA:,KERN  
COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS FIRE:,F1 FIRE PRIMARY -  
CDF:,151.1750,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS POLICE:,F5 POLICE SHERIFF  
LIAISON:,158.7600,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS POLICE:,F2 POLICE  
SECONDARY:,155.1900,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS POLICE:,F3 POLICE SHERIFF  
LIAISON:,158.7600,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS POLICE:,F4 POLICE  
CWMA:,158.9250,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS POLICE:,F6 POLICE COUNTYWIDE MUTUAL  
AID:,158.9250,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:DESERT HOT SPRINGS:,DESERT HOT SPRINGS POLICE:,F1 POLICE  
PRIMARY:,159.0300,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:DIABLO CANYON:,PACIFIC GAS & ELECTRIC:,F5 RADIATION SECURITY &  
FIREGROUND:,451.2000,::,OTHER:,CA:,SAN LUIS OBISBO COUNTY:  
:DIABLO CANYON:,PACIFIC GAS & ELECTRIC:,PERIMETER  
SECURITY:,153.5600,::,OTHER:,CA:,SAN LUIS OBISBO COUNTY:  
:DIABLO CANYON:,PACIFIC GAS & ELECTRIC:,F4 SECURITY & FIRE  
DIRECT:,451.0750,::,OTHER:,CA:,SAN LUIS OBISBO COUNTY:  
:DIABLO CANYON:,PACIFIC GAS & ELECTRIC:,F3 SECURITY & FIRE  
REPEATER:,451.0750,::,OTHER:,CA:,SAN LUIS OBISBO COUNTY:  
:DIAMOND BAR:,DIAMOND BAR FIRE:,FIRE -  
LACOFD:,154.3400,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:DIAMOND BAR:,DIAMOND BAR POLICE:,POLICE - LACOSD CONTRACT  
F28:,483.2375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:DIXON:,DIXON POLICE:,F3 POLICE PRIMARY:,154.8300,::,POLICE:,CA:,SOLANO  
COUNTY:  
:DIXON:,DIXON POLICE:,F1 POLICE - SHERIFF:,155.4900,::,POLICE:,CA:,SOLANO  
COUNTY:  
:DIXON:,DIXON POLICE:,F4 POLICE SECONDARY:,155.0850,::,POLICE:,CA:,SOLANO  
COUNTY:  
:DIXON:,DIXON FIRE:,F1 FIRE - COUNTY FIRE:,156.0000,::,FIRE:,CA:,SOLANO  
COUNTY:  
:DIXON:,DIXON FIRE:,F2 FIREGROUND:,154.3400,::,FIRE:,CA:,SOLANO COUNTY:  
:DIXON:,DIXON FIRE:,F3 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SOLANO

COUNTY:  
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:DIXON:, :DIXON POLICE:, :F2 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:DORRIS:, :DORRIS POLICE:, :F1 POLICE  
PRIMARY:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DORRIS:, :DORRIS POLICE:, :F2 POLICE  
DIRECT:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DORRIS:, :DORRIS POLICE:, :F3 POLICE  
COMMON:, 155.7000, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DORRIS:, :DORRIS FIRE:, :FIRE DEPARTMENT:, 33.9800, ::, :FIRE:, :CA:, :SISKIYOU  
COUNTY:  
:DOS PALOS:, :DOS PALOS FIRE:, :F1 FIRE PROTECTION DISTRICT  
F1:, 154.4000, ::, :FIRE:, :CA:, :MERCED COUNTY:  
:DOS PALOS:, :DOS PALOS FIRE:, :F2 FIRE  
SECONDARY:, 154.3400, ::, :FIRE:, :CA:, :MERCED COUNTY:  
:DOS PALOS:, :DOS PALOS POLICE:, :F1 POLICE  
SECONDARY:, 154.8150, ::, :POLICE:, :CA:, :MERCED COUNTY:  
:DOS PALOS:, :DOS PALOS POLICE:, :F3 POLICE MUTUAL AID &  
DISPATCH:, 154.9200, ::, :POLICE:, :CA:, :MERCED COUNTY:  
:DOS PALOS:, :DOS PALOS POLICE:, :F2 POLICE  
SHERIFF:, 154.8900, ::, :POLICE:, :CA:, :MERCED COUNTY:  
:DOUGLAS COUNTY:, :DOUGLAS COUNTY  
SHERIFFS:, ::, 154.8900, ::, :POLICE:, :NV:, :DOUGLAS COUNTY:  
:DOWNEY:, :DOWNEY FIRE:, :FIRE MUTUAL AID WHITE 2:, 154.2800, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:DOWNEY:, :DOWNEY FIRE:, :FIRE & MEDICS RED 1:, 154.2500, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:DOWNEY:, :DOWNEY FIRE:, :FIREGROUND INCIDENT COMMAND GREEN  
3:, 154.2950, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:DOWNEY:, :DOWNEY POLICE:, :F1 POLICE PRIMARY:, 155.8950, ::, :POLICE:, :CA:, :LOS  
ANGELES COUNTY:  
:DOWNEY:, :DOWNEY POLICE:, :F4 POLICE MUTUAL AID:, 154.9200, ::, :POLICE:, :CA:, :LOS  
ANGELES COUNTY:  
:DOWNEY:, :DOWNEY POLICE:, :F3 POLICE TACTICAL:, 155.8050, ::, :POLICE:, :CA:, :LOS  
ANGELES COUNTY:  
:DUARTE:, :DUARTE FIRE:, :FIRE - LACOFD:, 154.3400, ::, :FIRE:, :CA:, :LOS ANGELES  
COUNTY:  
:DUARTE:, :DUARTE EMERGENCY SERVICES:, :REACT:, 462.6750, ::, :OTHER:, :CA:, :LOS  
ANGELES COUNTY:  
:DUARTE:, :DUARTE POLICE:, :F11 POLICE - LACOSD  
CONTRACT:, 482.9875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:DUBLIN:, :DUBLIN FIRE:, :FIRE DISPATCH:, 33.9200, ::, :FIRE:, :CA:, :ALAMEDA COUNTY:  
:DUBLIN:, :DUBLIN POLICE (CCSO CONTRACT):, :POLICE - SHERIFF  
(70):, 155.2500, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:DUNSMUIR:, :DUNSMUIR POLICE:, :F1 POLICE  
PRIMARY:, 155.9700, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DUNSMUIR:, :DUNSMUIR POLICE:, :F2 POLICE  
DIRECT:, 155.9700, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DUNSMUIR:, :DUNSMUIR POLICE:, :F3 POLICE  
COMMON:, 155.7000, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DUNSMUIR:, :DUNSMUIR POLICE:, :F4 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:DUNSMUIR:, :DUNSMUIR FIRE:, :FIRE PRIMARY  
LINK:, 453.0000, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:DUNSMUIR:, :DUNSMUIR FIRE:, :F6 FIRE MUTUAL  
AID:, 154.2650, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:

:DUNSMUIR:,:DUNSMUIR POLICE:,:F5 POLICE MUTUAL  
AID:,155.4750,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:DUNSMUIR:,:DUNSMUIR FIRE:,:F1 FIRE PRIMARY:,154.0400,::,:FIRE:,:CA:,:SISKIYOU  
COUNTY:  
:DUNSMUIR:,:DUNSMUIR FIRE:,:F2 FIRE SHASTA  
COUNTY:,154.4300,::,:FIRE:,:CA:,:SISKIYOU COUNTY:  
:DUNSMUIR:,:DUNSMUIR FIRE:,:F3 FIRE SISKIYOU  
COUNTY:,154.3400,::,:FIRE:,:CA:,:SISKIYOU COUNTY:  
:DUNSMUIR:,:DUNSMUIR FIRE:,:F4 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:SISKIYOU COUNTY:  
:DUNSMUIR:,:DUNSMUIR FIRE:,:F5 FIRE MUTUAL  
AID:,154.2950,::,:FIRE:,:CA:,:SISKIYOU COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F8 POLICE TACTICAL  
1:,488.8625,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F9 SHERIFF  
PRIMARY:,488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO FIRE:,:FIRE - MENLO PARK  
FPD:,154.3700,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F7 POLICE ATHERTON  
PD:,489.0875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F6 POLICE PRIMARY  
DIRECT:,488.3875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F1 POLICE  
PRIMARY:,488.3875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F2 POLICE MENLO PARK  
PD:,488.3375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F4 POLICE TACTICAL  
2:,488.7125,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EAST PALO ALTO:,:EAST PALO ALTO POLICE:,:F5 POLICE TACTICAL  
3:,488.5375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:FIRE COUNTYWIDE MUTUAL  
AID:,155.0850,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:FIRE PRIMARY:,154.2050,::,:FIRE:,:CA:,:SAN DIEGO  
COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:POLICE FIRE COMMON STATION  
F:,155.9850,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F1 FIRE MUTUAL AID  
WHITE:,154.2800,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F2 FIRE MUTUAL AID WHITE  
3:,154.2950,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F4 FIRE & MEDICS:,154.2050,::,:FIRE:,:CA:,:SAN  
DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F11 HOSPITALS:,155.3250,::,:FIRE:,:CA:,:SAN DIEGO  
COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F10 FIRE METROPOLITAN TACTICAL  
1:,154.4300,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F3 FIRE HEARTLAND TACTICAL  
1:,154.2500,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F9 FIRE AVOCADO TACTICAL  
1:,154.3550,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F5 FIRE SOUTH BAY TACTICAL  
1:,153.8900,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F6 FIRE COUNTYWIDE MUTUAL AID  
RED:,155.0850,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:EL CAJON:,:EL CAJON FIRE:,:F7 FIRE MUTUAL AID WHITE

2:,154.2650,::,FIRE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON FIRE,:,F8 POLICE EL CAJON  
PD:,155.6250,::,FIRE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON POLICE,:,F3 POLICE PRIMARY  
DIRECT:,155.6250,::,POLICE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON POLICE,:,F4 POLICE  
ALTERNATE:,155.3100,::,POLICE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON POLICE,:,F5 POLICE MUTUAL  
AID:,154.9200,::,POLICE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON POLICE,:,F1 POLICE PRIMARY STATION  
K:,155.6250,::,POLICE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON POLICE,:,F6 POLICE COUNTYWIDE MUTUAL AID  
BLUE:,153.9950,::,POLICE,:,CA,:,SAN DIEGO COUNTY:  
:EL CAJON,:,EL CAJON POLICE,:,F2 POLICE RECORDS &  
TACTICAL:,155.3100,::,POLICE,:,CA,:,SAN DIEGO COUNTY:  
:EL CENTRO,:,EL CENTRO FIRE,:,F1 FIRE PRIMARY  
ORANGE:,154.3700,::,POLICE,:,CA,:,IMPERIAL COUNTY:  
:EL CENTRO,:,EL CENTRO POLICE,:,F3 POLICE  
COMMON:,155.1300,::,POLICE,:,CA,:,IMPERIAL COUNTY:  
:EL CENTRO,:,EL CENTRO FIRE,:,F2 FIRE SECONDARY  
YELLOW:,153.8900,::,POLICE,:,CA,:,IMPERIAL COUNTY:  
:EL CENTRO,:,EL CENTRO POLICE,:,F2 POLICE  
SECONDARY:,155.2500,::,POLICE,:,CA,:,IMPERIAL COUNTY:  
:EL CENTRO,:,EL CENTRO POLICE,:,F4 POLICE MUTUAL  
AID:,154.9200,::,POLICE,:,CA,:,IMPERIAL COUNTY:  
:EL CENTRO,:,EL CENTRO POLICE,:,F1 POLICE PRIMARY (STATION  
3):,154.8150,::,POLICE,:,CA,:,IMPERIAL COUNTY:  
:EL CERRITO,:,EL CERRITO FIRE,:,FIRE PRIMARY:,46.0600,::,FIRE,:,CA,:,CONTRA  
COSTA COUNTY:  
:EL CERRITO,:,EL CERRITO POLICE,:,F4 POLICE COUNTYWIDE  
COMMON:,460.1000,::,POLICE,:,CA,:,CONTRA COSTA COUNTY:  
:EL CERRITO,:,EL CERRITO POLICE,:,F1 POLICE  
PRIMARY:,460.3750,::,POLICE,:,CA,:,CONTRA COSTA COUNTY:  
:EL CERRITO,:,EL CERRITO POLICE,:,F2 POLICE  
RICHMOND:,460.4000,::,POLICE,:,CA,:,CONTRA COSTA COUNTY:  
:EL CERRITO,:,EL CERRITO POLICE,:,F3 POLICE  
TACTICAL:,460.0250,::,POLICE,:,CA,:,CONTRA COSTA COUNTY:  
:EL CERRITO,:,EL CERRITO POLICE,:,PRIMARY  
DISPATCH:,460.3750,KTU275,:,POLICE,:,CA,:,CONTRA COSTA COUNTY:  
:EL DORADO,:,EL DORADO COUNTY FIRE,:,GARDEN VALLEY:,46.4200,::,FIRE,:,CA,:,EL  
DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY FIRE,:,FIRE LAKE VALLEY  
E:,154.3400,::,FIRE,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY EMS,:,MED 10  
PLACERVILLE:,462.9750,::,MEDICAL,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY FIRE,:,FIRE MUTUAL AID WHITE  
1A:,154.2800,::,FIRE,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY EMS,:,MED 2  
KYBURTZ:,463.0250,::,MEDICAL,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY FIRE,:,COUNTY FIRE DIRECT  
F2:,46.4200,::,FIRE,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY EMS,:,HOSPITAL EMERGENCY  
BLUE:,155.3400,::,MEDICAL,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY FIRE,:,FIRE MUTUAL AID WHITE  
2B:,154.2650,::,FIRE,:,CA,:,EL DORADO COUNTY:  
:EL DORADO,:,EL DORADO COUNTY ANIMAL  
CONTROL,:,DISPATCH:,158.9250,::,OTHER,:,CA,:,EL DORADO COUNTY:



:EL DORADO:, :EL DORADO COUNTY FIRE:, :MEEKS BAY FPD SECONDARY  
F2:, 46.4200, ::, :FIRE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :TACTICAL  
B:, 154.8450, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :MEEKS BAY FPD & MEDICS TAHOMA  
F1:, 46.0800, ::, :FIRE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :COMM CENTER AMADOR SHERIFF  
LIAISON:, 45.6000, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :CENTRAL/CAMINO COUNTY FIRE PRIMARY  
F1:, 46.4200, ::, :FIRE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :MOSQUITO FPD PLACERVILLE  
46.420:, 46.4200, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :SOUTH LAKE TAHOE FD  
MEDICS:, 153.9500, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :POLICE MUTUAL AID SEARCH &  
RESCUE C:, 154.9200, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :MED 6  
CAMINO:, 463.1250, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :DETECTIVES TACTICAL  
E:, 154.9350, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :MED 7 SOUTH LAKE  
TAHOE:, 463.1500, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :MOBILE EXTENDERS  
A:, 154.8450, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :TAHOMA MEEKS BAY FPD  
MEDICS:, 46.0800, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS  
DEPARTMENT:, :UNUSED:, 155.7900, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :F4 FIREGROUND:, 46.1400, ::, :FIRE:, :CA:, :EL  
DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :TACTICAL  
OPERATIONS:, 460.2125, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :FIRE SOUTH LAKE TAHOE  
F:, 153.9500, ::, :FIRE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :CENTRAL OPERATIONS  
PLACERVILLE F1:, 45.5000, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :SOUTH LAKE TAHOE  
AMBULANCE:, 155.2950, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :CLERS  
VALLEY:, 155.0700, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :MED 4  
RESCUE:, 463.0750, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :F3 TACTICAL SOUTH LAKE  
TAHOE:, 45.1000, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :CAMINO PIONEER & RESCUE PRIMARY  
F1:, 46.3400, ::, :FIRE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :F3 FIREGROUND:, 46.2200, ::, :FIRE:, :CA:, :EL  
DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :WEST COUNTY-EL DORADO COUNTY  
AMBULANCE:, 155.2950, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY EMS:, :MED 8 LAKE  
TAHOE:, 463.1750, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY FIRE:, :RESCUE VFD:, 46.3400, ::, :FIRE:, :CA:, :EL  
DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :F2 CONTROL 12 OPERATIONS  
SOUTH LAKE TAHOE:, 45.3000, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:EL DORADO:, :EL DORADO COUNTY SHERIFFS DEPARTMENT:, :CLERS LAKE

TAHOE:,154.7100,::,POLICE:,CA:,EL DORADO COUNTY:  
:EL DORADO:,EL DORADO COUNTY SHERIFFS DEPARTMENT:,SEARCH & RESCUE  
D:,155.1600,::,POLICE:,CA:,EL DORADO COUNTY:  
:EL DORADO:,EL DORADO COUNTY SHERIFFS DEPARTMENT:,POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,EL DORADO COUNTY:  
:EL MONTE:,EL MONTE FIRE:,F4 FIRE LACOFD  
VALLEY:,154.3400,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:EL MONTE:,EL MONTE FIRE:,F2 FIRE SECONDARY  
RED:,154.3700,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:EL MONTE:,EL MONTE FIRE:,F3 FIRE MUTUAL AID  
WHITE:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:EL MONTE:,EL MONTE FIRE:,F1 FIRE PRIMARY BLUE:,154.0850,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:EL MONTE:,EL MONTE POLICE:,F1 POLICE  
PRIMARY:,470.7125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:EL MONTE:,EL MONTE POLICE:,F2 POLICE  
SECONDARY:,470.9625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO FIRE:,F1 FIRE PRIMARY:,154.3550,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO FIRE:,F3 FIRE SOUTH  
BAY:,154.1300,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO POLICE:,F4 POLICE TACTICAL  
1:,471.1125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO POLICE:,F5 POLICE TACTICAL  
2:,470.3125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO POLICE:,F2 POLICE DISPATCH  
2:,470.3875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO POLICE:,F3 POLICE  
PRIMARY:,470.8125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:EL SEGUNDO:,EL SEGUNDO POLICE:,F1 POLICE  
SECONDARY:,470.6375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:ELK GROVE:,ELK GROVE UNIFIED SCHOOL DISTRICT:,POLICE  
TACTICAL:,155.2350,::,POLICE:,CA:,SACRAMENTO COUNTY:  
:ELK GROVE:,ELK GROVE UNIFIED SCHOOL DISTRICT:,POLICE  
DISPATCH:,464.5750,::,POLICE:,CA:,SACRAMENTO COUNTY:  
:EMERYVILLE:,EMERYVILLE FIRE:,FIRE PRIMARY  
(21):,453.7750,::,FIRE:,CA:,ALAMEDA COUNTY:  
:EMERYVILLE:,EMERYVILLE POLICE:,POLICE  
PRIMARY:,453.4500,::,POLICE:,CA:,ALAMEDA COUNTY:  
:ENCINITAS:,ENCINITAS FIRE:,FIRE PRIMARY:,154.3850,::,FIRE:,CA:,SAN DIEGO  
COUNTY:  
:ENCINITAS:,ENCINITAS POLICE:,POLICE - SHERIFF  
CONTRACT:,453.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:ESCONDIDO:,ESCONDIDO FIRE:,FIRE AVOCADO FIRE:,154.2350,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:ESCONDIDO:,ESCONDIDO FIRE:,FIRE & MEDICS:,154.3250,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:ESCONDIDO:,ESCONDIDO FIRE:,FIRE CALLBOXES:,72.5800,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:ESCONDIDO:,ESCONDIDO POLICE:,F5 POLICE COUNTYWIDE MUTUAL  
AID:,153.9950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:ESCONDIDO:,ESCONDIDO POLICE:,F1 POLICE PRIMARY STATION  
H:,154.0250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:ESCONDIDO:,ESCONDIDO POLICE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SAN DIEGO COUNTY:

:ESCONDIDO:, :ESCONDIDO POLICE:, :F4 POLICE  
TACTICAL:, 155.4150, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
:ESCONDIDO:, :ESCONDIDO POLICE:, :F3 POLICE  
SECONDARY:, 154.7250, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
:ETNA:, :ETNA FIRE:, :FIRE DEPARTMENT:, 154.3400, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:ETNA:, :ETNA POLICE:, :F3 POLICE COMMON:, 155.7000, ::, :POLICE:, :CA:, :SISKIYOU  
COUNTY:  
:ETNA:, :ETNA POLICE:, :F2 POLICE DIRECT:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU  
COUNTY:  
:ETNA:, :ETNA POLICE:, :F1 POLICE - SHERIFF:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU  
COUNTY:  
:EUREKA:, :EUREKA FIRE:, :F1 FIRE PRIMARY  
(3F) :, 154.4300, ::, :FIRE:, :CA:, :HUMBOLDT COUNTY:  
:EUREKA:, :EUREKA FIRE:, :F2 FIREGROUND  
TACTICAL:, 154.1750, ::, :FIRE:, :CA:, :HUMBOLDT COUNTY:  
:EUREKA:, :HUMBOLDT FPD 1:, :F1 PRIMARY:, 153.9500, ::, :FIRE:, :CA:, :HUMBOLDT  
COUNTY:  
:EUREKA:, :EUREKA POLICE:, :POLICE TACTICAL TAC  
3:, 156.0300, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:EUREKA:, :EUREKA POLICE:, :F1 POLICE  
PRIMARY:, 154.9500, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:EUREKA:, :EUREKA POLICE:, :POLICE TACTICAL TAC  
4:, 155.0700, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:EUREKA:, :EUREKA POLICE:, :POLICE MUTUAL AID TAC  
2:, 154.9200, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:FAIRFAX:, :FAIRFAX FIRE:, :FIRE - ROSS VALLEY FPD &  
MEDICS:, 46.5000, ::, :FIRE:, :CA:, :MARIN COUNTY:  
:FAIRFAX:, :FAIRFAX POLICE:, :F2 POLICE COUNTYWIDE MUTUAL  
AID:, 39.5200, ::, :POLICE:, :CA:, :MARIN COUNTY:  
:FAIRFAX:, :FAIRFAX POLICE:, :F1 POLICE ZONE 3  
DISPATCH:, 39.4400, ::, :POLICE:, :CA:, :MARIN COUNTY:  
:FAIRFAX:, :FAIRFAX POLICE:, :F3 POLICE PRIMARY:, 39.3000, ::, :POLICE:, :CA:, :MARIN  
COUNTY:  
:FAIRFIELD:, :SOLANO COLLEGE  
POLICE:, :OPERATIONS:, 154.5400, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:FAIRFIELD:, :FAIRFIELD POLICE:, :F1 POLICE PRIMARY  
BLUE:, 483.0875, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:FAIRFIELD:, :FAIRFIELD FIRE:, :FIRE MUTUAL AID  
B:, 154.2800, ::, :FIRE:, :CA:, :SOLANO COUNTY:  
:FAIRFIELD:, :FAIRFIELD POLICE:, :F2 POLICE SECONDARY  
BROWN:, 482.4625, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:FAIRFIELD:, :FAIRFIELD POLICE:, :POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:FAIRFIELD:, :FAIRFIELD FIRE:, :F3 FIRE PRIMARY:, 482.7875, ::, :FIRE:, :CA:, :SOLANO  
COUNTY:  
:FAIRFIELD:, :FAIRFIELD FIRE:, :FIREGROUND A:, 154.3400, ::, :FIRE:, :CA:, :SOLANO  
COUNTY:  
:FERNDALE:, :FERNDALE FIRE:, :FIREGROUND:, 154.1750, ::, :FIRE:, :CA:, :HUMBOLDT  
COUNTY:  
:FERNDALE:, :FERNDALE FIRE:, :FIRE PROTECTION  
DISTRICT:, 33.7000, ::, :FIRE:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY SHERIFF:, :POLICE -  
SHERIFF:, 154.7400, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:FIREBAUGH:, :FIREBAUGH FIRE:, :FIRE - MID VALLEY  
FPD:, 154.4450, ::, :FIRE:, :CA:, :FRESNO COUNTY:  
:FIREBAUGH:, :FIREBAUGH POLICE:, :F1 POLICE  
PRIMARY:, 45.2800, ::, :POLICE:, :CA:, :FRESNO COUNTY:

:FIREBAUGH:,:FIREBAUGH POLICE:,:F2 POLICE  
SECONDARY:,:45.1800,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FLINTRIDGE:,:FLINTRIDGE FIRE:,:FIRE & MEDICS -  
LACOFD:,:154.3400,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:FLINTRIDGE:,:FLINTRIDGE POLICE:,:F1 POLICE - LACOSD  
CONTRACT:,:483.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:FOLSOM:,:FOLSOM FIRE:,:F3 FIRE MUTUAL  
AID:,:154.2800,::,:FIRE:,:CA:,:SACRAMENTO COUNTY:  
:FOLSOM:,:FOLSOM FIRE:,:F1 FIRE & MEDICS:,:153.9950,::,:FIRE:,:CA:,:SACRAMENTO  
COUNTY:  
:FOLSOM:,:FOLSOM FIRE:,:F2 FIRE COUNTY  
FIRE:,:154.1900,::,:FIRE:,:CA:,:SACRAMENTO COUNTY:  
:FOLSOM:,:FOLSOM POLICE:,:POLICE  
PRIMARY:,:453.2750,::,:POLICE:,:CA:,:SACRAMENTO COUNTY:  
:FONTANA:,:KAISER STEEL:,:FIRE DISPATCH:,:154.2800,::,:FIRE:,:CA:,:  
:FONTANA:,:FONTANA FIRE:,:FIRE - CENTRAL VALLEY  
FPD:,:154.1900,::,:FIRE:,:CA:,:SAN BERNARDINO COUNTY:  
:FONTANA:,:FONTANA POLICE:,:F3 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:SAN BERNARDINO COUNTY:  
:FONTANA:,:FONTANA POLICE:,:F1 POLICE PRIMARY:,:155.3100,::,:POLICE:,:CA:,:SAN  
BERNARDINO COUNTY:  
:FONTANA:,:FONTANA POLICE:,:F2 POLICE TACTICAL:,:154.8750,::,:POLICE:,:CA:,:SAN  
BERNARDINO COUNTY:  
:FONTANA:,:FONTANA POLICE:,:POLICE MOBILE DATA:,:859.2375,::,:POLICE:,:CA:,:SAN  
BERNARDINO COUNTY:  
:FORT BRAGG:,:FORT BRAGG FIRE:,:F1 FIRE PRIMARY &  
MEDICS:,:45.0800,::,:FIRE:,:CA:,:MENDOCINO COUNTY:  
:FORT BRAGG:,:FORT BRAGG FIRE:,:F2 FIRE COUNTYWIDE MUTUAL  
AID:,:153.9500,::,:FIRE:,:CA:,:MENDOCINO COUNTY:  
:FORT BRAGG:,:FORT BRAGG FIRE:,:F1 FIRE PRIMARY &  
MEDICS:,:154.1900,::,:FIRE:,:CA:,:MENDOCINO COUNTY:  
:FORT BRAGG:,:FORT BRAGG FIRE:,:F3 FIRE MUTUAL  
AID:,:154.2800,::,:FIRE:,:CA:,:MENDOCINO COUNTY:  
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LIAISON:,:45.2400,::,:FIRE:,:CA:,:MENDOCINO COUNTY:  
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AID:,:154.9200,::,:POLICE:,:CA:,:MENDOCINO COUNTY:  
:FORT BRAGG:,:FORT BRAGG POLICE:,:F1 POLICE  
PRIMARY:,:154.8450,::,:POLICE:,:CA:,:MENDOCINO COUNTY:  
:FORT JONES:,:FORT JONES POLICE:,:F3 POLICE  
COMMON:,:155.7000,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:FORT JONES:,:FORT JONES FIRE:,:FIRE  
DEPARTMENT:,:154.3400,::,:FIRE:,:CA:,:SISKIYOU COUNTY:  
:FORT JONES:,:FORT JONES POLICE:,:F2 POLICE  
DIRECT:,:155.3100,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:FORT JONES:,:FORT JONES POLICE:,:F1 POLICE -  
SHERIFF:,:155.3100,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:FORT TEJON:,:CALIFORNIA HIGHWAY PATROL:,:TAN MOBILE OFFICE #  
69:,:42.8400,,:KA4993:,:POLICE:,:CA:,:  
:FORT TEJON:,:CALIFORNIA HIGHWAY PATROL:,:TAN BASE OFFICE #  
69:,:42.4200,,:KMH277:,:POLICE:,:CA:,:  
:FORTUNA:,:FORTUNA FIRE:,:FIRE PROTECTION  
DISTRICT:,:33.7000,::,:FIRE:,:CA:,:HUMBOLDT COUNTY:  
:FORTUNA:,:FORTUNA POLICE:,:F1 POLICE  
PRIMARY:,:155.2500,::,:POLICE:,:CA:,:HUMBOLDT COUNTY:  
:FORTUNA:,:FORTUNA POLICE:,:F3 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:HUMBOLDT COUNTY:

:FORTUNA:,:FORTUNA POLICE:,:F2 POLICE -  
SHERIFF:,:154.7400,::,:POLICE:,:CA:,:HUMBOLDT COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F4 POLICE TACTICAL  
3:,:488.5375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F5 POLICE TACTICAL  
1:,:488.8625,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F6 POLICE PRIMARY  
DIRECT:,:488.9375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F3 POLICE COUNTYWIDE MUTUAL  
AID:,:488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F7 POLICE SAN MATEO  
PD:,:488.3125,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY FIRE:,:F1 FIRE  
PRIMARY:,:153.9500,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY FIRE:,:F2 FIRE MUTUAL  
AID:,:154.2800,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F2 POLICE TACTICAL  
2:,:488.7125,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOSTER CITY:,:FOSTER CITY POLICE:,:F1 POLICE  
PRIMARY:,:488.9375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:FOUNTAIN VALLEY:,:FOUNTAIN VALLEY POLICE:,:POLICE SECONDARY ORANGE  
SOUTH:,:460.2000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:FOUNTAIN VALLEY:,:FOUNTAIN VALLEY POLICE:,:POLICE PRIMARY  
GREEN:,:460.3250,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:FOWLER:,:FOWLER FIRE:,:FIRE - MID VALLEY FPD:,:154.4450,::,:FIRE:,:CA:,:FRESNO  
COUNTY:  
:FOWLER:,:FOWLER POLICE:,:F2 POLICE  
SECONDARY:,:155.2500,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FOWLER:,:FOWLER POLICE:,:F1 POLICE - SHERIFF  
SYSTEM:,:155.6550,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FREMONT:,:FREMONT FIRE:,:FIRE PRIMARY (5):,:488.4125,::,:FIRE:,:CA:,:ALAMEDA  
COUNTY:  
:FREMONT:,:WASHINGTON HOSPITAL:,:155.2800,::,:MEDICAL:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:C POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:A POLICE  
EXPLORERS:,:156.0300,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:AB10 POLICE SOUTH  
DIRECT:,:482.6375,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:A1 POLICE DISPATCH  
EAST:,:483.0375,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:B1 POLICE DISPATCH  
WEST:,:483.1375,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:AB3 POLICE  
TACTICAL:,:482.4875,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FREMONT:,:FREMONT POLICE:,:B POLICE  
TACTICAL:,:155.0700,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:FRESNO:,:FRESNO FIRE:,:F2 FIRE & MEDICS:,:153.8450,::,:FIRE:,:CA:,:FRESNO  
COUNTY:  
:FRESNO:,:FRESNO FIRE:,:F4 FIREGROUND:,:153.8300,::,:FIRE:,:CA:,:FRESNO COUNTY:  
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COUNTY:  
:FRESNO:,:FRESNO FIRE:,:F3 FIRE MUTUAL AID:,:154.2800,::,:FIRE:,:CA:,:FRESNO  
COUNTY:  
:FRESNO:,:FRESNO FIRE:,:F1 FIREGROUND:,:154.3100,::,:FIRE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO FIRE:,:F5 FIST HAZMAT FD/PD  
TACTICAL:,:154.8300,::,:FIRE:,:CA:,:FRESNO COUNTY:

:FRESNO:,:FRESNO FIRE:,:FIRE INVESTIGATIVE STRIKE TEAM  
A:,154.8300,::,:FIRE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F9 NARCOTICS TASK FORCE +  
TELEPHONE:,460.4250,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F3 POLICE DISTRICT 3  
SOUTHEAST:,460.2750,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F6 POLICE  
TACTICAL:,460.2500,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F1 POLICE DISTRICT 1  
SOUTHWEST:,460.0500,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F8 POLICE MUTUAL  
AID:,460.0250,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:AIRPORT POLICE &  
FIRE:,453.1000,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F5 POLICE DISTRICT 5  
NORTHWEST:,460.4750,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F2 POLICE DISTRICT 2  
CENTRAL:,460.3250,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:F4 POLICE DISTRICT 4  
NORTHEAST:,460.4000,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:F1 STATE CENTER COMMUNITY COLLEGE:,:POLICE  
PRIMARY:,155.6850,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:FRESNO POLICE:,:POLICE MUTUAL AID  
B:,154.9200,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:FRESNO:,:CALIFORNIA HIGHWAY PATROL:,:SILVER MOBILE OFFICE #  
65:,42.2800,,:KA4993:,:POLICE:,:CA:,::  
:FRESNO:,:CALIFORNIA HIGHWAY PATROL:,:SILVER BASE OFFICE #  
65:,42.0800,,:KMC988:,:POLICE:,:CA:,::  
:FRESNO COUNTY:,:FRESNO COUNTY FIRE:,:F4 FIRE COMMAND  
2:,153.8900,::,:FIRE:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY FIRE:,:F5 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY FIRE:,:F3 FIRE COMMAND  
1:,154.4450,::,:FIRE:,:CA:,:FRESNO COUNTY:  
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PRIMARY:,151.3850,::,:FIRE:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY FIRE:,:F2 FIRE & MEDIC  
SECONDARY:,159.3600,::,:FIRE:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 2 ST AGNES MEDICAL  
CENTER:,463.0250,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 6 FRESNO COMMUNITY  
HOSPITAL:,463.1250,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:HOSPITAL EMERGENCY ADMINISTRATIVE RADIO (HEAR):,:HOSPITAL  
EMERGENCY REGION:,155.3400,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:HOSPITAL EMERGENCY ADMINISTRATIVE RADIO (HEAR):,:HOSPITAL  
EMERGENCY LOCAL:,155.3850,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 10 MEADOW LAKES  
DISPATCH:,462.9750,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MEADOW LAKES  
PRIMARY:,463.0750,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 3 FRESNO COMMUNITY  
HOSPITAL:,463.0500,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 8 SOUTHEAST  
AREA:,463.1750,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 1 VALLEY MEDICAL  
CENTER:,463.0000,::,:MEDICAL:,:CA:,:FRESNO COUNTY:  
:FRESNO COUNTY:,:FRESNO COUNTY EMS:,:MED 5 ST AGNES MEDICAL

CENTER:,463.1000,::,MEDICAL:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F13 MEDICAL CENTER  
SECURITY:,155.5150,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F6 OPERATIONS AREA 2  
NORTH GREEN:,154.7550,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F1 DETECTIVE DIVISION  
BLACK:,154.6500,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F3 OPERATIONS AREA 1 WEST  
ORANGE:,153.9200,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,COMM CENTER CLERS SOUTH  
VALLEY:,155.0700,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,COMM CENTER CLERS NORTH  
VALLEY:,154.7100,::,POLICE:,CA:,FRESNO COUNTY:  
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NORTH GREEN:,160.5450,::,POLICE:,CA:,FRESNO COUNTY:  
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GOLD:,154.9200,::,POLICE:,CA:,FRESNO COUNTY:  
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TACTICAL:,153.8000,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F2 COUNTYWIDE OPERATIONS  
TACTICAL RED:,154.8750,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F11 OPERATIONS AREA 3  
SOUTH BLUE:,160.6950,::,POLICE:,CA:,FRESNO COUNTY:  
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SECURITY:,153.8000,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F7 OPERATIONS AREA 4  
SOUTH BLUE:,155.6550,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,COUNTYWIDE SEARCH &  
RESCUE:,39.9400,::,POLICE:,CA:,FRESNO COUNTY:  
:FRESNO COUNTY:,FRESNO COUNTY SHERIFFS DEPARTMENT:,F10 SHAVER LAKE  
GREEN:,160.5900,::,POLICE:,CA:,FRESNO COUNTY:  
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AID:,155.4750,::,POLICE:,CA:,FRESNO COUNTY:  
:FRONTERA:,CALIFORNIA INSTITUTE FOR WOMEN:,FIRE  
DISPATCH:,154.2350,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:FULLERTON:,FULLERTON POLICE:,POLICE PRIMARY  
GREEN:,460.1750,::,POLICE:,CA:,ORANGE COUNTY:  
:FULLERTON:,FULLERTON POLICE:,POLICE SECONDARY ORANGE  
NORTH:,460.4000,::,POLICE:,CA:,ORANGE COUNTY:  
:GALT:,GALT FIRE:,F1 FIRE & MEDICS:,154.1300,::,FIRE:,CA:,SACRAMENTO  
COUNTY:  
:GALT:,GALT FIRE:,F2 FIRE COUNTY FIRE:,154.1900,::,FIRE:,CA:,SACRAMENTO  
COUNTY:  
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COUNTY:  
:GALT:,GALT POLICE:,F2 POLICE  
SECONDARY:,460.0250,::,POLICE:,CA:,SACRAMENTO COUNTY:  
:GARBERVILLE (REDWAY):,CALIFORNIA HIGHWAY PATROL:,GREEN MOBILE OFFICE #  
105:,42.2400,KA4993:,POLICE:,CA:,:  
:GARBERVILLE (REDWAY):,CALIFORNIA HIGHWAY PATROL:,GREEN BASE OFFICE #  
105:,42.5400,KCR954:,POLICE:,CA:,:  
:GARDEN GROVE:,GARDEN GROVE POLICE:,POLICE MOBILE  
DATA:,858.3375,::,POLICE:,CA:,ORANGE COUNTY:  
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GREEN:,460.2750,::,POLICE:,CA:,ORANGE COUNTY:  
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AVL:,45.1800,::,POLICE:,CA:,ORANGE COUNTY:

:GARDEN GROVE:,:GARDEN GROVE POLICE:,:POLICE SECONDARY ORANGE  
NORTH: ,460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:GARDENA:,:GARDENA FIRE:,:FIRE MUTUAL AID F2: ,154.2800,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:GARDENA:,:GARDENA FIRE:,:FIRE SOUTH BAY F3: ,154.1300,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:GARDENA:,:GARDENA FIRE:,:FIRE PRIMARY F1: ,154.3550,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:GARDENA:,:GARDENA POLICE:,:F3 POLICE PRIMARY: ,470.8125,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:GARDENA:,:GARDENA POLICE:,:F5 POLICE TACTICAL  
2: ,470.3125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GARDENA:,:GARDENA POLICE:,:F4 POLICE TACTICAL  
1: ,471.1125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GARDENA:,:GARDENA POLICE:,:F1 POLICE DISPATCH  
1: ,470.6375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GARDENA:,:GARDENA POLICE:,:F2 POLICE DISPATCH  
2: ,470.6375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GASQUET:,:GASQUET FPD:,:DISPATCH: ,154.4150,::,:FIRE:,:CA:,:DEL NORTE COUNTY:  
:GILROY:,:GILROY FIRE:,:F2 FIRE MUTUAL AID: ,154.2800,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GILROY FIRE:,:F1 FIRE PRIMARY: ,154.3400,::,:FIRE:,:CA:,:SANTA CLARA  
COUNTY:  
:GILROY:,:GILROY FIRE:,:F3 FIRE MUTUAL AID: ,154.2650,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GILROY POLICE:,:F4 POLICE MUTUAL  
AID: ,154.9200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:GILROY:,:GILROY POLICE:,:F3 POLICE SHERIFF: ,156.2100,::,:POLICE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GILROY POLICE:,:F2 POLICE MORGAN  
HILL: ,155.1150,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:GILROY:,:GILROY POLICE:,:F1 POLICE PRIMARY: ,154.8300,::,:POLICE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GILROY POLICE:,:F6 POLICE TACTICAL: ,155.0850,::,:POLICE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GILROY POLICE:,:F5 POLICE PRIMARY  
DIRECT: ,154.8300,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:GILROY:,:GILROY FIRE:,:F4 FIRE MUTUAL AID: ,154.2950,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GAVILAN COLLEGE:,:F4 POLICE  
OPERATIONS: ,155.9100,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:GILROY:,:GAVILAN COLLEGE:,:F1 POLICE MUTUAL  
AID: ,154.9200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:GILROY:,:GAVILAN COLLEGE:,:F3 GILROY POLICE: ,154.8300,::,:POLICE:,:CA:,:SANTA  
CLARA COUNTY:  
:GILROY:,:GAVILAN COLLEGE:,:F2 MORGAN HILL  
POLICE: ,155.1150,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:GLENDALE:,:GLENDALE FIRE:,:FIRE MUTUAL AID WHITE 3 TAC  
6: ,154.2950,,:KBG521: ,:FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE FIRE:,:LA COUNTY FD VALLEY TAC  
7: ,154.3400,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE FIRE:,:FIRE MUTUAL AID WHITE 2 TAC  
5: ,154.2650,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
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2: ,154.2050,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
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1: ,46.1000,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:



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3:,:153.7700,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
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F3:,:158.9550,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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4:,:154.2800,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE POLICE:,:F5 GLENDALE 5:,:482.2875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE POLICE:,:F1 POLICE  
PRIMARY:,:159.0900,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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:GLENDALE:,:GLENDALE POLICE:,:F7 GLENDALE 7:,:482.4875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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6:,:154.9200,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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7:,:155.4750,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE FIRE:,:FIRE & MEDICS PRIMARY TAC  
1:,:153.8900,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:PROFESSIONAL AMBULANCE  
PARAMEDIC:,:DISPATCH1:,:46.0000,::,:MEDICAL:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE POLICE:,:POLICE GALLERIA MALL TAC  
5:,:155.5350,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE POLICE:,:F2 POLICE TACTICAL  
2:,:158.9550,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDALE:,:GLENDALE POLICE:,:F3 GLENDALE 3:,:482.1875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDDORA:,:GLENDDORA FIRE:,:FIRE & MEDICS -  
LACOFD:,:154.3400,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDDORA:,:GLENDDORA POLICE:,:F1 POLICE  
PRIMARY:,:154.8450,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDDORA:,:GLENDDORA POLICE:,:F3 POLICE  
TACTICAL:,:153.8600,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENDDORA:,:GLENDDORA POLICE:,:F2 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:GLENN COUNTY:,:GLENN COUNTY FIRE:,:F1 COUNTY FIRE

PRIMARY:,154.4000,::,FIRE:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY FIRE:,F2 COUNTY FIRE WIDE  
AREA:,154.4000,::,FIRE:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY EMS:,MED 5 TUSCAN  
BUTTE:,463.1000,::,MEDICAL:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY SHERIFF:,F2 POLICE  
COMMON:,155.9100,::,POLICE:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY SHERIFF:,F1 OPERATIONS  
PRIMARY:,155.5500,::,POLICE:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY EMS:,MED 8 BLOOMER  
HILL:,463.1750,::,MEDICAL:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY SHERIFF:,DETENTION  
PORTABLES:,155.1900,::,POLICE:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY SHERIFF:,F5 DETECTIVES  
TACTICAL:,155.2500,::,POLICE:,CA:,GLENN COUNTY:  
:GLENN COUNTY:,GLENN COUNTY SHERIFF:,F3 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,GLENN COUNTY:  
::,::,0.0000,::,POLICE:,CA:,::  
:GOLD RUN (DUTCH FLAT):,CALIFORNIA HIGHWAY PATROL:,GRAY MOBILE OFFICE #  
70:,42.6800,KA4993:,POLICE:,CA:,::  
:GOLD RUN (DUTCH FLAT):,CALIFORNIA HIGHWAY PATROL:,GRAY BASE OFFICE #  
70:,42.4800,KDG889:,POLICE:,CA:,::  
:GONZALES:,GONZALES FIRE:,F1 FIRE PRIMARY:,154.3700,::,FIRE:,CA:,MONTEREY  
COUNTY:  
:GONZALES:,GONZALES POLICE:,F2 POLICE  
SECONDARY:,158.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
:GONZALES:,GONZALES POLICE:,F1 POLICE  
PRIMARY:,158.8050,::,POLICE:,CA:,MONTEREY COUNTY:  
:GONZALES:,GONZALES POLICE:,F3 POLICE  
TACTICAL:,155.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
:GRAND TERRACE:,GRAND TERRACE FIRE:,FIRE - CDF:,151.4450,::,FIRE:,CA:,SAN  
BERNARDINO COUNTY:  
:GRAND TERRACE:,GRAND TERRACE POLICE:,POLICE - SHERIFF  
CONTRACT:,155.9700,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:GRASS VALLEY:,GRASS VALLEY FIRE:,FIRE  
PRIMARY:,46.1600,::,FIRE:,CA:,NEVADA COUNTY:  
:GRASS VALLEY:,GRASS VALLEY POLICE:,F1 POLICE  
PRIMARY:,45.2200,::,POLICE:,CA:,NEVADA COUNTY:  
:GRASS VALLEY:,GRASS VALLEY POLICE:,F2 POLICE  
TACTICAL:,45.7800,::,POLICE:,CA:,NEVADA COUNTY:  
:GRASS VALLEY:,GRASS VALLEY POLICE:,F3 POLICE TACTICAL  
MOBILE:,45.5200,::,POLICE:,CA:,NEVADA COUNTY:  
:GRASS VALLEY:,CALIFORNIA HIGHWAY PATROL:,GREEN BASE OFFICE #  
42:,42.5400,KME239:,POLICE:,CA:,::  
:GRASS VALLEY:,CALIFORNIA HIGHWAY PATROL:,GREEN MOBILE OFFICE #  
42:,42.2400,KA4993:,POLICE:,CA:,::  
:GREENFIELD:,GREENFIELD FIRE:,FIRE  
PRIMARY:,154.3700,::,FIRE:,CA:,MONTEREY COUNTY:  
:GREENFIELD:,GREENFIELD POLICE:,F1 POLICE  
PRIMARY:,158.8050,::,POLICE:,CA:,MONTEREY COUNTY:  
:GREENFIELD:,GREENFIELD POLICE:,F2 POLICE  
SECONDARY:,158.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
:GREENFIELD:,GREENFIELD POLICE:,F3 POLICE  
TACTICAL:,155.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
:GREENFIELD:,GREENFIELD POLICE:,F4 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,MONTEREY COUNTY:  
:GRIDLEY:,GRIDLEY FIRE:,FIRE PRIMARY

DISPATCH:,154.3100,::, :FIRE:, :CA:, :BUTTE COUNTY:  
:GRIDLEY:, :GRIDLEY POLICE:, :F2 POLICE SHERIFF  
REPEATER:,154.7250,::, :POLICE:, :CA:, :BUTTE COUNTY:  
:GRIDLEY:, :GRIDLEY POLICE:, :F1 POLICE  
PRIMARY:,155.1150,::, :POLICE:, :CA:, :BUTTE COUNTY:  
:GRIDLEY:, :GRIDLEY POLICE:, :PF3 OLICE MUTUAL AID  
TACTICAL:,154.9200,::, :POLICE:, :CA:, :BUTTE COUNTY:  
:GROVER CITY:, :GROVER-OCEANO CSD FIREGROUND:, :F2  
DISPATCH:,158.9400,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER-OCEANO CSD FIRE:, :F1  
DISPATCH:,154.4150,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER CITY FIRE:, :F2 FIRE PISMO BEACH  
FD:,154.1450,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER CITY FIRE:, :F1 FIRE  
PRIMARY:,154.4150,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER CITY POLICE:, :F2 YELLOW POLICE  
SECONDARY:,460.4750,::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER CITY POLICE:, :F3 RED POLICE  
EMERGENCY:,460.0500,::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER CITY POLICE:, :F4 WHITE POLICE MUTUAL  
AID:,460.0250,::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GROVER CITY:, :GROVER CITY POLICE:, :F1 POLICE  
PRIMARY:,460.1750,::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:GUADALUPE:, :GUADALUPE POLICE:, :F1 POLICE PRIMARY  
GREEN:,460.2250,::, :POLICE:, :CA:, :SANTA BARBARA COUNTY:  
:GUADALUPE:, :GUADALUPE POLICE:, :F4 POLICE MUTUAL AID  
WHITE:,460.0250,::, :POLICE:, :CA:, :SANTA BARBARA COUNTY:  
:GUADALUPE:, :GUADALUPE POLICE:, :F3 POLICE EMERGENCY  
RED:,460.0500,::, :POLICE:, :CA:, :SANTA BARBARA COUNTY:  
:GUADALUPE:, :GUADALUPE POLICE:, :F2 POLICE SECONDARY  
YELLOW:,460.3250,::, :POLICE:, :CA:, :SANTA BARBARA COUNTY:  
:GUERNEVILLE:, :REDWOOD EMPIRE SECURITY:, :RUSSIAN RIVER  
PATROL:,464.8500,::, :OTHER:, :CA:, :SONOMA COUNTY:  
:GUSTINE:, :GUSTINE FIRE:, :F1 FIRE PRIMARY:,154.4000,::, :FIRE:, :CA:, :MERCED  
COUNTY:  
:GUSTINE:, :GUSTINE FIRE:, :F2 FIRE SECONDARY:,154.3400,::, :FIRE:, :CA:, :MERCED  
COUNTY:  
:GUSTINE:, :GUSTINE POLICE:, :F1 POLICE  
PRIMARY:,154.8900,::, :POLICE:, :CA:, :MERCED COUNTY:  
:GUSTINE:, :GUSTINE POLICE:, :F2 POLICE MUTUAL  
AID:,154.9200,::, :POLICE:, :CA:, :MERCED COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY FIRE:, :F5 FIRE MUTUAL  
AID:,154.2950,::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY FIRE:, :F3 FIRE MUTUAL  
AID:,154.2800,::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY FIRE:, :F4 FIRE MUTUAL  
AID:,154.2650,::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY FIRE:, :F2 FIRE PRIMARY  
DIRECT:,154.3400,::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY POLICE:, :F4 POLICE TACTICAL  
1:,488.8625,::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY POLICE:, :F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY POLICE:, :F2 POLICE TACTICAL  
2:,488.7125,::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:HALF MOON BAY:, :HALF MOON BAY POLICE:, :F1 POLICE  
PRIMARY:,488.3875,::, :POLICE:, :CA:, :SAN MATEO COUNTY:

:HALF MOON BAY:,:HALF MOON BAY FIRE:,:F1 FIRE PROTECTION  
DISTRICT:,:154.3400,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:HALF MOON BAY:,:HALF MOON BAY POLICE:,:F6 SHERIFF PRIMARY  
DIRECT:,:488.9875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:HALF MOON BAY:,:HALF MOON BAY POLICE:,:F5 SHERIFF  
PRIMARY:,:488.9875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:HANFORD:,:HANFORD FIRE:,:F2 FIRE PRIMARY:,:460.5750,::,:FIRE:,:CA:,:KINGS  
COUNTY:  
:HANFORD:,:HANFORD FIRE:,:F1 FIRE COUNTY FIRE:,:460.6000,::,:FIRE:,:CA:,:KINGS  
COUNTY:  
:HANFORD:,:MOBILE LIFE SUPPORT:,:UNITS MED 2 4 6  
8:,:155.1750,::,:MEDICAL:,:CA:,:KINGS COUNTY:  
:HANFORD:,:HANFORD POLICE:,:F4 POLICE MUTUAL  
AID:,:460.0250,::,:POLICE:,:CA:,:KINGS COUNTY:  
:HANFORD:,:HANFORD POLICE:,:F3 POLICE  
PRIMARY:,:460.2000,::,:POLICE:,:CA:,:KINGS COUNTY:  
:HANFORD:,:HANFORD POLICE:,:F1 POLICE - SHERIFF  
LIAISON:,:460.0750,::,:POLICE:,:CA:,:KINGS COUNTY:  
:HANFORD:,:HANFORD POLICE:,:F2 POLICE - SHERIFF  
OPERATIONS:,:460.1250,::,:POLICE:,:CA:,:KINGS COUNTY:  
:HANFORD:,:CALIFORNIA HIGHWAY PATROL:,:PINK BASE OFFICE #  
68:,:42.4400,,:KMD455:,:POLICE:,:CA:,::  
:HANFORD:,:CALIFORNIA HIGHWAY PATROL:,:PINK MOBILE OFFICE #  
68:,:42.7600,,:KA4993:,:POLICE:,:CA:,::  
:HAWAIIAN GARDENS:,:HAWAIIAN GARDENS FIRE:,:FIRE -  
LACOFD:,:154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:HAWAIIAN GARDENS:,:HAWAIIAN GARDENS POLICE:,:F14 POLICE - LACOSD  
CONTRACT:,:483.1375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE FIRE:,:F3 FIRE SOUTH BAY:,:154.1300,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE FIRE:,:F1 FIRE PRIMARY:,:154.3550,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE FIRE:,:F2 FIRE MUTUAL AID:,:154.2800,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE POLICE:,:F4 POLICE TACTICAL  
1:,:471.1125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE POLICE:,:B POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE POLICE:,:F3 POLICE  
DISPATCH:,:470.8125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE POLICE:,:F5 POLICE TACTICAL  
2:,:470.3125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE POLICE:,:F2 POLICE  
PRIMARY:,:470.3875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAWTHORNE:,:HAWTHORNE POLICE:,:F1 POLICE  
DISPATCH:,:470.6375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:HAYWARD:,:HAYWARD FIRE:,:FIRE MUTUAL AID WHITE  
2:,:154.2800,::,:FIRE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD FIRE:,:FIRE PRIMARY (4)  
YELLOW:,:460.6000,::,:FIRE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD FIRE:,:FIRE WEST RED 1:,:154.0700,::,:FIRE:,:CA:,:ALAMEDA  
COUNTY:  
:HAYWARD:,:HAYWARD HUMANA HOSPITAL:,:155.2200,::,:MEDICAL:,:CA:,:ALAMEDA  
COUNTY:  
:HAYWARD:,:KAISER FOUNDATION HOSPITAL:,:464.7750,::,:MEDICAL:,:CA:,:ALAMEDA  
COUNTY:  
:HAYWARD:,:ST ROSE MEDICAL CENTER:,:464.4750,::,:MEDICAL:,:CA:,:ALAMEDA

COUNTY:

:HAYWARD:,:HAYWARD POLICE:,:F2 POLICE TACTICAL GREEN  
2:,:155.0700,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:F5 POLICE SOUTH COMMON  
REPEATER:,:482.6375,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:POLICE TACTICAL  
4:,:155.8950,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:POLICE ALTERNATE PINK  
1:,:154.8900,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:F7 POLICE PRIMARY  
REPEATER:,:483.1125,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:CHABOT HAYWARD OPERATIONS:,:POLICE  
DISPATCH:,:854.1875,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:F1 POLICE PRIMARY (A-  
H):,:483.1125,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:POLICE MUTUAL AID GOLD  
3:,:154.9200,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:HAYWARD POLICE:,:F3 POLICE SECONDARY  
REPEATER:,:482.6625,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:HAYWARD:,:CALIFORNIA HIGHWAY PATROL:,:TAN BASE OFFICE #  
25:,:42.4200,:KMD592:,:POLICE:,:CA:,::  
:HAYWARD:,:CALIFORNIA HIGHWAY PATROL:,:TAN MOBILE OFFICE #  
25:,:42.8400,:KA4993:,:POLICE:,:CA:,::  
:HEALDSBURG:,:HEALDSBURG FIRE:,:FIRE PRIMARY:,:154.3100,::,:FIRE:,:CA:,:SONOMA  
COUNTY:  
:HEALDSBURG:,:HEALDSBURG POLICE:,:F4 POLICE ALTERNATE  
(NIGHT):,:156.0150,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:HEALDSBURG:,:HEALDSBURG POLICE:,:F3 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:HEALDSBURG:,:HEALDSBURG POLICE:,:F2 POLICE  
SECONDARY:,:154.8900,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:HEALDSBURG:,:HEALDSBURG POLICE:,:F1 POLICE  
PRIMARY:,:154.9500,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:HEMET:,:HEMET FIRE:,:F2 FIRE MUTUAL AID:,:154.2800,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:HEMET:,:HEMET FIRE:,:F3 FIREGROUND:,:154.2650,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:HEMET:,:HEMET FIRE:,:F1 FIRE PRIMARY:,:154.1450,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:HEMET:,:HEMET POLICE:,:F8 POLICE  
TACTICAL:,:159.4500,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F4 POLICE PRIMARY  
DIRECT:,:155.0550,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F3 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F2 POLICE  
SECONDARY:,:154.9950,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F1 POLICE  
PRIMARY:,:155.0550,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F5 POLICE SHERIFF  
LIAISON:,:158.7600,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F6 POLICE COUNTYWIDE MUTUAL  
AID:,:158.9250,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HEMET:,:HEMET POLICE:,:F7 POLICE PRIMARY  
DIRECT:,:155.0550,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:HERCULES:,:PACIFIC REFINING FD:,:DISPATCH:,:153.0800,::,:FIRE:,:CA:,:CONTRA  
COSTA COUNTY:

:HERCULES:,:HERCULES FIRE:,:FIRE - RODEO-HERCULES  
FPD: ,46.4800,::, :FIRE: ,:CA: ,:CONTRA COSTA COUNTY:  
:HERCULES: ,:HERCULES POLICE: ,:POLICE  
PRIMARY: ,460.3250,::, :POLICE: ,:CA: ,:CONTRA COSTA COUNTY:  
:HERCULES: ,:HERCULES POLICE: ,:F3 POLICE MUTUAL AID  
WEST: ,460.0250,::, :POLICE: ,:CA: ,:CONTRA COSTA COUNTY:  
:HERCULES: ,:HERCULES POLICE: ,:F4 POLICE  
COMMON: ,460.1000,::, :POLICE: ,:CA: ,:CONTRA COSTA COUNTY:  
:HERCULES: ,:HERCULES POLICE: ,:POLICE MUTUAL  
AID: ,154.9200,::, :POLICE: ,:CA: ,:CONTRA COSTA COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH FIRE: ,:F2 FIRE MUTUAL  
AID: ,154.2800,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH FIRE: ,:F3 FIRE SOUTH  
BAY: ,154.1300,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH FIRE: ,:F1 FIRE  
PRIMARY: ,154.3550,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:F1 POLICE  
DISPATCH: ,470.6375,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:F2 POLICE  
DISPATCH: ,470.3875,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:F3 POLICE  
DISPATCH: ,470.8125,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:B POLICE MUTUAL  
AID: ,154.9200,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:A POLICE MOBILE  
DATA: ,155.6100,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:F4 POLICE TACTICAL  
1: ,471.1125,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HERMOSA BEACH: ,:HERMOSA BEACH POLICE: ,:F5 POLICE PRIMARY (1)  
TEMPORARY: ,470.3125,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HESPERIA: ,:HESPERIA POLICE: ,:POLICE - SHERIFF: ,155.5650,::, :POLICE: ,:CA: ,:SAN  
BERNARDINO COUNTY:  
:HESPERIA HESPERIA FIRE: ,:HESPERIA FIRE - CDF: ,:FIRE  
CDF: ,151.4450,::, :FIRE: ,:CA: ,:SAN BERNARDINO COUNTY:  
:HIDDEN HILLS: ,:HIDDEN HILLS FIRE: ,:FIRE -  
LACOFD: ,154.4000,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:HIDDEN HILLS: ,:HIDDEN HILLS POLICE: ,:F10 POLICE - LACOSD  
CONTRACT: ,482.9125,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:HIGHLAND: ,:HIGHLAND FIRE: ,:FIRE - CDF: ,151.4450,::, :FIRE: ,:CA: ,:SAN  
BERNARDINO COUNTY:  
:HIGHLAND: ,:HIGHLAND POLICE: ,:POLICE - SHERIFF: ,155.9700,::, :POLICE: ,:CA: ,:SAN  
BERNARDINO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH FIRE: ,:F1 FIRE  
PRIMARY: ,153.9500,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH POLICE: ,:F3 POLICE COUNTYWIDE MUTUAL  
AID: ,488.8875,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH POLICE: ,:F5 POLICE PRIMARY  
DIRECT: ,488.3375,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH POLICE: ,:F2 POLICE TACTICAL  
2: ,488.7125,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH POLICE: ,:F4 POLICE TACTICAL  
1: ,488.8625,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH FIRE: ,:F2 FIRE MUTUAL  
AID: ,154.2800,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:HILLSBOROUGH: ,:HILLSBOROUGH POLICE: ,:F1 POLICE  
PRIMARY: ,488.3375,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:HOLLISTER: ,:HOLLISTER FIRE: ,:F6 FIRE TACTICAL 2: ,155.8050,::, :FIRE: ,:CA: ,:SAN

BENITO COUNTY:  
:HOLLISTER:, :HOLLISTER FIRE:, :F4 FIRE MUTUAL AID:, 154.2800, ::, :FIRE:, :CA:, :SAN  
BENITO COUNTY:  
:HOLLISTER:, :HOLLISTER POLICE:, :POLICE FIRE PUBLIC  
WORKS:, 158.7750, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
:HOLTVILLE:, :HOLTVILLE FIRE:, :FIRE PRIMARY (3600) ORANGE  
1:, 154.3700, ::, :FIRE:, :CA:, :IMPERIAL COUNTY:  
:HOLTVILLE:, :HOLTVILLE POLICE:, :F1 POLICE PRIMARY (STATION  
10):, 155.1300, ::, :POLICE:, :CA:, :IMPERIAL COUNTY:  
:HOLTVILLE:, :HOLTVILLE POLICE:, :F2 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :IMPERIAL COUNTY:  
:HOOPA:, :HOOPA FIRE:, :F1 FIRE PRIMARY:, 153.9500, ::, :FIRE:, :CA:, :HUMBOLDT  
COUNTY:  
:HOOPA:, :HOOPA FIRE:, :DISPATCH:, 172.7750, ::, :FIRE:, :CA:, :HUMBOLDT COUNTY:  
:HUGHSON:, :HUGHSON POLICE:, :POLICE  
PRIMARY:, 158.7300, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:HUGHSON:, :HUGHSON FIRE:, :FIRE PRIMARY:, 153.7700, ::, :FIRE:, :CA:, :STANISLAUS  
COUNTY:  
:HUMBOLDT (ARCATA):, :CALIFORNIA HIGHWAY PATROL:, :GREEN MOBILE OFFICE #  
16:, 42.2400, :KA4993:, :POLICE:, :CA:, :  
:HUMBOLDT (ARCATA):, :CALIFORNIA HIGHWAY PATROL:, :GREEN BASE OFFICE #  
16:, 42.5400, :KME382:, :POLICE:, :CA:, :  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY FIRE:, :SOUTH  
DISTRICTS:, 154.0100, ::, :FIRE:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 5 REDWOOD  
HOSPITAL:, 463.1000, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 1 MOUNT  
PIERCE:, 463.0000, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 2 HORSE  
MOUNTAIN:, 463.0250, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 2 PRATT  
MOUNTAIN:, 463.0250, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 4 HOOPA  
CLINIC:, 463.0750, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 7 ST JOSEPH  
HOSPITAL:, 463.1500, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 6 MAD RIVER  
HOSPITAL:, 463.1250, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 10 MEDIC  
DISPATCH:, 462.9750, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 9 KLAMATH-TRINITY  
COMMUNITY:, 462.9500, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 3 RODGERS  
PEAK:, 463.0500, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY EMS:, :MED 8 EUREKA GENERAL  
HOSPITAL:, 463.1750, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY SHERIFF:, :OPERATIONS DIRECT TAC  
6:, 154.7400, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :AMBULANCES AND AIR  
EVACS:, ::, 155.1750, ::, :MEDICAL:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY SHERIFF:, :CA FISH & GAME TAC  
7:, 151.4150, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY FIRE:, :F1 FIRE DISTRICTS  
NORTH:, 46.0600, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY SHERIFF:, :F1 OPERATIONS  
REPEATERS:, 154.7400, ::, :POLICE:, :CA:, :HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:, :HUMBOLDT COUNTY SHERIFF:, :ARCATA CONSTABLE

OPERATIONS:,158.8350,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,DETENTION BLUE LAKE HONOR  
CAMP:,154.7400,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,HOOPA SUBSTATION TAC  
5:,155.4750,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,GARBERVILLE SUBSTATION TAC  
2:,154.9200,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,COUNTYWIDE SHERIFF RESERVE  
OPS:,45.9600,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,OPERATIONS TACTICAL TAC  
4:,155.8500,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,OPERATIONS TACTICAL TAC  
3:,155.0700,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY SHERIFF:,COMM CENTER CLERS HORSE  
MOUNTAIN:,155.7000,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,COLLEGE OF THE REDWOODS  
SECURITY:,DISPATCH:,154.5400,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUMBOLDT COUNTY:,HUMBOLDT COUNTY FIRE:,F2 FIRE DISTRICTS  
SOUTH:,46.2200,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:HUNTINGTON BEACH:,HUNTINGTON BEACH POLICE:,POLICE SECONDARY ORANGE  
SOUTH:,460.2000,::,POLICE:,CA:,ORANGE COUNTY:  
:HUNTINGTON BEACH:,HUNTINGTON BEACH POLICE:,POLICE MOBILE  
AVL:,506.6125,::,POLICE:,CA:,ORANGE COUNTY:  
:HUNTINGTON BEACH:,HUNTINGTON BEACH POLICE:,POLICE & FIRE MOBILE  
DATA:,856.2625,::,POLICE:,CA:,ORANGE COUNTY:  
:HUNTINGTON BEACH:,HUNTINGTON BEACH POLICE:,POLICE PRIMARY  
GREEN:,460.1000,::,POLICE:,CA:,ORANGE COUNTY:  
:HUNTINGTON PARK:,HUNTINGTON PARK FIRE:,FIRE & MEDICS -  
LACOFD:,154.4300,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:HUNTINGTON PARK:,HUNTINGTON PARK POLICE:,F2 POLICE  
TACTICAL:,154.0400,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:HUNTINGTON PARK:,HUNTINGTON PARK POLICE:,F1 POLICE  
PRIMARY:,154.8150,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:HURON:,HURON FIRE:,FIRE - MID VALLEY FPD:,154.4450,::,FIRE:,CA:,FRESNO  
COUNTY:  
:HURON:,HURON POLICE:,POLICE PRIMARY:,154.8600,::,POLICE:,CA:,FRESNO  
COUNTY:  
:IMPERIAL:,IMPERIAL FIRE:,F1 FIRE PRIMARY  
ORANGE:,154.3700,::,FIRE:,CA:,IMPERIAL COUNTY:  
:IMPERIAL:,IMPERIAL FIRE:,F2 FIRE SECONDARY  
GREEN:,154.0100,::,FIRE:,CA:,IMPERIAL COUNTY:  
:IMPERIAL:,IMPERIAL POLICE:,F1 POLICE  
PRIMARY:,154.8150,::,POLICE:,CA:,IMPERIAL COUNTY:  
:IMPERIAL:,IMPERIAL POLICE:,F2 POLICE  
COMMON:,155.1300,::,POLICE:,CA:,IMPERIAL COUNTY:  
:IMPERIAL BEACH:,IMPERIAL BEACH FIRE:,FIRE &  
MEDICS:,154.4150,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:IMPERIAL BEACH:,IMPERIAL BEACH POLICE:,F2 POLICE CORONADO  
2:,155.2500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:IMPERIAL BEACH:,IMPERIAL BEACH POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,153.9950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:IMPERIAL BEACH:,IMPERIAL BEACH POLICE:,F1 POLICE CORONADO  
1:,154.8450,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:IMPERIAL BEACH:,IMPERIAL BEACH POLICE:,POLICE -  
SHERIFF:,453.9500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:IMPERIAL COUNTY:,IMPERIAL COUNTY FIRE:,F2 COUNTY FIRE NORTH  
GREEN:,154.0100,::,FIRE:,CA:,IMPERIAL COUNTY:



:IMPERIAL COUNTY:,:IMPERIAL COUNTY FIRE:,:F3 COUNTY FIRE EAST  
BLUE:,154.4300,,:FIRE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY FIRE:,:F1 COUNTY FIRE CENTRAL  
ORANGE:,154.3700,,:FIRE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:MED 1  
HOSPITALS:,463.0000,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:HOSPITALS AMBULANCE-MEDICS EMS  
2:,:155.1750,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:MED 8 SUPERSTITION  
MOUNTAINS:,463.1750,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:HOSPITALS AMBULANCE-MEDICS EMS  
1:,:155.3250,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY SHERIFF:,:F7 OPERATIONS TACTICAL  
RED:,155.7450,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:F3  
HOSPITALS:,155.3850,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY SHERIFF:,:F1 OPERATIONS CENTRAL  
BLUE:,156.0300,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:MED 4  
HOSPITALS:,463.0750,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY SHERIFF:,:F9 POLICE MOBILE  
ONLY:,155.5200,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL VALLEY  
COLLEGE:,:154.5150,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:QUECHAN TRIBE  
POLICE:,:153.8600,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY SHERIFF:,:F5 OPERATIONS WEST  
WHITE:,154.9950,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY SHERIFF:,:F8 POLICE MUTUAL  
AID:,154.9200,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:MED 2  
HOSPITALS:,463.0250,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY EMS:,:MED 3  
HOSPITALS:,463.0500,,:MEDICAL:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:IMPERIAL COUNTY SHERIFF:,:F3 OPERATIONS EAST  
BLACK:,154.8450,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:IMPERIAL COUNTY:,:DE ANZA SEARCH &  
RESCUE:,:155.1600,,:POLICE:,:CA:,:IMPERIAL COUNTY:  
:INDIAN WELLS:,:INDIAN WELLS FIRE:,:FIRE PRIMARY - COUNTY  
FIRE:,151.1750,,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:INDIAN WELLS:,:INDIAN WELLS POLICE:,:POLICE - SHERIFF  
CONTRACT:,159.0900,,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:INDIO:,:INDIO FIRE:,:FIRE DESERT  
INTERSYSTEM:,154.3100,,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:INDIO:,:INDIO FIRE:,:FIRE PRIMARY:,154.4000,,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:INDIO:,:INDIO FIRE:,:FIRE MUTUAL AID:,154.2800,,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:INDIO:,:INDIO POLICE:,:F1 POLICE  
PRIMARY:,158.7300,,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:INDIO:,:INDIO POLICE:,:F2 POLICE SECONDARY  
RECORDS:,158.8800,,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:INDIO:,:INDIO POLICE:,:F3 POLICE MUTUAL  
AID:,154.9200,,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:INDIO:,:INDIO POLICE:,:F4 POLICE COUNTYWIDE MUTUAL  
AID:,158.9250,,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:INDUSTRY:,:INDUSTRY FIRE:,:FIRE & MEDICS -  
LACOFD:,154.3400,,:FIRE:,:CA:,:LOS ANGELES COUNTY:

:INDUSTRY:,:INDUSTRY POLICE:,:F8 POLICE - LACOSD  
CONTRACT:,:470.9125,,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD FIRE:,:F1 FIRE & MEDICS:,:154.1750,,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD FIRE:,:F2 FIRE TORRANCE  
FD:,:154.1300,,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD FIRE:,:F4 FIRE MUTUAL AID:,:154.2800,,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD FIRE:,:F3 FIRE SOUTH BAY  
REGIONAL:,:154.3550,,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:MCCORMICK AMBULANCE:,:DISPATCH:,:155.2200,,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:B BURGLARY AUTO DETAIL  
FB:,:155.8200,,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:F2 POLICE TACTICAL  
F2:,:460.2750,,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:F6 POLICE:,:460.3250,,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:F4 POLICE  
TACTICAL:,:460.1750,,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:F1 POLICE  
PRIMARY:,:460.1500,,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:F3 POLICE  
TACTICAL:,:460.0500,,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:INGLEWOOD:,:INGLEWOOD POLICE:,:F5 POLICE:,:460.2500,,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:INYO COUNTY:,:INYO COUNTY EMS:,:F4 FIRE  
DEPARTMENTS:,:154.4300,,:FIRE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY FIRE:,:F3 BISHOP FIRE  
DEPARTMENT:,:154.1450,,:FIRE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY FIRE:,:F1 COUNTY FIRE  
PRIMARY:,:154.4300,,:FIRE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY FIRE:,:F2 FIRE MUTUAL  
AID:,:154.2800,,:FIRE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:F3 POLICE MUTUAL  
AID:,:154.9200,,:POLICE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY EMS:,:F5 MOUNTAIN RESCUE  
ASSOCIATION:,:155.1600,,:MEDICAL:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:F4 SHERIFF POSSE SEARCH &  
RESCUE:,:155.1600,,:POLICE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY EMS:,:F3 HOSPITAL  
EMERGENCY:,:155.3400,,:MEDICAL:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:F1 OPERATIONS  
REPEATER:,:154.7250,,:POLICE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY EMS:,:F2 AMBULANCE-MEDIC  
DIRECT:,:154.0250,,:MEDICAL:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:COMM CENTER INTERAGENCY  
HOTLINE:,:453.0000,,:POLICE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:PROBATION  
DEPARTMENT:,:158.8650,,:POLICE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:TACTICAL  
OPERATIONS:,:155.5350,,:POLICE:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY EMS:,:F6 NEVADA HOSPITALS  
EMMA:,:155.1450,,:MEDICAL:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY EMS:,:F1 AMBULANCE-MEDIC  
REPEATER:,:154.0250,,:WNB612:,:MEDICAL:,:CA:,:INYO COUNTY:  
:INYO COUNTY:,:INYO COUNTY SHERIFFS DEPARTMENT:,:F2 OPERATIONS

DIRECT:,155.4150,::,POLICE:,CA:,INYO COUNTY:  
:AMADOR COUNTY:,AMADOR COUNTY SHERIFF:,F2 POLICE - SHERIFF POLICE  
COMMON:,45.5400,::,POLICE:,CA:,AMADOR COUNTY:  
:AMADOR COUNTY:,AMADOR COUNTY SHERIFF:,POLICE -  
SHERIFF:,45.6000,::,POLICE:,CA:,AMADOR COUNTY:  
:IRVINE:,IRVINE POLICE:,POLICE PRIMARY  
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COUNTY:  
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PRIMARY:,460.2000,KMA247:,POLICE:,CA:,ALAMEDA COUNTY:  
:KERMAN:,NORTH CENTRAL FPD:,F1 FIRE & MEDIC:,154.1900,::,FIRE:,CA:,FRESNO  
COUNTY:  
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FPD:,154.1900,::,FIRE:,CA:,FRESNO COUNTY:  
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5:,453.7250,::,FIRE:,CA:,KERN COUNTY:  
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YELLOW:,453.3750,::,FIRE:,CA:,KERN COUNTY:  
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BLUE:,453.3000,::,FIRE:,CA:,KERN COUNTY:

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BROWN:, 453.4000, ::, :POLICE:, :CA:, :KERN COUNTY:  
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6:, 453.2250, ::, :FIRE:, :CA:, :KERN COUNTY:  
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B:, 158.7300, ::, :POLICE:, :CA:, :KERN COUNTY:  
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AMBER:, 460.5750, ::, :FIRE:, :CA:, :KERN COUNTY:  
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C:, 453.7500, ::, :POLICE:, :CA:, :KERN COUNTY:  
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POINT:, 463.0250, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
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INTERSYSTEM:, 155.9100, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PEAK:, 463.1000, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
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C:, 154.9200, ::, :POLICE:, :CA:, :KERN COUNTY:  
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AREA:, 463.1750, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
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WHITE:, 453.2750, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PLANNED:, 460.1750, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PEAK:, 463.1250, ::, :MEDICAL:, :CA:, :KERN COUNTY:  
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D:, 460.0250, ::, :POLICE:, :CA:, :KERN COUNTY:  
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S&R:, 155.1600, ::, :OTHER:, :CA:, :KERN COUNTY:  
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S&R:, 155.1600, ::, :OTHER:, :CA:, :KERN COUNTY:  
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RESCUE:, 453.0125, ::, :OTHER:, :CA:, :KERN COUNTY:  
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A:, 159.1500, ::, :POLICE:, :CA:, :KERN COUNTY:  
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S&R:, 155.2950, ::, :OTHER:, :CA:, :KERN COUNTY:  
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1:, 453.2000, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PURPLE:, 453.9250, ::, :POLICE:, :CA:, :KERN COUNTY:  
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SYSTEM:, 460.2250, ::, :POLICE:, :CA:, :KERN COUNTY:  
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WHITE:, 453.6000, ::, :POLICE:, :CA:, :KERN COUNTY:  
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OPERATIONS E:, 460.0250, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PLANNED:, 460.1000, ::, :POLICE:, :CA:, :KERN COUNTY:  
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METRO:, 453.0500, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PEAK:,463.1500,::,MEDICAL:,CA:,KERN COUNTY:  
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GREEN:,453.7000,::,POLICE:,CA:,KERN COUNTY:  
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RESCUE:,155.2200,::,OTHER:,CA:,KERN COUNTY:  
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RED:,453.2250,::,POLICE:,CA:,KERN COUNTY:  
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PLANNED:,460.1250,::,POLICE:,CA:,KERN COUNTY:  
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DEVELOPMENTAL:,858.4875,::,OTHER:,CA:,KERN COUNTY:  
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RESCUE:,155.1600,::,OTHER:,CA:,KERN COUNTY:  
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8:,453.4500,::,FIRE:,CA:,KERN COUNTY:  
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AREA:,463.0750,::,MEDICAL:,CA:,KERN COUNTY:  
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CENTER:,463.0000,::,MEDICAL:,CA:,KERN COUNTY:  
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PEAK:,463.0500,::,MEDICAL:,CA:,KERN COUNTY:  
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COUNTY:  
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TACTICAL:,155.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
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(KC):,158.8050,::,POLICE:,CA:,MONTEREY COUNTY:  
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SECONDARY:,158.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
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PRIMARY:,460.6000,::,FIRE:,CA:,KINGS COUNTY:  
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FIREGROUND:,460.6250,::,FIRE:,CA:,KINGS COUNTY:  
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PRIMARY:,460.6000,::,FIRE:,CA:,KINGS COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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OPERATIONS:,460.5000,::,POLICE:,CA:,KINGS COUNTY:

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AID:,460.0250,::,:POLICE:,:CA:,:KINGS COUNTY:  
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DIRECT:,460.0250,::,:POLICE:,:CA:,:KINGS COUNTY:  
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DIRECT:,460.0750,::,:POLICE:,:CA:,:KINGS COUNTY:  
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COUNTY:  
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PRIMARY:,155.1300,::,:POLICE:,:CA:,:KINGS COUNTY:  
:KLAMATH:,:KLAMATH FPD:,:F5 DISPATCH:,153.7700,::,:FIRE:,:CA:,:DEL NORTE  
COUNTY:  
:LA CANADA:,:LA CANADA FIRE:,:FIRE & MEDICS -  
LACOFD:,154.3400,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
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CONTRACT:,483.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LA HABRA:,:LA HABRA POLICE:,:POLICE SECONDARY ORANGE  
NORTH:,460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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GREEN:,460.4750,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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DEPARTMENT:,33.4600,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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CONTRACT:,483.1375,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:LA JOLLA:,:UNIVERSITY OF CALIFORNIA  
MARSHAL:,:DISPATCH:,153.3200,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:LA MESA:,:LA MESA FIRE:,:F1 FIRE PRIMARY:,154.2050,::,:FIRE:,:CA:,:SAN DIEGO  
COUNTY:  
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DIEGO COUNTY:  
:LA MESA:,:LA MESA POLICE:,:F2 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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1:,153.8450,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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DIRECT:,153.8450,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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AID:,153.9950,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:LA MIRADA:,:LA MIRADA FIRE:,:FIRE - LACOFD:,154.4300,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:LA MIRADA:,:LA MIRADA POLICE:,:F13 POLICE - LACOSD  
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NORTH:,460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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GREEN:,460.3250,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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ANGELES COUNTY:  
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ANGELES COUNTY:

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CONTRACT:, 483.6875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LA QUINTA:, :LA QUINTA FIRE:, :FIRE PRIMARY -  
RCFD:, 151.1750, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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CONTRACT:, 159.0900, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
:LA SIERRA:, :LA SIERRA POLICE:, :LOMA LINDA UNIVERSITY  
PATROL:, 151.8900, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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RESCUE:, 155.1600, ::, :RESCUE:, :CA:, :RIVERSIDE COUNTY:  
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GREEN:, 153.8150, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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TACTICAL:, 155.5500, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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GOLD:, 154.9200, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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BLACK:, 155.4900, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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FPD:, 46.3200, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
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GREEN:, 460.4750, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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SOUTH:, 460.2000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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YELLOW:, 154.2350, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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RED:, 155.0250, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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GREEN:, 155.0250, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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WHITE:, 154.2800, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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BLUE:, 154.1750, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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INTERAGENCY:, 155.1150, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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ORANGE:, 154.2950, ::, :FIRE:, :CA:, :LAKE COUNTY:  
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COUNTY:  
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MOUNTAIN:, 463.0500, ::, :MEDICAL:, :CA:, :LAKE COUNTY:  
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OPERATIONS:, 155.2950, ::, :MEDICAL:, :CA:, :LAKE COUNTY:  
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HOSPITAL:, 463.1250, ::, :MEDICAL:, :CA:, :LAKE COUNTY:

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OPERATIONS:, 155.2050, :, :MEDICAL:, :CA:, :LAKE COUNTY:  
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MEDICS:, :DISPATCH:, 155.0250, :, :MEDICAL:, :CA:, :LAKE COUNTY:  
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MEDICS:, :, 155.0250, :, :MEDICAL:, :CA:, :LAKE COUNTY:  
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HOSPITAL:, 463.0750, :, :MEDICAL:, :CA:, :LAKE COUNTY:  
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F10:, 155.4300, :, :POLICE:, :CA:, :LAKE COUNTY:  
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F3:, 154.9200, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKE COUNTY:, :LAKE COUNTY SHERIFF:, :F9 FGLENN SHERIFF DIRECT  
F9:, 155.5500, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKE COUNTY:, :LAKE COUNTY SHERIFF:, :F7 CALCORD  
F7:, 156.0750, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKE COUNTY:, :LAKE COUNTY SHERIFF:, :F6 SEARCH & RESCUE  
F6:, 155.1600, :, :POLICE:, :CA:, :LAKE COUNTY:  
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F2:, 155.9700, :, :POLICE:, :CA:, :LAKE COUNTY:  
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F1:, 154.7550, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKE COUNTY:, :LAKE COUNTY SHERIFF:, :F8 COLUSA SHERIFF DIRECT  
F8:, 154.9500, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKE COUNTY:, :LAKE COUNTY TRANSIT  
DISTRICT:, :DISPATCH:, 462.1000, :, :POLICE:, :CA:, :LAKE COUNTY:  
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DIRECT:, 155.9700, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKE ELSINORE:, :LAKE ELSINORE FIRE:, :FIRE PRIMARY -  
CDF:, 151.3850, :, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
:LAKE ELSINORE:, :LAKE ELSINORE POLICE:, :POLICE - SHERIFF  
CONTRACT:, 158.8200, :, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
:LAKE ISABELLA:, :KERN VALLEY  
HOSPITAL:, :DISPATCH:, 155.2200, :, :MEDICAL:, :CA:, :KERN COUNTY:  
:LAKE TAHOE-SOUTH:, :BARTON HOSPITAL:, :DISPATCH:, 155.1600, :, :MEDICAL:, :CA:, :EL  
DORADO COUNTY:  
:LAKE VALLEY (MEYERS):, :CALIFORNIA HIGHWAY PATROL:, :GRAY BASE OFFICE #  
13:, 42.4800, :KML957:, :POLICE:, :CA:, :  
:LAKEPORT:, :LAKEPORT FIRE:, :F2 FIRE - COUNTY:, 155.0250, :, :FIRE:, :CA:, :LAKE  
COUNTY:  
:LAKEPORT:, :LAKEPORT FIRE:, :F1 FIRE PRIMARY:, 154.2350, :, :FIRE:, :CA:, :LAKE  
COUNTY:  
:LAKEPORT:, :LAKEPORT POLICE:, :F1 POLICE  
PRIMARY:, 155.6850, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKEPORT:, :LAKEPORT POLICE:, :F2 POLICE MUTUAL  
AID:, 154.9200, :, :POLICE:, :CA:, :LAKE COUNTY:  
:LAKEPORT (KELSEYVILLE):, :CALIFORNIA HIGHWAY PATROL:, :WHITE MOBILE OFFICE #  
7:, 42.7200, :KA4993:, :POLICE:, :CA:, :  
:LAKEPORT (KELSEYVILLE):, :CALIFORNIA HIGHWAY PATROL:, :WHITE BASE OFFICE #  
7:, 42.5600, :, :POLICE:, :CA:, :  
:LAKEVALLEY (MEYERS):, :CALIFORNIA HIGHWAY PATROL:, :GRAY MOBILE OFFICE #  
13:, 42.6800, :KA4993:, :POLICE:, :CA:, ::



:LAKEWOOD:,:LAKEWOOD FIRE:,:FIRE & MEDICS -  
LACOFD:,154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LAKEWOOD:,:LAKEWOOD POLICE:,:F14 POLICE - LACOSD  
CONTRACT:,483.1375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LANCASTER:,:LANCASTER FIRE:,:FIRE - LACOFD:,154.4000,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:LANCASTER:,:WILSON AMBULANCE:,:DISPATCH:,47.5400,::,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
:LANCASTER:,:LANCASTER POLICE:,:F5 POLICE - LACOSD CONTRACT  
F5:,482.8625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LARKSPUR:,:LARKSPUR FIRE:,:F2 FIRE COUNTYWIDE MUTUAL  
AID:,46.1200,::,:FIRE:,:CA:,:MARIN COUNTY:  
:LARKSPUR:,:LARKSPUR FIRE:,:F3 FIRE DISTRICTS:,46.5000,::,:FIRE:,:CA:,:MARIN  
COUNTY:  
:LARKSPUR:,:LARKSPUR FIRE:,:F1 FIRE PRIMARY:,46.4000,::,:FIRE:,:CA:,:MARIN  
COUNTY:  
:LARKSPUR:,:LARKSPUR POLICE:,:F1 TWIN CITIES PD  
PRIMARY:,39.2800,::,:POLICE:,:CA:,:MARIN COUNTY:  
:LARKSPUR:,:LARKSPUR POLICE:,:F5 SHERIFF  
LIAISON:,39.2400,::,:POLICE:,:CA:,:MARIN COUNTY:  
:LARKSPUR:,:LARKSPUR POLICE:,:F6 POLICE ZONE 1  
DISPATCH:,39.7200,::,:POLICE:,:CA:,:MARIN COUNTY:  
:LARKSPUR:,:LARKSPUR POLICE:,:F2 POLICE COUNTYWIDE MUTUAL  
AID:,39.5200,::,:POLICE:,:CA:,:MARIN COUNTY:  
:LARKSPUR:,:LARKSPUR POLICE:,:F3 POLICE DETECTIVES TACTICAL  
1:,39.8000,::,:POLICE:,:CA:,:MARIN COUNTY:  
:LARKSPUR:,:LARKSPUR POLICE:,:F4 POLICE PATROL TACTICAL  
2:,39.7800,::,:POLICE:,:CA:,:MARIN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY FIRE:,:F3 FIRE  
UTILITY:,154.3250,::,:FIRE:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY FIRE:,:F4 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY FIRE:,:F2 FIRE PRIMARY  
DIRECT:,154.4450,::,:FIRE:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY FIRE:,:F1 FIRE PRIMARY  
REPEATER:,154.4450,::,:FIRE:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY EMS:,:MED 5 BIG  
VALLEY:,463.1000,::,:MEDICAL:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY EMS:,:MED 6 LIKELY  
MOUNTAIN:,463.1250,::,:MEDICAL:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY EMS:,:AMBULANCE-  
MEDICS:,154.4000,::,:MEDICAL:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY EMS:,:MED 4 SHAFFER  
MOUNTAIN:,463.0750,::,:MEDICAL:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY SHERIFF:,:F3 POLICE  
COMMON:,155.7000,::,:POLICE:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY SHERIFF:,:F4 PATROL  
TACTICAL:,155.7750,::,:POLICE:,:CA:,:LASSEN COUNTY:  
:LASSEN COUNTY:,:LASSEN COUNTY SHERIFF:,:F2 PRIMARY  
OPERATIONS:,154.8750,::,:POLICE:,:CA:,:LASSEN COUNTY:  
:LAWNDALE:,:LAWNDALE FIRE:,:FIRE - LACOFD:,154.4300,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:LAWNDALE:,:LAWNDALE POLICE:,:F12 POLICE - LACOSD  
CONTRACT:,483.4375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LEMON GROVE:,:LEMON GROVE FIRE:,:FIRE PRIMARY:,154.2050,::,:FIRE:,:CA:,:SAN  
DIEGO COUNTY:  
:LEMON GROVE:,:LEMON GROVE FIRE:,:FIRE LOCAL:,46.4600,::,:FIRE:,:CA:,:SAN

DIEGO COUNTY:

:LEMON GROVE:,:LEMON GROVE POLICE:,:POLICE - SHERIFF  
CONTRACT:,:453.9500,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:LEMOORE:,:LEMOORE FIRE:,:FIRE - VFD:,:460.6000,::,:FIRE:,:CA:,:KINGS COUNTY:  
:LEMOORE:,:SOUTH VALLEY MEDICAL  
SERVICES:,:AMBULANCES:,:155.2200,::,:MEDICAL:,:CA:,:KINGS COUNTY:  
:LEMOORE:,:NAS LEMOORE MEDICS:,:DISPATCH:,:138.7500,::,:MEDICAL:,:CA:,:KINGS  
COUNTY:  
:LEMOORE:,:LEMOORE POLICE:,:POLICE PRIMARY:,:460.1250,::,:POLICE:,:CA:,:KINGS  
COUNTY:  
:LINCOLN:,:LINCOLN FIRE:,:FIRE PRIMARY:,:154.3550,::,:FIRE:,:CA:,:PLACER  
COUNTY:  
:LINCOLN:,:LINCOLN POLICE:,:F2 POLICE  
ROSEVILLE:,:155.5650,::,:POLICE:,:CA:,:PLACER COUNTY:  
:LINCOLN:,:LINCOLN POLICE:,:F1 POLICE  
PRIMARY:,:156.0900,::,:POLICE:,:CA:,:PLACER COUNTY:  
:LINCOLN:,:LINCOLN POLICE:,:F3 POLICE  
AUBURN:,:154.6500,::,:POLICE:,:CA:,:PLACER COUNTY:  
:LIVE OAK:,:LIVE OAK POLICE:,:F2 POLICE  
SECONDARY:,:460.5000,::,:POLICE:,:CA:,:SUTTER COUNTY:  
:LIVE OAK:,:LIVE OAK POLICE:,:F5 POLICE MUTUAL  
AID:,:460.0250,::,:POLICE:,:CA:,:SUTTER COUNTY:  
:LIVE OAK:,:LIVE OAK FIRE:,:FIRE PRIMARY:,:154.2500,::,:FIRE:,:CA:,:SUTTER  
COUNTY:  
:LIVE OAK:,:LIVE OAK POLICE:,:F1 POLICE  
PRIMARY:,:460.2250,::,:POLICE:,:CA:,:SUTTER COUNTY:  
:LIVE OAK:,:LIVE OAK POLICE:,:F4 POLICE YUBA  
SHERIFF:,:460.1000,::,:POLICE:,:CA:,:SUTTER COUNTY:  
:LIVE OAK:,:LIVE OAK POLICE:,:F3 POLICE  
TACTICAL:,:460.1750,::,:POLICE:,:CA:,:SUTTER COUNTY:  
:LIVERMORE:,:LIVERMORE FIRE:,:F1 FIRE PRIMARY  
(16):,:154.2350,::,:FIRE:,:CA:,:ALAMEDA COUNTY:  
:LIVERMORE:,:LIVERMORE FIRE:,:F2 FIRE SECONDARY  
RED:,:154.0700,::,:FIRE:,:CA:,:ALAMEDA COUNTY:  
:LIVERMORE:,:VALLEY MEMORIAL HOSPITAL:,:155.1600,::,:MEDICAL:,:CA:,:ALAMEDA  
COUNTY:  
:LIVERMORE:,:VETERANS ADMINISTRATION:,:164.5000,::,:MEDICAL:,:CA:,:ALAMEDA  
COUNTY:  
:LIVERMORE:,:LIVERMORE POLICE:,:F1 POLICE PRIMARY  
(400):,:154.8450,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:LIVERMORE:,:LIVERMORE POLICE:,:F3 POLICE  
TACTICAL:,:155.0700,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:LIVERMORE:,:LIVERMORE POLICE:,:F2 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:LIVERMORE:,:LIVERMORE POLICE:,:F4 POLICE  
TACTICAL:,:155.1300,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:LIVERMORE:,:CHABOT LIVERMORE POLICE:,:POLICE  
DISPATCH:,:484.2125,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:LIVINGSTON:,:LIVINGSTON FIRE:,:F1 FIRE  
PRIMARY:,:154.4000,::,:FIRE:,:CA:,:MERCED COUNTY:  
:LIVINGSTON:,:LIVINGSTON FIRE:,:F2 FIRE  
SECONDARY:,:154.3400,::,:FIRE:,:CA:,:MERCED COUNTY:  
:LIVINGSTON:,:LIVINGSTON POLICE:,:F2 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:MERCED COUNTY:  
:LIVINGSTON:,:LIVINGSTON POLICE:,:F3 POLICE  
SHERIFF:,:154.8900,::,:POLICE:,:CA:,:MERCED COUNTY:  
:LIVINGSTON:,:LIVINGSTON POLICE:,:F1 POLICE

PRIMARY:,155.6850,::,POLICE:,CA:,MERCED COUNTY:  
:LOMA LINDA:,LOMA LINDA FIRE:,FIRE PRIMARY:,154.1900,::,FIRE:,CA:,SAN  
BERNARDINO COUNTY:  
:LOMA LINDA:,LOMA LINDA UNIVERSITY MED  
CENTER:,DISPATCH:,453.0375,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:LOMA LINDA:,LOMA LINDA POLICE:,POLICE -  
SHERIFF:,155.9700,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:LOMITA:,LOMITA FIRE:,FIRE & MEDICS - LACOFD:,154.4300,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:LOMITA:,LOMITA POLICE:,F7 POLICE - LACOSD  
CONTRACT:,484.0375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOMPOC:,LOMPOC POLICE:,F4 POLICE MUTUAL AID  
WHITE:,460.0250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:LOMPOC:,LOMPOC FIRE:,FIRE PRIMARY:,154.4300,::,FIRE:,CA:,SANTA BARBARA  
COUNTY:  
:LOMPOC:,LOMPOC POLICE:,F3 POLICE EMERGENCY  
RED:,460.0500,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:LOMPOC:,LOMPOC POLICE:,F1 POLICE PRIMARY  
GREEN:,460.1250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:LOMPOC:,LOMPOC POLICE:,F2 POLICE SECONDARY  
YELLOW:,460.3250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:LONG BEACH:,QUEEN MARY SECURITY:,DISPATCH:,464.7750,::,OTHER:,CA:,LOS  
ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH FIRE:,FIRE ADMINISTRATION &  
TELEPHONE:,453.5500,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH POLICE:,F4 POLICE DETECTIVES &  
TACTICAL:,460.4500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH FIRE:,F1 FIRE & MEDICS  
PRIMARY:,153.9500,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH POLICE:,F2 POLICE EAST  
NORTH:,460.2250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH FIRE:,F5 FIRE MUTUAL AID WHITE  
3:,154.2950,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH POLICE:,F1POLICE WEST  
CENTRAL:,460.1250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LIFEFIGHT AIR  
COORDINATION:,DISPATCH:,123.0750,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH POLICE:,F3 POLICE RECORDS &  
TACTICAL:,460.3500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,QUEEN MARY OPERATIONS:,DISPATCH:,464.3750,::,OTHER:,CA:,LOS  
ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH FIRE:,F2 FIRE MUTUAL AID WHITE  
1:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,BOWERS AMBULANCE:,DISPATCH:,47.6200,::,MEDICAL:,CA:,LOS  
ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH COMMUNITY HOSPITAL EMERGENCY  
RADIO:,DISPATCH:,155.3400,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH FIRE:,F3 FIRE MUTUAL AID WHITE  
2:,154.2650,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH POLICE:,POLICE MOBILE DATA  
TERMINALS:,45.1000,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH COMMUNITY COLLEGE  
POLICE:,DISPATCH:,154.6500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH POLICE:,POLICE MOBILE DATA  
TERMINALS:,860.2375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LONG BEACH:,LONG BEACH AIRPORT  
POLICE:,DISPATCH:,453.5000,::,POLICE:,CA:,LOS ANGELES COUNTY:

:LOOMIS:,:LOOMIS POLICE:,:DISPATCH  
POLICE/FIRE:,:154.3550,::,:POLICE:,:CA:,:PLACER COUNTY:  
:LOS ALAMITOS:,:LOS ALAMITOS POLICE:,:POLICE SECONDARY ORANGE  
NORTH:,:460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:LOS ALAMITOS:,:LOS ALAMITOS POLICE:,:POLICE PRIMARY  
GREEN:,:460.3250,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:LOS ALTOS:,:LOS ALTOS POLICE:,:F1 POLICE  
PRIMARY:,:483.0625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS:,:LOS ALTOS POLICE:,:F2 POLICE PRIMARY  
DIRECT:,:483.0625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS:,:LOS ALTOS POLICE:,:F3 POLICE MOUNTAIN VIEW  
SECONDARY:,:482.7875,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS:,:LOS ALTOS POLICE:,:F4 POLICE  
SECONDARY:,:482.3375,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS:,:LOS ALTOS FIRE:,:F1 FIRE PRIMARY:,:154.4000,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
:LOS ALTOS:,:LOS ALTOS FIRE:,:F2 FIRE MUTUAL  
AID:,:154.2800,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS:,:LOS ALTOS FIRE:,:F3 FIRE MOUNTAIN VIEW  
FD:,:154.0250,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS HILLS:,:LOS ALTOS HILLS POLICE:,:POLICE -  
SHERIFF:,:155.7000,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ALTOS HILLS:,:LOS ALTOS HILLS FIRE:,:FIRE - LOS ALTOS  
FD:,:154.4000,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY FIRE:,:FIREFIGHTING AIR TO  
AIR:,:118.9250,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LONG BEACH-LONG BEACH NAVAL  
FD:,:DISPATCH:,:140.3250,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY FIRE:,:FIREFIGHTING AIR TO  
GROUND:,:118.9250,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:VERDUGO FIRE COMMUNICATIONS:,:FIRE MUTUAL AID WHITE 2 TAC  
5:,:154.2650,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:PASADENA-CA INSTITUTE OF TECHNOLOGY:,:JET PROPULSION LAB FIRE  
F2:,:508.2125,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES FIRE:,:CITYWIDE ADMINISTRATION & SERVICES  
F6:,:860.4375,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY FIRE:,:F3  
FIRE:,:482.7125,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES FIRE:,:CITYWIDE EMERGENCY MEDICAL FIREGROUND  
F10:,:856.2375,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:VERDUGO FIRE COMMUNICATIONS:,:LOCAL GOVERNMENT COORDINATION TAC  
8:,:153.8450,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:PASADENA-CA INSTITUTE OF TECHNOLOGY:,:JET PROPULSION LAB FIRE  
F1:,:508.1875,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES FIRE:,:F9 CITYWIDE ALTERNATE  
DISPATCH:,:857.2375,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY FIRE:,:F3 LOS ANGELES INCIDENT  
TACTICAL 2:,:470.6125,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES FIRE:,:VALLEY DIVISION 3 OPERATIONS  
F3:,:858.9375,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:VERDUGO FIRE COMMUNICATIONS:,:FIRE PRIMARY DISPATCH  
1:,:46.1000,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES FIRE:,:F5 CITYWIDE INVESTIGATIVE  
SERVICES:,:856.9375,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:VAN NUYS-GENERAL MOTORS  
FD:,:DISPATCH:,:153.3200,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES FIRE:,:SOUTH DIVISION 2 FIREGROUND

F14:,856.4375,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES FIRE:,SOUTH DIVISION 2 FIREGROUND  
F16:,858.7625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,BURBANK-BURBANK STUDIOS:,F1 FIRE &  
SECURITY:,152.9900,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F9 ANTELOPE INCIDENT  
TACTICAL:,470.6375,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F7C CATALINA ISLAND INCIDENT  
TACTICAL:,470.4625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,SOUTH BAY REGIONAL PUBLIC COMMUNICATIONS AUTHORITY:,FIRE SOUTH  
BAY TORRANCE F3:,154.1300,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LONG BEACH-EDISON COMPANY ALAMITOS  
FD:,DISPATCH:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,CULVER CITY-MCDONNELL DOUGLAS HELICOPTER CO  
FD:,DISPATCH:,140.3250,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES FIRE:,F11 CITYWIDE COMMAND  
1:,860.7625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,BURBANK-BURBANK STUDIOS:,F2 FIRE  
SECONDARY:,153.0200,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES FIRE:,F15 VALLEY DIVISION 3  
FIREGROUND:,859.7625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES FIRE:,F18 CENTRAL DIVISION 1  
FIREGROUND:,856.7625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F8 COUNTYWIDE ADMINISTRATION &  
COMMAND:,470.5375,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F5  
FIRE:,482.7625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,PALMDALE-LOCKHEED FD:,DISPATCH:,158.2950,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:LOS ANGELES:,PALMDALE-ROCKWELL INTERNATIONAL  
FD:,DISPATCH:,464.8750,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,VERDUGO FIRE COMMUNICATIONS:,FIRE & MEDICS ALT/COMMAND TAC  
3:,153.7700,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F2 LOS ANGELES DISPATCH &  
COMMAND:,470.4375,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,SOUTH BAY REGIONAL PUBLIC COMMUNICATIONS AUTHORITY:,FIRE SOUTH  
BAY PRIMARY F1:,154.3550,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES FIRE:,F13 CENTRAL DIVISION 1  
FIREGROUND:,857.4375,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F1 LOS ANGELES INCIDENT  
TACTICAL 1:,470.5625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,A4 COUNTYWIDE FIRE MUTUAL  
AID:,154.2650,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,A3 ANTELOPE MALIBU DISPATCH &  
COMMAND:,154.4000,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LONG BEACH-DOUGLAS AIRCRAFT CO  
FD:,DISPATCH:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY FIRE:,F6  
FIRE:,482.7875,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,EL SEGUNDO-HUGHES AIRCRAFT CO  
FD:,DISPATCH:,153.3800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,CARSON-SHELL OIL COMPANY  
FD:,DISPATCH:,464.8750,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,PALMDALE-NERO & ASSOCIATES FD AT USAF PLANT  
42:,DISPATCH:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES FIRE:,F2 SOUTH DIVISION 2  
OPERATIONS:,859.9375,::,FIRE:,CA:,LOS ANGELES COUNTY:

:LOS ANGELES:, :CARSON-FLETCHER OIL & REFINING  
FD:, :DISPATCH:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :VERDUGO FIRE COMMUNICATIONS:, :FIRE & MEDICS SECONDARY TAC  
2:, 154.2050, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :TORRANCE-MOBIL OIL COMPANY  
FD:, :DISPATCH:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES FIRE:, :F4 METRO EMERGENCY MEDICAL  
SERVICES:, 857.9375, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :VERDUGO FIRE COMMUNICATIONS:, :FIRE MUTUAL AID WHITE 3 TAC  
6:, 154.2950, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :COUNTYWIDE ADMINISTRATION &  
COMMAND F4:, 470.5125, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES FIRE:, :F17 VALLEY DIVISION 3  
FIREGROUND:, 857.7625, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :HELIPORT AIR-  
GROUND:, 119.9750, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :A6 COUNTYWIDE FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :F1  
FIRE:, 482.6625, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :BURBANK-BURBANK STUDIOS:, :F3 FIRE  
INCOMING:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :A1 LOS ANGELES DISPATCH &  
COMMAND:, 154.4300, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :VERDUGO FIRE COMMUNICATIONS:, :FIRE & MEDICS PRIMARY TAC  
1:, 153.8900, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :F5 VALLEY INCIDENT TACTICAL  
1:, 470.6625, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES FIRE:, :F1 CENTRAL DIVISION 1  
OPERATIONS:, 860.9375, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :BURBANK-LOCKHEED FD:, :DISPATCH:, 158.2950, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES FIRE:, :F12 CITYWIDE COMMAND  
2:, 858.2375, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :F7 VALLEY INCIDENT TACTICAL  
2:, 470.4625, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :F2  
FIRE:, 482.6875, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY EMS:, :F2 DOWNEY DOWNEY COMMUNITY  
HOSPITAL:, 463.0250, ::, :MEDICAL:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :VERDUGO FIRE COMMUNICATIONS:, :FIRE DATA DISPATCH  
2:, 859.2375, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :ALLEN AMBULANCE  
ASSOCIATES:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY FIRE:, :F6 VALLEY DISPATCH &  
COMMAND:, 470.4125, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY EMS:, :F1 HOLLYWOOD CEDARS SINAI  
MEDICAL CENTER:, 463.0000, ::, :MEDICAL:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :SOUTH BAY REGIONAL PUBLIC COMMUNICATIONS AUTHORITY:, :FIRE  
MUTUAL AID F2:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY EMS:, :F4 CULVER CITY BROTMAN MEDICAL  
CENTER:, 463.0750, ::, :MEDICAL:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :PICO RIVERA-NORTHRUP CORP  
FD:, :DISPATCH:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY HOSPITAL EMERGENCY ADMINISTRATION  
RA:, :HOSPITAL EMERGENCY REGION:, 155.2800, ::, :MEDICAL:, :CA:, :LOS ANGELES  
COUNTY:

:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY FIRE:,:A5 LOS ANGELES TACTICAL &  
COMMAND: ,154.2950,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY EMS:,:F8 ARCADIA METHODIST HOSP OF  
SOUTHERN CA: ,463.1750,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY FIRE:,:A2 VALLEY DISPATCH &  
COMMAND: ,154.3400,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:UCLA MEDICAL CENTER  
MEDICS: ,:DISPATCH: ,155.4450,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:VERDUGO FIRE COMMUNICATIONS: ,:FIRE MUTUAL AID WHITE 1 TAC  
4: ,154.2800,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:COLE-SCHAEFFER  
AMBULANCE: ,:DISPATCH: ,47.5800,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:LOS ANGELES FIRE: ,:F7 METRO FIRE  
DISPATCH: ,859.4375,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY EMS: ,:F9 ORANGE COUNTY HOSPITAL  
CALLING: ,462.9500,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:PALMDALE-LOCKHEED FD: ,:DISPATCH: ,154.2800,::, :FIRE: ,:CA: ,:LOS  
ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY EMS: ,:F6 PARAMOUNT CHARTER SUBURBAN  
HOSPITAL: ,463.1250,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:POMONA-GENERAL DYNAMICS  
FD: ,:DISPATCH: ,154.2800,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY EMS: ,:LOS ANGELES COUNTY HOSPITAL  
CALLING F10: ,462.9750,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:WILMINGTON-CHAMPLIN PETROLEUM COMPANY  
FD: ,:DISPATCH: ,154.2800,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY EMS: ,:F5 WHITTIER BEVERLY COMMUNITY  
HOSPITAL: ,463.1000,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:VERDUGO FIRE COMMUNICATIONS: ,:LA COUNTY FD VALLEY TAC  
7: ,154.3400,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY EMS: ,:F7 LANCASTER ANTELOPE VALLEY  
HOSPITAL MC: ,463.1500,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY FIRE: ,:F4  
FIRE: ,482.7375,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:HAWTHORNE-NORTHRUP AIRCRAFT  
FD: ,:DISPATCH: ,154.2800,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:LOS ANGELES FIRE: ,:F8 VALLEY FIRE & MEDIC  
DISPATCH: ,858.4375,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY FIRE: ,:F10 ANTELOPE DISPATCH &  
COMMAND: ,470.3625,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:CARSON-ATLANTIC RICHFIELD CO  
FD: ,:DISPATCH: ,154.2800,::, :FIRE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:GOODHEW AMBULANCE: ,:DISPATCH: ,46.0400,::, :MEDICAL: ,:CA: ,:LOS  
ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY EMS: ,:F3 LOS ANGELES HOLLYWOOD  
PRESBYTERIAN MED CENTER: ,463.0500,::, :MEDICAL: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:LOS ANGELES EMERGENCY  
SERVICES: ,:OPERATIONS: ,47.5000,::, :OTHER: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY LIFEGUARD DIVISION: ,:POINT DUME NORTH  
SECTION: ,37.0800,::, :OTHER: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES: ,:LOS ANGELES EMERGENCY  
SERVICES: ,:COMMAND: ,39.9000,::, :OTHER: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY SHERIFF: ,:F32 COUNTYWIDE SPECIAL OPS  
1 DIGITAL VOICE: ,483.8875,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY SHERIFF: ,:F1 NORTH DISP 1 ALTADENA -  
CRESCENTA VALLEY: ,483.9875,::, :POLICE: ,:CA: ,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY: ,:LOS ANGELES COUNTY LIFEGUARD DIVISION: ,:TACTICAL ALL

SECTIONS:,37.3600,::,OTHER:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,CITYWIDE POLICE MUTUAL AID TAC  
4:,154.9200,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY:,MARINA  
PATROL:,156.5750,::,OTHER:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F28 CITYWIDE BURGLARY AUTO DETAIL  
BAD:,154.7550,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY LIFEGUARD DIVISION:,SANTA MONICA  
CENTRAL SECTION:,37.2000,::,OTHER:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F11 NORTH DISP 11 TEMPLE  
CITY:,482.9875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY:,COAST GUARD  
LIAISON:,157.1000,::,OTHER:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F12 FUTURE SYSTEMS  
PLANNED:,484.5625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES AIRPORT DEPARTMENT OPS  
ONTARIO:,DISPATCH:,453.3750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F36 FUTURE SYSTEMS  
PLANNED:,507.1125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,CITYWIDE NARCOTICS DETAIL DIRECT TAC  
6:,453.1000,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES AIRPORT DEPARTMENT POLICE  
ONTARIO:,DISPATCH:,460.1000,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F6 NORTH HOLLYWOOD/FOOTHILL  
DIVISION:,507.1625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F42 COUNTYWIDE CUSTODY  
(PAIRED & NON-PAIRED):,483.7125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F3 HOLLENBECK AREA-NEWTON DIV.-CRASH  
UNIT:,507.1875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F28 FUTURE SYSTEMS  
PLANNED:,484.9625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F29 FUTURE SYSTEMS  
PLANNED:,484.9875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F16 FUTURE SYSTEMS  
PLANNED:,484.6625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F17 SOUTH BUREAU TACTICAL OPS ROVER  
7:,507.0375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F18 FUTURE SYSTEMS  
PLANNED:,484.7125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F56 COUNTYWIDE PORTABLE  
REPEATER 2:,486.8375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F23 FUTURE SYSTEMS  
PLANNED:,484.8375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F13 CITYWIDE EMERGENCY TRIGGER/EMERGENCY  
IN PROGRESS:,507.0875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES AIRPORT DEPARTMENT POLICE  
PALMDALE:,DISPATCH:,460.5250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F15 FUTURE SYSTEMS  
PLANNED:,484.6375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F17 FUTURE SYSTEMS  
PLANNED:,484.6875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F2 RAMPART AREA-N.E.  
DIVISION:,506.9375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES AIRPORT DEPARTMENT OPS  
PALMDALE:,DISPATCH:,453.3750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F28 NORTH LOCAL L-TAC-7 SAN  
DIMAS-TEMPLE CITY-WALNUT:,483.2375,::,POLICE:,CA:,LOS ANGELES COUNTY:



:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F19 WEST AREA A-TAC  
2: ,483.1625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F9 SOUTHWEST  
AREA: ,506.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES AIRPORT DEPARTMENT:,:DISPATCH  
LAX: ,453.3750,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F3 EAST DISP 3 EAST LOS  
ANGELES: ,483.2125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F20 EAST AREA A-TAC  
3: ,483.0125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
LOS ANGELES:,:LOS ANGELES POLICE:,:F20 FUTURE SYSTEMS  
PLANNED: ,484.7625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F15 COUNTYWIDE C-TAC  
1: ,482.8125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F24 FUTURE SYSTEMS  
PLANNED: ,484.8625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F1 FUTURE SYSTEMS  
PLANNED: ,484.2875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F53 SIMPLEX  
C: ,483.1875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F23 WEST LOCAL L-TAC-2  
AVALON-LENNOX-LOMITA: ,482.8875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F55 COUNTYWIDE PORTABLE  
REPEATER 1: ,486.6375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F1 CENTRAL BUREAU-CENTRAL CITY  
AREA: ,506.7375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F11 FUTURE SYSTEMS  
PLANNED: ,484.5375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F13 EAST DISP 13 NORWALK -  
PICO RIVERA: ,483.7625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F4 SOUTH DISP 4 FIRESTONE -  
LYNWOOD: ,483.2625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F31 FUTURE SYSTEMS  
PLANNED: ,506.4375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F9 FUTURE SYSTEMS  
PLANNED: ,484.4875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F36 NORTH/CENTRAL  
INVESTIGATORS 2: ,483.3375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F47 EAST MUTUAL AID 4 SAN  
GABRIEL VALLEY: ,484.1375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY MARSHAL:,:F2 TACTICAL  
PORTABLES: ,155.7750,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY MARSHAL:,:F1 MOBILE EXTENDERS  
PORTABLE: ,155.9400,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:CITYWIDE NARCOTICS  
DETAIL: ,453.1000,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES CITY COLLEGE POLICE:,:DISPATCH  
2: ,154.7250,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:CITYWIDE  
SURVEILLANCE: ,154.8750,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F30 FUTURE SYSTEMS  
PLANNED: ,506.3625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:SOUTH BAY REGIONAL PUBLIC COMMUNICATIONS AUTHORITY:,:POLICE  
TACTICAL 1: ,471.1125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F18 NORTH AREA A-TAC  
1: ,483.0875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES COMMUNITY COLLEGE:,:PD 9

LOCATIONS:,154.6500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F5 FUTURE SYSTEMS  
PLANNED:,484.3875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F30 SOUTH LOCAL L-TAC-9  
FIRESTONE-LYNWOOD:,483.8625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F13 FUTURE SYSTEMS  
PLANNED:,484.5875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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:LOS ANGELES:,LOS ANGELES POLICE:,F22  
SURVEILLANCE:,154.9650,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F12 HOLLYWOOD DIVISION/CRASH  
UNIT:,507.2125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F14 SOUTH DISP 14  
LAKEWOOD:,483.1375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F52 SIMPLEX  
A:,483.0375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F37 WEST INVESTIGATORS  
3:,483.8125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F7 SOUTH BUREAU-77 TH STREET  
DIVISION:,507.2375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F10 WEST BUREAU-WEST LOS ANGELES  
AREA:,506.7625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F33 FUTURE SYSTEMS  
PLANNED:,506.6125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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7:,483.5125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F15 VALLEY BUREAU TACTICAL OPS ROVER  
5:,507.2625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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ONTARIO:,DISPATCH:,153.8000,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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PLANNED:,506.6875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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4:,484.1125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES COMMUNITY COLLEGE:,POLICE  
TACTICAL:,155.6850,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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PLANNED:,484.8875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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TACTICAL:,156.0900,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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1:,154.8300,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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WALNUT:,482.9375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F8 HARBOR AREA-S.E. DIVISION CRASH  
UNIT:,506.7875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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PLANNED:,484.4375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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E:,158.8650,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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LAX:,DISPATCH:,153.8000,::,POLICE:,CA:,LOS ANGELES COUNTY:

:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F7 WEST DISP 7 LOMITA -  
AVALON:,:484.0375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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PALMDALE:,:DISPATCH:,:153.8000,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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:LOS ANGELES:,:SOUTH BAY REGIONAL PUBLIC COMMUNICATIONS AUTHORITY:,:POLICE  
TACTICAL 2:,:470.3125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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INDUSTRY:,:483.9625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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LAX:,:DISPATCH:,:460.5250,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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LAKEWOOD:,:483.3875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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DETAIL:,:453.8750,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES AIRPORT DEPARTMENT OPS VAN  
NUYS:,:DISPATCH:,:153.8000,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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AREA:,:506.8875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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4:,:506.5875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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REY-MALIBU-W HOLLYWOOD:,:483.9125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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UNIT:,:506.9625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F46 CENTRAL EASTERN L A  
BASIN MUTUAL AID 3:,:483.7875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F17 COUNTYWIDE C-TAC  
3:,:483.0625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F9 SOUTH DISP 9  
CARSON:,:484.1625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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DISPATCH 3:,:470.8125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES AIRPORT DEPARTMENT POLICE VAN  
NUYS:,:DISPATCH:,:460.5250,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F16 WEST BUREAU TACTICAL OPS ROVER  
6:,:506.8125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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DISPATCH 2:,:470.3875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F40 CENTRAL INVESTIGATORS  
6:,:483.6625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,:LOS ANGELES COUNTY SHERIFF:,:F50 COUNTYWIDE COURT  
SERVICE:,:483.9375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:AIR-AIR:,:122.2500,::,:POLICE:,:CA:,:LOS  
ANGELES COUNTY:  
:LOS ANGELES:,:LOS ANGELES POLICE:,:F2 FUTURE SYSTEMS

PLANNED:,484.3125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,NORTH DISP 5 ANTELOPE  
VALLEY - SANTA CLARITA F5:,482.8625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F43 COUNTYWIDE EMERGENCY  
CALLING:,483.2875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F32 FUTURE SYSTEMS  
PLANNED:,506.4625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F12 WEST DISP 12  
LENNOX:,483.4375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F34 COUNTYWIDE SPECIAL OPS  
3 DIGITAL VOICE:,483.8875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,CITYWIDE MOBILE DATA TERMINAL  
D:,159.0300,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F4 VALLEY BUREAU-VAN NUYS  
DIVISION:,506.7125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,L-TAC-8 NORTH ALTADENA-  
ANTELOPE VALLEY-CRESCENTA VALLEY:,483.1125,::,POLICE:,CA:,LOS ANGELES  
COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,SOUTH BUREAU MOBILE DATA TERMINAL  
B:,158.9100,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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INVESTIGATIONS DIV:,506.8375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,F21 FUTURE SYSTEMS  
PLANNED:,484.7875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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PLANNED:,484.9125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F51 COUNTYWIDE SPECIAL UNIT  
& RESCUE DISPATCH:,483.5375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES AIRPORT DEPARTMENT POLICE VAN  
NUYS:,DISPATCH:,460.1000,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,HELICOPTER-  
HELIPORT:,123.0500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,CENTRAL BUREAU MOBILE DATA TERMINAL  
C:,159.1800,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F49 COUNTYWIDE SHERIFFS  
RADIO CENTER ACCESS:,483.5625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F39 SOUTHEAST INVESTIGATORS  
5:,483.7375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES  
POLICE:,UNICOMM/MULTICOMM:,122.7500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F44 NORTH MUTUAL AID 1  
ANTELOPE VALLEY-SAN FERNANDO VALLEY:,483.5875,::,POLICE:,CA:,LOS ANGELES  
COUNTY:  
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PICO RIVERA:,484.0125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F10 WEST DISP 10 MALIBU -  
MARINA DEL REY:,482.9125,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES:,LOS ANGELES POLICE:,HELICOPTER AIR-  
AIR:,123.0250,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F27 L-TAC-6 EAST LOS  
ANGELES:,483.4875,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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PLANNED:,506.8625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY SHERIFF:,F48 CENTRAL AREA MUTUAL AID  
5 EASTERN L A BASIN:,484.0625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:,LOS ANGELES COUNTY MARSHAL:,F1 OPERATIONS  
WEST:,46.0200,::,POLICE:,CA:,LOS ANGELES COUNTY:

:LOS ANGELES:, :LOS ANGELES POLICE:, :CITYWIDE TACTICAL 2 SURVEILLANCE TAC  
2:, 154.7700, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES POLICE:, :HARBOR POLICE REMOTE  
DEVICE:, 460.5375, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY SHERIFF:, :F33 COUNTYWIDE SPECIAL OPS  
2 DIGITAL VOICE:, 482.9625, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY MARSHAL:, :F2 OPERATIONS  
EAST:, 45.8200, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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PLANNED:, 484.9375, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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PALMDALE:, :DISPATCH:, 460.1000, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY SHERIFF:, :F8 EAST DISP 8  
INDUSTRY:, 483.6875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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OPERATIONS:, 153.9800, ::, :OTHER:, :CA:, :LOS ANGELES COUNTY:  
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INVESTIGATORS 1:, 483.3125, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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OPERATIONS:, 156.6000, ::, :OTHER:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY SHERIFF:, :F26 SOUTH L-TAC-5  
CARSON:, 483.4625, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY LIFEGUARD DIVISION:, :HERMOSA BEACH  
SOUTH SECTION:, 37.0600, ::, :OTHER:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES CITY COLLEGE POLICE:, :DISPATCH  
1:, 154.7400, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY:, :MARINA  
PATROL:, 156.4250, ::, :OTHER:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES AIRPORT DEPARTMENT OPS VAN  
NUYS:, :DISPATCH:, 453.3750, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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3:, 154.9950, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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PLANNED:, 484.3375, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY SHERIFF:, :F45 CENTRAL WESTERN L A  
BASIN MUTUAL AID 2:, 484.0875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :LOS ANGELES COUNTY SHERIFF:, :F2 WEST DISP 2 WEST  
HOLLYWOOD:, 483.3625, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES POLICE:, :CITYWIDE SPECIAL SERVICES/VICE  
DETAIL:, 453.3500, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES POLICE:, :VALLEY BUREAU MOBILE DATA TERMINAL  
A:, 159.1500, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES AIRPORT DEPARTMENT POLICE  
ONTARIO:, :DISPATCH:, 460.5250, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :LOS ANGELES POLICE:, :F22 FUTURE SYSTEMS  
PLANNED:, 484.8125, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES:, :SOUTH BAY REGIONAL PUBLIC COMMUNICATIONS AUTHORITY:, :POLICE  
DISPATCH 1:, 470.6375, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS ANGELES COUNTY:, :SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT:, :SYSTEMWIDE  
TRANSIT POLICE C:, 453.6250, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:LOS BANOS:, :LOS BANOS FIRE:, :F2 FIRE  
SECONDARY:, 154.3400, ::, :FIRE:, :CA:, :MERCED COUNTY:  
:LOS BANOS:, :LOS BANOS FIRE:, :F1 FIRE PRIMARY:, 154.3100, ::, :FIRE:, :CA:, :MERCED  
COUNTY:  
:LOS BANOS:, :LOS BANOS POLICE:, :F1 POLICE  
PRIMARY:, 154.8150, ::, :POLICE:, :CA:, :MERCED COUNTY:  
:LOS BANOS:, :LOS BANOS POLICE F3 POLICE SHERIFF:, :POLICE-SHERIFF

F3:,154.8900,::,POLICE:,CA:,MERCED COUNTY:  
:LOS BANOS:,LOS BANOS POLICE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,MERCED COUNTY:  
:LOS BANOS:,CALIFORNIA HIGHWAY PATROL:,ORANGE BASE OFFICE #  
30:,42.8800,KBQ805:,POLICE:,CA:,::  
:LOS BANOS:,CALIFORNIA HIGHWAY PATROL:,ORANGE MOBILE OFFICE #  
30:,42.6600,KA4993:,POLICE:,CA:,::  
:LOS GATOS:,LOS GATOS POLICE:,F2 POLICE  
PRIMARY:,482.9125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:LOS GATOS:,LOS GATOS POLICE:,F1 POLICE  
PRIMARY:,482.9125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:LOS GATOS:,LOS GATOS FIRE:,FIRE - CENTRAL  
FPD:,154.2500,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:LOS GATOS:,LOS GATOS POLICE:,F3 POLICE PRIMARY  
DIRECT:,482.9125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:LOS GATOS:,LOS GATOS POLICE:,F4 POLICE  
SECONDARY:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:LOS GATOS:,LOS GATOS POLICE:,F5 POLICE SECONDARY  
DIRECT:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:LOS GATOS:,LOS GATOS POLICE:,POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:LOS OSOS:,SOUTH BAY FPD & MEDICS:,DISPATCH:,154.1300,::,FIRE:,CA:,SAN  
LUIS OBISBO COUNTY:  
:LOYALTON:,LOYALTON FIRE:,FIRE VOLUNTEER  
DEPARTMENT:,154.2350,::,FIRE:,CA:,SIERRA COUNTY:  
:LOYALTON:,LOYALTON POLICE:,POLICE -  
SHERIFF:,39.8600,::,POLICE:,CA:,SIERRA COUNTY:  
:LYNWOOD:,LYNWOOD FIRE:,FIRE PRIMARY RED 1:,154.2500,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:LYNWOOD:,LYNWOOD POLICE:,POLICE - LACOSD CONTRACT  
F4:,483.2625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:MADERA:,MADERA FIRE:,F2 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,MADERA  
COUNTY:  
:MADERA:,MADERA FIRE:,F1 FIRE PRIMARY:,154.0700,::,FIRE:,CA:,MADERA  
COUNTY:  
:MADERA:,MADERA COMMUNITY  
HOSPITAL:,DISPATCH:,462.9500,::,MEDICAL:,CA:,MADERA COUNTY:  
:MADERA:,MADERA POLICE:,F2 POLICE  
SECONDARY:,453.1500,::,POLICE:,CA:,MADERA COUNTY:  
:MADERA:,MADERA POLICE:,F3 POLICE  
TACTICAL:,453.4000,::,POLICE:,CA:,MADERA COUNTY:  
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66:,42.6600,KA4993:,POLICE:,CA:,::  
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66:,42.8800,KMD634:,POLICE:,CA:,::  
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DISPATCH:,151.4600,::,FIRE:,CA:,MADERA COUNTY:  
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D:,155.1600,::,POLICE:,CA:,MADERA COUNTY:  
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CONTROL:,39.4200,::,POLICE:,CA:,MADERA COUNTY:  
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PEAK:,462.9500,::,MEDICAL:,CA:,MADERA COUNTY:  
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MADERA:,39.8000,::,POLICE:,CA:,MADERA COUNTY:

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AID:, 154.9200, ::, :POLICE:, :CA:, :MADERA COUNTY:  
:MADERA COUNTY:, :MADERA COUNTY SHERIFF:, :JUVENILE  
DETENTION:, 453.8375, ::, :POLICE:, :CA:, :MADERA COUNTY:  
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A:, 155.6400, ::, :POLICE:, :CA:, :MADERA COUNTY:  
:MADERA COUNTY:, :MADERA COUNTY SHERIFF:, :F2 EAST OPERATIONS  
MOUNTAINS:, 39.8800, ::, :POLICE:, :CA:, :MADERA COUNTY:  
:MADERA COUNTY:, :MADERA COUNTY EMS:, :MED 7 DEADWOOD  
PEAK:, 463.1500, ::, :MEDICAL:, :CA:, :MADERA COUNTY:  
:MADERA COUNTY:, :MADERA COUNTY SHERIFF:, :F2 CENTRAL-MADERA-CHOWCHILLA-  
OPERATIONS VALLEY:, 39.6200, ::, :POLICE:, :CA:, :MADERA COUNTY:  
:MADERA COUNTY:, :MADERA COUNTY SHERIFF:, :POLICE MUTUAL AID  
C:, 154.9200, ::, :POLICE:, :CA:, :MADERA COUNTY:  
:MADERA COUNTY:, :MADERA COUNTY SHERIFF:, :PATROL TACTICAL  
B:, 155.9700, ::, :POLICE:, :CA:, :MADERA COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES FIRE:, :F3 FIRE COUNTY FIRE  
REPEATER:, 153.8600, ::, :FIRE:, :CA:, :MONO COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES FIRE:, :F1 FIRE  
PRIMARY:, 153.9500, ::, :FIRE:, :CA:, :MONO COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES FIRE:, :F2  
FIREGROUND:, 154.4300, ::, :FIRE:, :CA:, :MONO COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES POLICE:, :F4 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES POLICE:, :F3 SEARCH &  
RESCUE:, 155.1600, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES POLICE:, :F1 POLICE  
SHERIFF:, 154.8000, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MAMMOTH LAKES:, :MAMMOTH LAKES POLICE:, :F2 POLICE  
LOCAL:, 155.5950, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH POLICE:, :F2 POLICE DISPATCH  
2:, 470.3875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH POLICE:, :F1 POLICE  
PRIMARY:, 470.6375, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH FIRE:, :F3 FIRE SOUTH  
BAY:, 154.1300, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH FIRE:, :F5 FIREGROUND  
WHITE:, 154.2950, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH FIRE:, :F1 FIRE  
PRIMARY:, 154.3550, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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1:, 471.1125, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH POLICE:, :F3 POLICE DISPATCH  
3:, 470.8125, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH POLICE:, :F5 POLICE TACTICAL  
2:, 470.3125, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH FIRE:, :F4 FIREGROUND  
WHITE:, 154.2650, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:MANHATTAN BEACH:, :MANHATTAN BEACH FIRE:, :F2 FIRE MUTUAL AID  
WHITE:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:MARICOPA:, :MARICOPA POLICE:, :F2 POLICE & FIRE  
CWMA:, 453.2250, ::, :FIRE:, :CA:, :KERN COUNTY:  
:MARICOPA:, :MARICOPA POLICE:, :POLICE PRIMARY:, 158.8500, ::, :POLICE:, :CA:, :KERN  
COUNTY:  
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PRIMARY:, 453.1000, ::, :POLICE:, :CA:, :KERN COUNTY:  
:MARIN - CORTE MADERA:, :CALIFORNIA HIGHWAY PATROL:, :SILVER MOBILE OFFICE #

34:,42.2800,,:KA4993,,:POLICE,,:CA,,:  
:MARIN - CORTE MADERA,,:CALIFORNIA HIGHWAY PATROL,,:SILVER BASE OFFICE #  
34:,42.0800,,:KMD773,,:POLICE,,:CA,,:  
:MARIN COUNTY,,:MARIN COUNTY FIRE,,:MT TAMALPAIS VOTED  
REPEATER,,:37.1000,,:FIRE,,:CA,,:MARIN COUNTY:  
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A,,:154.2800,,:FIRE,,:CA,,:MARIN COUNTY:  
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FD,,:46.2000,,:FIRE,,:CA,,:MARIN COUNTY:  
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TACTICAL,,:46.4600,,:FIRE,,:CA,,:MARIN COUNTY:  
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MEDICS,,:46.5000,,:FIRE,,:CA,,:MARIN COUNTY:  
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FD,,:154.3250,,:FIRE,,:CA,,:MARIN COUNTY:  
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TACTICAL,,:46.0800,,:FIRE,,:CA,,:MARIN COUNTY:  
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EMERGENCY,,:155.3400,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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AID,,:46.1200,,:FIRE,,:CA,,:MARIN COUNTY:  
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HOSPITAL,,:155.3550,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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LINK,,:460.6125,,:FIRE,,:CA,,:MARIN COUNTY:  
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TAMALPAIS,,:462.9750,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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B,,:154.3700,,:FIRE,,:CA,,:MARIN COUNTY:  
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COUNTY:  
:MARIN COUNTY,,:MARIN COUNTY FIRE,,:CORTE MADERA & LARKSPUR  
FD,,:46.4000,,:FIRE,,:CA,,:MARIN COUNTY:  
:MARIN COUNTY,,:MARIN COUNTY FIRE,,:F1 WOODACRE COUNTY FIRE &  
MEDICS,,:46.2800,,:FIRE,,:CA,,:MARIN COUNTY:  
:MARIN COUNTY,,:MARIN COUNTY FIRE,,:KENTFIELD FPD SECONDARY  
OPERATIONS,,:482.7875,,:FIRE,,:CA,,:MARIN COUNTY:  
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TERTIARY,,:463.1750,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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SECONDARY,,:463.0250,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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TAMALPAIS,,:463.0000,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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PRIMARY,,:463.0500,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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DISPATCH,,:155.1000,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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DIRECT,,:155.1000,,:MEDICAL,,:CA,,:MARIN COUNTY:  
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SHERIFF,,:DEVELOPMENTAL,,:37.3200,,:POLICE,,:CA,,:MARIN COUNTY:  
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CLERS,,:453.8750,,:POLICE,,:CA,,:MARIN COUNTY:  
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A,,:153.9350,,:POLICE,,:CA,,:MARIN COUNTY:  
:MARIN COUNTY,,:MARIN COUNTY SHERIFF,,:F2 CONTROL 2 POLICE COUNTYWIDE MUTUAL  
AID,,:39.5200,,:POLICE,,:CA,,:MARIN COUNTY:



:MARIN COUNTY:,:MARIN COUNTY SHERIFF:,:PATROL MOBILE  
EXTENDERS: ,154.7400,::,:POLICE:,:CA:,:MARIN COUNTY:  
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SHERIFF:,:DEVELOPMENTAL: ,37.0400,::,:POLICE:,:CA:,:MARIN COUNTY:  
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B: ,154.9200,::,:POLICE:,:CA:,:MARIN COUNTY:  
:MARIN COUNTY:,:MARIN COUNTY SHERIFF:,:F1 CONTROL 1 FIELD OPERATIONS  
PRIMARY: ,39.2400,::,:POLICE:,:CA:,:MARIN COUNTY:  
:MARIN COUNTY:,:MARIN COUNTY SHERIFF:,:F4 CONTROL 11 DETECTIVES TASK FORCES  
NARCOTICS: ,39.0800,::,:POLICE:,:CA:,:MARIN COUNTY:  
:MARIN COUNTY:,:MARIN COUNTY SHERIFF:,:F3 CONTROL 3 OPERATIONS  
SECONDARY: ,39.3600,::,:POLICE:,:CA:,:MARIN COUNTY:  
:MARIN COUNTY:,:MARIN COUNTY SHERIFF:,:SEARCH & RESCUE  
C: ,155.1600,::,:POLICE:,:CA:,:MARIN COUNTY:  
:MARINA:,:MARINA FIRE:,:F2 FIRE SECONDARY: ,154.3700,::,:FIRE:,:CA:,:MARIN  
COUNTY:  
:MARINA:,:MARINA FIRE:,:F1 FIRE PRIMARY: ,154.2350,::,:FIRE:,:CA:,:MARIN  
COUNTY:  
:MARINA:,:MARINA POLICE:,:F1 POLICE PRIMARY: ,158.8350,::,:POLICE:,:CA:,:MARIN  
COUNTY:  
:MARINA:,:MARINA POLICE:,:F2 POLICE  
SECONDARY: ,158.9100,::,:POLICE:,:CA:,:MARIN COUNTY:  
:MARIPOSA:,:JOHN C FREMONT HOSPITAL:,:CONTROL  
3: ,153.9950,::,:MEDICAL:,:CA:,:MARIPOSA COUNTY:  
:MARIPOSA:,:RIGGS AMBULANCE:,:AMB 31: ,852.6125,::,:MEDICAL:,:CA:,:MARIPOSA  
COUNTY:  
:MARIPOSA COUNTY:,:MARIPOSA COUNTY SHERIFF:,:F4 POLICE MUTUAL  
AID: ,154.9200,::,:POLICE:,:CA:,:MARIPOSA COUNTY:  
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REPEATER: ,153.9950,::,:POLICE:,:CA:,:MARIPOSA COUNTY:  
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LIAISON: ,154.8900,::,:POLICE:,:CA:,:MARIPOSA COUNTY:  
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DIRECT: ,153.9950,::,:POLICE:,:CA:,:MARIPOSA COUNTY:  
:MARIPOSA:,:CALIFORNIA HIGHWAY PATROL:,:ORANGE M OBILE OFFICE #  
63: ,42.6600, :KA4993:,:POLICE:,:CA:,:  
:MARIPOSA:,:CALIFORNIA HIGHWAY PATROL:,:ORANGE BASE OFFICE #  
63: ,42.8800, :KDE675:,:POLICE:,:CA:,:  
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DISPATCH: ,151.4600,::,:FIRE:,:CA:,:MARIPOSA COUNTY:  
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PEAK: ,463.1500,::,:MEDICAL:,:CA:,:MARIPOSA COUNTY:  
:MARIPOSA COUNTY:,:MARIPOSA COUNTY EMS:,:MED 8 JOHN FREMONT  
HOSPITAL: ,463.1750,::,:MEDICAL:,:CA:,:MARIPOSA COUNTY:  
:MARIPOSA COUNTY:,:MARIPOSA COUNTY EMS:,:MED 3 JOHN FREMONT  
HOSPITAL: ,463.0500,::,:MEDICAL:,:CA:,:MARIPOSA COUNTY:  
:MARIPOSA COUNTY:,:MARIPOSA COUNTY EMS:,:MED 6 TURTLE  
ROCK: ,463.1250,::,:MEDICAL:,:CA:,:MARIPOSA COUNTY:  
:MARIPOSA COUNTY:,:MARIPOSA COUNTY EMS:,:MED 9 MIAMI  
PEAK: ,462.9500,::,:MEDICAL:,:CA:,:MARIPOSA COUNTY:  
:MARTINEZ:,:SHELL OIL CO FIRE  
DEPARTMENT:,:DISPATCH: ,490.8375,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
:MARTINEZ:,:SEA LAND OIL CO FIRE  
DEPARTMENT:,:DISPATCH: ,154.2800,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
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FPD: ,46.3200,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
:MARTINEZ:,:TOSCO CORP FIRE

DEPARTMENT:, :DISPATCH:, 158.3100, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
:MARTINEZ:, :MERRITHEW MEMORIAL  
HOSPITAL:, :DISPATCH:, 155.4000, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
:MARTINEZ:, :VETERANS ADMINISTRATION  
HOSPITAL:, :DISPATCH:, 163.0000, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
:MARTINEZ:, :KAISER FOUNDATION  
HOSPITAL:, :DISPATCH:, 464.8750, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
:MARTINEZ:, :MARTINEZ POLICE:, :F1 POLICE  
PRIMARY:, 460.4750, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:MARTINEZ:, :MARTINEZ POLICE:, :F3 POLICE  
COMMON:, 460.1000, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:MARTINEZ:, :MARTINEZ POLICE:, :F2 POLICE  
SECONDARY:, 460.0250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:MAYWOOD:, :MAYWOOD FIRE:, :FIRE - LACOFD:, 154.4300, ::, :POLICE:, :CA:, :LOS  
ANGELES COUNTY:  
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ANGELES COUNTY:  
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PRIMARY:, 460.1000, ::, :POLICE:, :CA:, :KERN COUNTY:  
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PRIMARY:, 158.8500, ::, :POLICE:, :CA:, :KERN COUNTY:  
:MENDECINO COUNTY:, :MENDECINO COUNTY SHERIFF:, :F4 OPERATIONS  
TACTICAL:, 155.9100, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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PRIMARY:, 154.7550, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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R:, 155.2650, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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TACTICAL:, 154.8000, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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SECURITY:, 154.8300, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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R:, 155.1600, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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SECURITY:, 154.8150, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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ENFORCEMENT TEAM OPS:, 154.8450, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :FORT BRAGG FD:, :DISPATCH  
PRIMARY:, 45.2400, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :REDWOOD VALLEY-CALPELLA  
FPD:, :DISPATCH:, 154.1300, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :FORT BRAGG  
FD:, :DISPATCH/WATER:, 45.0800, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :MENDOCINO FPD  
PRIMARY:, :DISPATCH:, 45.2400, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :WESTPORT VFD:, :DISPATCH  
PRIMARY:, 45.2400, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :LAYTONVILLE-LONG VALLEY  
FPD:, :DISPATCH:, 154.0700, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :WILLITS-BROOKTRAILS  
CSD:, :DISPATCH:, 154.3550, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :POTTER VALLEY  
CSD:, :DISPATCH:, 154.2050, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :ALBION-LITTLE RIVER  
VFD:, :DISPATCH:, 46.4800, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:

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WARDEN:, :DISPATCH:, 46.2200, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :HOPLAND VFD:, :DISPATCH:, 154.1900, ::, :FIRE:, :CA:, :MENDOCINO  
COUNTY:  
:MENDICINO COUNTY:, :GUALALA-SOUTH COAST FPD &  
MEDICS:, :DISPATCH:, 153.8900, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :ELK-GREENWOOD RIDGE  
FD:, :DISPATCH:, 153.9500, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :LEGGETT VALLEY  
FPD:, :DISPATCH:, 46.2200, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :WESTPORT VFD FORT BRAGG  
FD:, :DISPATCH:, 45.0800, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :ELK VFD &  
MEDICS:, :DISPATCH:, 153.8900, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
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CSD:, :DISPATCH:, 153.7700, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :COVELO FPD &  
MEDICS:, :DISPATCH:, 154.1900, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :GARCIA FIRE &  
RESCUE:, :DISPATCH:, 153.7700, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDICINO COUNTY:, :POINT ARENA  
FD:, :DISPATCH:, 153.7700, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
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LINK:, 462.5250, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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HOSPITAL:, 463.1750, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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HOSPITAL:, 463.1000, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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HOSPITAL:, 462.9750, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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LOOKOUT:, 463.0750, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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HOSPITAL:, 463.1250, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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PEAK:, 463.0500, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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MOUNTAIN:, 463.0250, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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HOSPITAL:, 463.1500, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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ARENA:, 463.0000, ::, :MEDICAL:, :CA:, :MENDOCINO COUNTY:  
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FD:, :DISPATCH:, 45.0800, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
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DISPATCH:, 153.8900, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDOCINO COUNTY:, :MENDOCINO COUNTY FIRE:, :PRESENT CDF  
DISPATCH:, 151.3850, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
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AID:, 153.9500, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDOCINO COUNTY:, :MENDOCINO COUNTY FIRE:, :F3 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
:MENDOTA:, :MENDOTA FIRE:, :FIRE - MID VALLEY  
FPD:, 154.4450, ::, :FIRE:, :CA:, :FRESNO COUNTY:  
:MENDOTA:, :MENDOTA POLICE:, :F1 POLICE  
PRIMARY:, 155.5350, ::, :POLICE:, :CA:, :FRESNO COUNTY:  
:MENLO PARK:, :MENLO PARK FIRE:, :F2 FIRE MUTUAL

AID:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:MENLO PARK:,MENLO PARK POLICE:,F8 POLICE PALO ALTO  
PD:,482.6125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:MENLO PARK:,MENLO PARK FIRE:,F1 FIRE PROTECTION  
DISTRICT:,154.3700,::,FIRE:,CA:,SAN MATEO COUNTY:  
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DATA:,857.2125,::,POLICE:,CA:,SAN MATEO COUNTY:  
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PRIMARY:,488.3375,::,POLICE:,CA:,SAN MATEO COUNTY:  
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3:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:MENLO PARK:,MENLO PARK POLICE:,F7 POLICE EAST PALO ALTO  
PD:,488.3875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:MENLO PARK:,MENLO PARK POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:MENLO PARK:,MENLO PARK POLICE:,F4 SHERIFF  
PRIMARY:,488.9875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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DIRECT:,488.3375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:MENLO PARK:,MENLO PARK POLICE:,F6 POLICE ATHERTON  
PD:,488.0875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,MERCED COUNTY:  
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TACTICAL:,155.4300,::,POLICE:,CA:,MERCED COUNTY:  
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64:,42.8800,KMC983:,POLICE:,CA:,  
:MERCED:,CALIFORNIA HIGHWAY PATROL:,ORANGE MOBILE OFFICE #  
64:,42.6600,KA4993:,POLICE:,CA:,  
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SECONDARY:,154.3400,::,FIRE:,CA:,MERCED COUNTY:  
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BULLION:,463.1750,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,GUSTINE/WESTSIDE  
COMMUNITY:,DISPATCH:,155.2650,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,LOS BANOS COMMUNITY  
HOSPITAL:,DISPATCH:,155.3550,::,MEDICAL:,CA:,MERCED COUNTY:  
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BLANCO:,463.0500,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,DOS PALOS  
HOSPITAL:,DISPATCH:,155.2650,::,MEDICAL:,CA:,MERCED COUNTY:  
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82):,DISPATCH:,155.2650,::,MEDICAL:,CA:,MERCED COUNTY:  
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DISPATCH:,155.2950,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,MERCED COMMUNITY MEDICAL CENTER:,F1  
DISPATCH:,155.2800,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,RIGGS AMBULANCE (91-  
99):,DISPATCH:,852.6125,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,ALPINE MOTHER LODGE SAN JOAQUIN EMS AGENCY:,MED 9 MEDIC  
DISPATCH:,462.9500,::,MEDICAL:,CA:,MERCED COUNTY:  
:MERCED COUNTY:,ALPINE MOTHER LODGE SAN JOAQUIN EMS AGENCY:,MED 6 MOUNT  
BULLION:,463.1250,::,MEDICAL:,CA:,MERCED COUNTY:  
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SHERIFF:,153.9950,::,POLICE:,CA:,MERCED COUNTY:  
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POLICE:,155.5200,::,POLICE:,CA:,MERCED COUNTY:  
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POLICE:,154.8150,::,POLICE:,CA:,MERCED COUNTY:  
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TACTICAL:,155.4300,::,POLICE:,CA:,MERCED COUNTY:  
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POLICE:,155.6850,::,POLICE:,CA:,MERCED COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,MERCED COUNTY:  
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POLICE:,154.7250,::,POLICE:,CA:,MERCED COUNTY:  
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PRIMARY:,154.8900,::,POLICE:,CA:,MERCED COUNTY:  
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PRIMARY:,46.5000,::,FIRE:,CA:,MARIN COUNTY:  
:MILL VALLEY:,MILL VALLEY FIRE:,F2 FIRE COUNTYWIDE MUTUAL  
AID:,46.1200,::,FIRE:,CA:,MARIN COUNTY:  
:MILL VALLEY:,MILL VALLEY FIRE:,FIRE MOBILE  
EXTENDERS:,155.0550,::,FIRE:,CA:,MARIN COUNTY:  
:MILL VALLEY:,MILL VALLEY POLICE:,F4 POLICE BELVEDERE  
PD:,39.7400,::,POLICE:,CA:,MARIN COUNTY:  
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1:,39.7200,::,POLICE:,CA:,MARIN COUNTY:  
:MILL VALLEY:,MILL VALLEY POLICE:,POLICE MOBILE  
EXTENDERS:,154.8750,::,POLICE:,CA:,MARIN COUNTY:  
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EXTENDERS:,155.5800,::,POLICE:,CA:,MARIN COUNTY:  
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TACTICAL:,39.8800,::,POLICE:,CA:,MARIN COUNTY:  
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COUNTY:  
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MATEO COUNTY:  
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MATEO COUNTY:  
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AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
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PRIMARY:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:MILLBRAE:,MILLBRAE POLICE:,F5 POLICE PRIMARY  
DIRECT:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:

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1: ,488.8625,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:MILLBRAE:,:MILLBRAE FIRE:,:F3 FIRE MUTUAL AID: ,154.2650,::,:FIRE:,:CA:,:SAN  
MATEO COUNTY:  
:MILLBRAE:,:MILLBRAE FIRE:,:F1 FIRE & MEDIC  
PRIMARY: ,153.9500,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:MILPITAS:,:MILPITAS POLICE:,:F3 POLICE  
SECONDARY: ,483.0125,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:MILPITAS:,:MILPITAS POLICE:,:F2 POLICE  
PRIMARY: ,482.8625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
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PRIMARY: ,482.8625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:MILPITAS:,:MILPITAS POLICE:,:F5 POLICE MUTUAL AID  
DIRECT: ,482.3375,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:MILPITAS:,:MILPITAS FIRE:,:F1 FIRE PRIMARY  
UHF: ,460.6250,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:MILPITAS:,:MILPITAS POLICE:,:SCHOOL CAMPUS  
SECURITY: ,463.8875,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:MILPITAS:,:MILPITAS FIRE:,:F3 FIRE MUTUAL AID: ,154.2950,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
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AID: ,482.3375,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
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CLARA COUNTY:  
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:MILPITAS:,:MILPITAS FIRE:,:F2 FIRE SECONDARY: ,154.2500,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
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DIRECT: ,482.8625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
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DIRECT: ,483.0125,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
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AID: ,154.9200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:MILPITAS:,:MILPITAS POLICE:,:POLICE MOBILE  
DATA: ,859.4625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
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VHF: ,154.4000,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
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CLARA COUNTY:  
:MISSION VIEJO:,:MISSION VIEJO POLICE:,:POLICE - SHERIFF BEAT 50-59  
YELLOW: ,460.4250,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:MODESTO:,:CALIFORNIA HIGHWAY PATROL:,:YELLOW MOBILE OFFICE #  
48: ,42.3000,,:KA4993:,:POLICE:,:CA:,::  
:MODESTO:,:CALIFORNIA HIGHWAY PATROL:,:YELLOW BASE OFFICE #  
48: ,42.5200,,:KMC985:,:POLICE:,:CA:,::  
:MODESTO:,:YOSEMITE COMMUNITY COLLEGE  
DISTRICT: ,:POLICE: ,453.3500,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
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NARCOTICS: ,460.1750,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
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A: ,856.4625,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
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TACTICAL: ,460.5000,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
:MODESTO:,:MODESTO POLICE:,:POLICE WIDE AREA  
B: ,857.4625,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
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AID:,460.0250,::,POLICE:,CA:,STANISLAUS COUNTY:  
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PRIMARY:,460.3750,::,POLICE:,CA:,STANISLAUS COUNTY:  
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COUNTY:  
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AID:,154.2950,::,FIRE:,CA:,STANISLAUS COUNTY:  
:MODESTO:,MODESTO FIRE:,F4 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,STANISLAUS COUNTY:  
:MODOC COUNTY:,MODOC COUNTY FIRE:,F3 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,MODOC COUNTY:  
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PRIMARY:,154.4000,::,FIRE:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY EMS:,MED 6 LIKELY  
MOUNTAIN:,463.1250,::,MEDICAL:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY EMS:,MED 6 HAPPY CAMP  
BASE:,463.1250,::,MEDICAL:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY EMS:,MED 7 WARNER  
RIDGE:,463.1500,::,MEDICAL:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY SHERIFF:,POLICE BACKUP CHP  
A:,42.1800,::,POLICE:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY SHERIFF:,F3 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY SHERIFF:,POLICE BACKUP CHP  
B:,42.3400,::,POLICE:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY SHERIFF:,F1 OPERATIONS  
REPEATER:,155.8500,::,POLICE:,CA:,MODOC COUNTY:  
:MODOC COUNTY:,MODOC COUNTY SHERIFF:,F4 POLICE LAW NET  
5:,155.7000,::,POLICE:,CA:,MODOC COUNTY:  
:MONO COUNTY:,MONO COUNTY FIRE:,F6 LEE VINING  
VFD:,154.1300,::,FIRE:,CA:,MONO COUNTY:  
:MONO COUNTY:,MONO COUNTY FIRE:,F8 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,MONO COUNTY:  
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COUNTY:  
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PRIMARY:,154.4000,::,FIRE:,CA:,MONO COUNTY:  
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MEADOWS:,149.0250,::,FIRE:,CA:,MONO COUNTY:  
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COUNTY:  
:MONO COUNTY:,MONO COUNTY FIRE:,LEE VINING  
VFD:,154.1300,::,FIRE:,CA:,MONO COUNTY:  
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DISPATCH:,154.0250,::,FIRE:,CA:,MONO COUNTY:  
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FPD:,154.4000,::,FIRE:,CA:,MONO COUNTY:

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REPEATERS:, 153.8600, ::, :FIRE:, :CA:, :MONO COUNTY:  
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FPD:, 154.3850, ::, :FIRE:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MONO COUNTY EMS:, :F7 NV AMBULANCE-MEDIC  
EMMA:, 155.1450, ::, :MEDICAL:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MONO COUNTY EMS:, :AMBULANCE-MEDIC DISPATCH  
1:, 154.0250, ::, :MEDICAL:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MAMMOTH MOUNTAIN SKI AREA:, :SKI  
PATROLS:, 851.3875, ::, :OTHER:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MONO COUNTY SHERIFF:, :F2 OPERATIONS  
PRIMARY:, 154.8000, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MONO COUNTY SHERIFF:, :COMM CENTER INTERAGENCY  
HOTLINE:, 453.0000, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MONO COUNTY SHERIFF:, :F3 SEARCH &  
RESCUE:, 155.1600, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MONO COUNTY SHERIFF:, :F4 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MONO COUNTY:, :MAMMOTH MOUNTAIN SKI AREA:, :F1 SECURITY  
OPERATIONS:, 151.8350, ::, :POLICE:, :CA:, :MONO COUNTY:  
:MONROVIA:, :MONROVIA FIRE:, :F2 FIREGROUND:, 154.1150, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:MONROVIA:, :MONROVIA FIRE:, :F3 FIRE MUTUAL AID:, 154.2800, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:MONROVIA:, :MONROVIA FIRE:, :F1 FIRE & MEDICS:, 154.3700, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MONROVIA:, :MONROVIA POLICE:, :F4 POLICE TACTICAL  
(MOTAC), 154.1150, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MONROVIA:, :MONROVIA POLICE:, :F1 POLICE  
PRIMARY:, 158.7300, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MONROVIA:, :MONROVIA POLICE:, :F5 POLICE  
TACTICAL:, 155.8800, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MONTAGUE:, :MONTAGUE FIRE:, :FIRE COUNTY  
DISTRICTS:, 154.3400, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:MONTAGUE:, :MONTAGUE FIRE:, :FIRE PROTECTION  
DISTRICT:, 154.1450, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:MONTAGUE:, :MONTAGUE POLICE:, :F3 POLICE  
COMMON:, 155.7000, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:MONTAGUE:, :MONTAGUE POLICE:, :F2 POLICE  
SECONDARY:, 155.6400, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:MONTAGUE:, :MONTAGUE POLICE:, :F1 POLICE  
PRIMARY:, 155.0100, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:MONTCLAIR:, :MONTCLAIR FIRE:, :FIRE PRIMARY:, 154.0250, ::, :FIRE:, :CA:, :SAN  
BERNARDINO COUNTY:  
:MONTCLAIR:, :MONTCLAIR POLICE:, :F1 POLICE  
PRIMARY:, 155.5950, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:MONTCLAIR:, :MONTCLAIR POLICE:, :F2 POLICE  
SECONDARY:, 155.5500, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:MONTCLAIR:, :MONTCLAIR POLICE:, :F3 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:MONTCLAIR:, :MONTCLAIR POLICE:, :F4 PRECOM  
PRIMARY:, 155.0400, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:MONTE SERENO:, :MONTE SERENO FIRE:, :FIRE - CENTRAL  
FPD:, 154.2500, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:MONTE SERENO:, :MONTE SERENO POLICE:, :POLICE -



SHERIFF:,155.7000,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MONTEBELLO:,MONTEBELLO FIRE:,FIRE & MEDICS  
RED:,154.2500,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:MONTEBELLO:,MONTEBELLO POLICE:,MONTEBELLO 3:,482.2125,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:MONTEBELLO:,MONTEBELLO FIRE:,FIRE MUTUAL AID WHITE  
2:,154.2800,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:MONTEBELLO:,MONTEBELLO POLICE:,MONTEBELLO 2:,482.1125,::,POLICE:,CA:,LOS  
ANGELES COUNTY:  
:MONTEBELLO:,MONTEBELLO FIRE:,FIRE & MEDICS:,854.1125,::,FIRE:,CA:,LOS  
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4:,154.2650,::,FIRE:,CA:,LOS ANGELES COUNTY:  
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PRIMARY:,155.7300,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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MALL:,482.1500,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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:MONTEBELLO:,RISHER AMBULANCE  
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3:,154.2950,::,FIRE:,CA:,LOS ANGELES COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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SECONDARY:,155.8650,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:MONTEREY:,MONTEREY FIRE:,F3 FIRE  
TACTICAL:,153.8600,::,FIRE:,CA:,MONTEREY COUNTY:  
:MONTEREY:,MONTEREY FIRE:,F2 FIRE MUTUAL  
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DISPATCH:,153.8900,::,FIRE:,CA:,MONTEREY COUNTY:  
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TACTICAL:,158.8500,::,POLICE:,CA:,MONTEREY COUNTY:  
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PRIMARY:,155.4900,::,POLICE:,CA:,MONTEREY COUNTY:  
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TEAM:,DISPATCH:,45.9600,::,POLICE:,CA:,MONTEREY COUNTY:

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TEAM:,:OPERATIONS:,:151.9250,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
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FIRE:,:158.9250,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY:,:CENTRAL CALIFORNIA RESCUE TEAM:,:SEARCH &  
RESCUE:,:155.1600,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY:,:MONTEREY POLICE:,:F1 PACIFIC GROVE  
PD:,:155.5350,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
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AID:,:154.9200,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
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1:,:154.2800,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY SHERIFF:,:F5 COAST FIRE MUTUAL AID  
RESCUE:,:154.2800,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:BIG SUR FIRE:,:DISPATCH:,:46.0000,::,:FIRE:,:CA:,:MONTEREY  
COUNTY:  
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GOLD:,:154.1750,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
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2:,:154.2650,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:FORT ORD FD:,:DISPATCH:,:165.0625,::,:FIRE:,:CA:,:MONTEREY  
COUNTY:  
:MONTEREY COUNTY:,:PAJARO CSD - WATSONVILLE  
FD:,:DISPATCH:,:154.4450,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY FIRE:,:F10 FIRE MUTUAL AID WHITE  
3:,:154.2950,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY EMS:,:MED 6 MONTEREY MEDIC-  
HOSPITAL:,:463.1250,::,:MEDICAL:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY FIRE:,:F1 SALINAS VALLEY  
RED:,:154.3700,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
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AREA:,:463.0750,::,:MEDICAL:,:CA:,:MONTEREY COUNTY:  
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GREEN:,:154.2050,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
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COAST:,:463.0000,::,:MEDICAL:,:CA:,:MONTEREY COUNTY:  
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ORANGE:,:154.2350,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:FORT ORD MAST  
HELO:,:DISPATCH:,:36.5000,::,:MEDICAL:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:PENINSULA AIRPORT DISTRICT  
FD:,:DISPATCH:,:158.9250,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
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AREA:,:463.1000,::,:MEDICAL:,:CA:,:MONTEREY COUNTY:  
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SILVER:,:153.8600,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY FIRE:,:F3 MONTEREY FD  
BLUE:,:153.8900,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:NAVAL POST GRADUATE SCHOOL  
FD:,:DISPATCH:,:140.0500,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY FIRE:,:AROMAS  
1:,:154.3250,::,:FIRE:,:CA:,:MONTEREY COUNTY:  
:MONTEREY COUNTY:,:MONTEREY COUNTY EMS:,:MED 7 SALINAS MEDIC-  
HOSPITAL:,:463.1500,::,:MEDICAL:,:CA:,:MONTEREY COUNTY:  
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AREA:,463.0250,::,MEDICAL:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,FORT ORD ARMY  
AMBULANCE:,DISPATCH:,413.0250,::,MEDICAL:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,TRANSPORTATION  
OPERATIONS:,460.7875,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,MARSHAL  
OPERATIONS:,460.8125,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,F3 HOST  
OPERATIONS:,468.6625,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,PEBBLE BEACH COMPANY:,F1  
SECURITY:,152.3000,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,MARSHAL  
OPERATIONS:,460.7125,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,DISTRICT ATTORNEY  
TACTICAL:,158.9700,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LOCAL  
GOVERNMENT:,DISPATCH:,453.6750,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F15 COAST GUARD  
16:,156.8000,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,TRANSPORTATION  
OPERATIONS:,468.7125,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,COUNTYWIDE CALCORD INTERAGENCY  
COMMON F14:,156.0750,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,F1 LAGUNA SECA  
EVENTS:,151.1600,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F11 MONTEREY CENTER SEASIDE  
POLICE:,155.6850,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,F2 HOST  
OPERATIONS:,465.7125,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F12 COUNTYWIDE POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,MONTEREY COUNTY:  
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OPERATIONS:,460.6875,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F3 OPERATIONS TACTICAL  
DETECTIVES:,155.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F13 JAIL DETENTION  
SECURITY:,159.2100,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,CORRECTIONAL TRAINING FACILITY-  
SOLEDAD:,154.430:,154.4300,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY EMS:,MED 10 MEDIC  
DISPATCH:,462.9750,::,POLICE:,CA:,MONTEREY COUNTY:  
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PD:,155.4900,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F7 SALINAS CENTER MARINA PUBLIC  
SAFETY:,158.8350,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F9 MONTEREY CENTER PACIFIC GROVE  
PD:,155.5350,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F16 COAST GUARD  
21:,157.0500,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,MONTEREY COUNTY SHERIFF:,F6 COUNTYWIDE SHERIFFS  
RESERVE:,155.1600,::,POLICE:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,F3 MEDICAL  
OPERATIONS:,468.0625,::,OTHER:,CA:,MONTEREY COUNTY:  
:MONTEREY COUNTY:,LAGUNA SECA RACEWAY:,F4 MEDICAL  
OPERATIONS:,461.3750,::,OTHER:,CA:,MONTEREY COUNTY:  
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NET:,463.5125,::,OTHER:,CA:,MONTEREY COUNTY:

:MONTEREY COUNTY:, :MONTEREY COUNTY SHERIFF:, :F8 KING CITY POLICE SOUTH  
COUNTY:, 158.8050, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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RECORDS F2:, 158.9100, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
:MONTEREY COUNTY:, :MONTEREY COUNTY SHERIFF:, :F4 MONTEREY TACTICAL SWAT  
RESCUE:, 155.9700, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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PRIMARY:, 159.0900, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
:MONTEREY COUNTY:, :LAGUNA SECA RACEWAY:, :F1 HOST  
OPERATIONS:, 460.6625, ::, :OTHER:, :CA:, :MONTEREY COUNTY:  
:MONTEREY COUNTY:, :LAGUNA SECA RACEWAY:, :MARSHAL  
OPERATIONS:, 460.7375, ::, :OTHER:, :CA:, :MONTEREY COUNTY:  
:MONTEREY PARK:, :MONTEREY PARK FIRE:, :F1 FIRE  
PRIMARY:, 153.9950, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:MONTEREY PARK:, :MONTEREY PARK FIRE:, :F4 FIRE MUTUAL  
AID:, 154.2950, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:MONTEREY PARK:, :MONTEREY PARK FIRE:, :F3 FIRE LACOFD LOS  
ANGELES:, 154.4300, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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AID:, 154.2800, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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SECONDARY:, 155.4150, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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PRIMARY:, 155.5650, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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DETECTIVES:, 154.8900, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:MORAGA:, :MORAGA FIRE:, :FIRE - MORAGA FPD:, 46.3800, ::, :FIRE:, :CA:, :CONTRA  
COSTA COUNTY:  
:MORAGA:, :MORAGA POLICE (CCSO CONTRACT):, :F1 POLICE -  
SHERIFF:, 155.1900, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:MORAGA:, :MORAGA POLICE (CCSO CONTRACT):, :F5 POLICE  
TACTICAL:, 155.0400, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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CDF:, 151.3850, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
:MORENO VALLEY:, :MORENO VALLEY POLICE:, :POLICE - SHERIFF  
CONTRACT:, 158.9250, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
:MORGAN HILL:, :MORGAN HILL FIRE:, :F2 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:MORGAN HILL:, :MORGAN HILL FIRE:, :F1 FIRE  
PRIMARY:, 154.1450, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:MORGAN HILL:, :MORGAN HILL POLICE:, :F1 POLICE  
PRIMARY:, 155.1150, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:MORGAN HILL:, :MORGAN HILL POLICE:, :F2 POLICE GILROY  
PD:, 154.8300, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:MORGAN HILL:, :MORGAN HILL FIRE:, :F3 FIRE COUNTYWIDE MUTUAL AID  
BLUE:, 153.8450, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:MORRO BAY:, :MORRO BAY FIRE:, :F3 FIRE MUTUAL AID:, 154.2800, ::, :FIRE:, :CA:, :SAN  
LUIS OBISBO COUNTY:  
:MORRO BAY:, :MORRO BAY FIRE:, :F2 FIRE COUNTY  
FIRE:, 154.3850, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:MORRO BAY:, :MORRO BAY FIRE:, :F1 FIRE PRIMARY:, 154.1300, ::, :FIRE:, :CA:, :SAN  
LUIS OBISBO COUNTY:  
:MORRO BAY:, :MORRO BAY FIRE:, :FIRE PLANNED:, 460.6250, ::, :FIRE:, :CA:, :SAN LUIS  
OBISBO COUNTY:  
:MORRO BAY:, :MORRO BAY POLICE:, :F4 POLICE MUTUAL

AID:,460.0250,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:MORRO BAY:,MORRO BAY POLICE:,F3 POLICE  
EMERGENCY:,460.0500,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:MORRO BAY:,MORRO BAY POLICE:,POLICE PLANNED:,460.0750,::,POLICE:,CA:,SAN  
LUIS OBISBO COUNTY:  
:MORRO BAY:,MORRO BAY POLICE:,F1 POLICE  
PRIMARY:,460.1750,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:MORRO BAY:,MORRO BAY POLICE:,F2 POLICE  
SECONDARY:,460.4750,::,POLICE:,CA:,SAN LUIS OBISBO COUNTY:  
:MOUNT SHASTA:,CALIFORNIA HIGHWAY PATROL:,PURPLE MOBILE OFFICE #  
53:,42.1600,KA4993:,POLICE:,CA:,  
:MOUNT SHASTA:,CALIFORNIA HIGHWAY PATROL:,PURPLE BASE OFFICE #  
52:,42.4000,KCR953:,POLICE:,CA:,  
:MOUNT SHASTA:,MOUNT SHASTA POLICE:,F2 POLICE PRIMARY  
DIRECT:,155.9700,::,POLICE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA POLICE:,F3 POLICE  
TACTICAL:,155.7000,::,POLICE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA POLICE:,F1 POLICE PRIMARY  
REPEATER:,155.9700,::,POLICE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA FIRE:,FIRE REMOTE  
LINK:,453.0000,::,FIRE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA POLICE:,F4 POLICE SHERIFF  
REPEATER:,155.3100,::,POLICE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA POLICE:,F5 POLICE SHERIFF  
DIRECT:,155.3100,::,POLICE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA POLICE:,F6 POLICE  
COMMON:,155.7000,::,POLICE:,CA:,SISKIYOU COUNTY:  
:MOUNT SHASTA:,MOUNT SHASTA FIRE:,FIRE  
PRIMARY:,154.0400,::,FIRE:,CA:,SISKIYOU COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW POLICE:,F1 POLICE  
PRIMARY:,482.5125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW POLICE:,F2 POLICE PRIMARY  
DIRECT:,482.5125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW POLICE:,F3 POLICE  
SECONDARY:,482.7875,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW POLICE:,F4 POLICE MUTUAL  
AID:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW POLICE:,F5 POLICE PALO ALTO  
PD:,482.8125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW POLICE:,F6 POLICE LOS ALTOS  
PD:,483.0625,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW FIRE:,F1 FIRE PRIMARY  
RED:,154.0250,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW FIRE:,F2 FIRE MUTUAL AID  
WHITE:,154.2800,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW FIRE:,F3 FIRE PALO ALTO  
FD:,153.7700,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW FIRE:,F4 FIRE PRIMARY  
DIRECT:,154.0250,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW FIRE:,F5 FIRE COUNTYWIDE MUTUAL  
AID:,153.8450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOUNTAIN VIEW FIRE:,F6  
FIREGROUND:,153.8300,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:MOUNTAIN VIEW:,MOFFETT FIELD NAS  
FD:,DISPATCH:,140.2500,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:NAPA:,NAPA FIRE:,F5 FIRE & MEDICS:,155.8050,::,FIRE:,CA:,NAPA COUNTY:  
:NAPA:,NAPA POLICE:,F1 POLICE PRIMARY:,155.4300,::,POLICE:,CA:,NAPA

COUNTY:  
:NAPA:, :NAPA POLICE:, :F6 TACTICAL 10:, 156.0300, :, :POLICE:, :CA:, :NAPA COUNTY:  
:NAPA:, :NAPA POLICE:, :F3 POLICE MUTUAL AID:, 154.9200, :, :POLICE:, :CA:, :NAPA  
COUNTY:  
:NAPA:, :NAPA POLICE:, :F1 PRIMARY:, 155.4300, :KMA518:, :POLICE:, :CA:, :NAPA  
COUNTY:  
:NAPA:, :NAPA POLICE:, :CALCORD F2:, 156.0750, :, :POLICE:, :CA:, :NAPA COUNTY:  
:NAPA:, :CALIFORNIA HIGHWAY PATROL:, :ORANGE MOBILE OFFICE #  
21:, 42.6600, :KA4993:, :POLICE:, :CA:, :  
:NAPA:, :CALIFORNIA HIGHWAY PATROL:, :ORANGE BASE OFFICE #  
21:, 42.8800, :KMH961:, :POLICE:, :CA:, :  
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MEDICS:, 46.1600, ::, :FIRE:, :CA:, :NEVADA COUNTY:  
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PRIMARY:, 46.2400, ::, :FIRE:, :CA:, :NEVADA COUNTY:  
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PRIMARY:, 46.1600, ::, :FIRE:, :CA:, :NEVADA COUNTY:  
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FIREGROUND:, 46.3200, ::, :FIRE:, :CA:, :NEVADA COUNTY:  
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3C:, 154.2950, ::, :FIRE:, :CA:, :NEVADA COUNTY:  
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OPERATIONS:,153.3650,::,FIRE:,CA:,NEVADA COUNTY:  
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VFD:,154.3250,::,FIRE:,CA:,NEVADA COUNTY:  
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OPERATIONS:,39.8400,::,POLICE:,CA:,NEVADA COUNTY:  
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OPERATIONS:,39.7600,::,POLICE:,CA:,NEVADA COUNTY:  
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ANNEX:,453.2750,::,POLICE:,CA:,NEVADA COUNTY:  
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OPERATIONS:,39.6800,::,POLICE:,CA:,NEVADA COUNTY:  
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MOUNTAIN:,463.1750,::,POLICE:,CA:,NEVADA COUNTY:  
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OPERATIONS:,39.3400,::,POLICE:,CA:,NEVADA COUNTY:  
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PEAK:,463.9750,::,POLICE:,CA:,NEVADA COUNTY:  
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HOSPITAL:,DISPATCH:,155.4000,::,POLICE:,CA:,NEVADA COUNTY:  
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B:,463.0500,::,POLICE:,CA:,NEVADA COUNTY:  
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HOSPITAL:,DISPATCH:,155.3850,::,POLICE:,CA:,NEVADA COUNTY:  
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F5:,45.1800,::,POLICE:,CA:,NEVADA COUNTY:  
:NEWARK:,NEWARK FIRE:,FIRE PRIMARY REPEATER  
(8):,488.6125,::,FIRE:,CA:,ALAMEDA COUNTY:  
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COUNTY:  
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GREEN:,155.0700,::,POLICE:,CA:,ALAMEDA COUNTY:



:NEWMAN:,:NEWMAN POLICE:,:F1 POLICE  
PRIMARY:,:158.7300,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
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SECONDARY:,:158.8050,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
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COUNTY:  
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GREEN:,:460.2750,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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SOUTH:,:460.2000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
:NORCO:,:NORCO FIRE:,:F1 FIRE PRIMARY - CORONA  
FD:,:154.2350,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
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COUNTY:  
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COUNTY:  
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CONTRACT:,:158.8500,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:NORTH SACRAMENTO:,:CALIFORNIA HIGHWAY PATROL:,:GOLD BASE OFFICE #  
46:,:42.1200,,:KDE678:,:POLICE:,:CA:,::  
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46:,:42.2000,,:KA4993:,:POLICE:,:CA:,::  
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COUNTY:  
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AMBULANCE:,:DISPATCH:,:45.9600,::,:MEDICAL:,:CA:,:LOS ANGELES COUNTY:  
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:NORWALK:,:SCHOOL POLICE:,:DISPATCH:,:464.6250,::,:POLICE:,:CA:,:LOS ANGELES  
COUNTY:  
:NORWALK:,:CERRITOS SCHOOL POLICE:,:DISPATCH:,:464.3250,::,:POLICE:,:CA:,:LOS  
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COUNTY:  
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POLICE:,:DISPATCH:,:453.9500,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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CONTRACT:,:484.0375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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CARE:,DISPATCH:,462.9500,::,MEDICAL:,CA:,MADERA COUNTY:  
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47):,DISPATCH:,155.3400,::,POLICE:,CA:,MADERA COUNTY:  
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CENTER:,155.2800,::,MEDICAL:,CA:,ALAMEDA COUNTY:  
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HOSPITAL:,DISPATCH:,461.9250,::,MEDICAL:,CA:,ALAMEDA COUNTY:  
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COUNTY:  
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COUNTY:  
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BASE:,42.2000,JKK725:,POLICE:,CA:,ALAMEDA COUNTY:  
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SOUTH):,156.0900,::,POLICE:,CA:,ALAMEDA COUNTY:  
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FORCE:,154.9200,::,POLICE:,CA:,ALAMEDA COUNTY:  
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96:,42.1200,JKK725:,POLICE:,CA:,  
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COUNTY:  
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DVP:,158.7300,::,POLICE:,CA:,ALAMEDA COUNTY:  
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DISPATCH:,860.2125,::,POLICE:,CA:,ALAMEDA COUNTY:  
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INVESTIGATORS:,158.7300,::,POLICE:,CA:,ALAMEDA COUNTY:  
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RECORDS:,155.8500,::,POLICE:,CA:,ALAMEDA COUNTY:

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NORTH) :, 155.7900, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
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DIEGO COUNTY:  
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COUNTY:  
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POLICE:, 156.1500, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
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NARCOTICS:, 156.0450, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
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OPERATIONS:, 155.8950, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
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GROUND:, 123.9000, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
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OPERATIONS:, 153.8000, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:ONTARIO:, :ONTARIO FIRE:, :FIRE REMOTE LINK:, 72.1200, ::, :FIRE:, :CA:, :SAN  
BERNARDINO COUNTY:  
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PORTABLES:, 153.8300, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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PD:, 155.5950, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
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TACTICAL:, 154.8600, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
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POLICE:, 154.6500, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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COUNTY:  
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NORTH:,:460.4000,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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GREEN:,:460.2500,::,:POLICE:,:CA:,:ORANGE COUNTY:  
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DIEGO:,:151.1900,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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RED:,:151.2200,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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GROUND:,:170.0000,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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COUNTYWIDE:,:859.2125,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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2:,:168.2000,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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NET:,:168.7500,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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REPEATER:,:168.0750,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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COUNTYWIDE:,:860.2125,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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WEST:,:151.3850,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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DISPATCH:,:154.3400,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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COUNTYWIDE:,:856.7125,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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REPEATER:,:168.7000,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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NORTH:,:858.4625,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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1:,:154.1600,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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REGION:,:155.2800,::,:MEDICAL:,:CA:,:ORANGE COUNTY:  
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CENTRAL:,:856.4625,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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AMBULANCE:,:45.9600,::,:MEDICAL:,:CA:,:ORANGE COUNTY:  
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NORTH:,:856.9625,::,:FIRE:,:CA:,:ORANGE COUNTY:  
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AMBULANCE:,:47.5800,::,:MEDICAL:,:CA:,:ORANGE COUNTY:

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1:, 168.0500, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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AMBULANCE:, 155.2050, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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CENTRAL:, 858.7125, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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AMBULANCE:, 463.9000, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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COUNTYWIDE:, 858.2125, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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MEDICAL:, 852.1125, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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3:, 154.2950, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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HOSPITAL:, 463.0250, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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REPEATER:, 168.1000, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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AMBULANCE:, 155.1600, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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CENTRAL:, 857.9625, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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DISPATCH:, 860.9625, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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HOSPITAL:, 463.0000, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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NORTH:, 859.9625, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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AMBULANCE:, 155.2200, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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TRAVEL:, 169.1250, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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22:, 157.1000, ::, :OTHER:, :CA:, :ORANGE COUNTY:  
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F27:, 168.1250, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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SECURITY:, 462.5750, ::, :OTHER:, :CA:, :ORANGE COUNTY:  
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COUNTYWIDE:, 856.2125, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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ENTERTAINMENT:, 464.4875, ::, :OTHER:, :CA:, :ORANGE COUNTY:  
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NET:, 153.9200, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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1:, 155.1600, ::, :OTHER:, :CA:, :ORANGE COUNTY:  
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SECURITY:, 464.4625, ::, :OTHER:, :CA:, :ORANGE COUNTY:  
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HOSPITAL:, 463.0750, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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PAGING:, 154.6250, ::, :OTHER:, :CA:, :ORANGE COUNTY:  
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SERVICE:,155.1600,::,MEDICAL:,CA:,ORANGE COUNTY:  
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SUBMARINES/SHOWS:,154.6000,::,OTHER:,CA:,ORANGE COUNTY:  
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MUSIC!?!??:,464.3250,::,OTHER:,CA:,ORANGE COUNTY:  
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AREA:,155.3400,::,MEDICAL:,CA:,ORANGE COUNTY:  
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WEST:,151.4450,::,FIRE:,CA:,ORANGE COUNTY:  
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16:,156.8000,::,OTHER:,CA:,ORANGE COUNTY:  
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COUNTY:  
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SEC:,45.4000,::,OTHER:,CA:,ORANGE COUNTY:  
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REPEATERS:,169.1250,::,FIRE:,CA:,ORANGE COUNTY:  
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AID:,46.0600,::,OTHER:,CA:,ORANGE COUNTY:  
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2:,155.2350,::,OTHER:,CA:,ORANGE COUNTY:  
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CENTRAL:,858.9625,::,FIRE:,CA:,ORANGE COUNTY:  
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PRIMARY:,45.9200,::,OTHER:,CA:,ORANGE COUNTY:  
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COUNTYWIDE:,857.7125,::,FIRE:,CA:,ORANGE COUNTY:  
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12:,156.6000,::,OTHER:,CA:,ORANGE COUNTY:  
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HOSPITAL:,463.1000,::,MEDICAL:,CA:,ORANGE COUNTY:  
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CENTRAL:,860.7125,::,FIRE:,CA:,ORANGE COUNTY:  
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PAGING:,37.0400,::,POLICE:,CA:,ORANGE COUNTY:  
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CENTRAL:,859.7125,::,FIRE:,CA:,ORANGE COUNTY:  
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OPERATIONS:,506.8625,::,POLICE:,CA:,ORANGE COUNTY:  
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NORTH:,859.4625,::,FIRE:,CA:,ORANGE COUNTY:

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CONTROL/SECURITY 2:, 151.7450, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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PRIMARY:, 153.9500, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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GRAY:, 460.5500, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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AMBULANCE:, 462.7000, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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MAINTENANCE:, 464.5375, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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RESCUE:, 155.1600, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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NORTH:, 857.4625, ::, :FIRE:, :CA:, :ORANGE COUNTY:  
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AMBULANCE:, 47.4600, ::, :MEDICAL:, :CA:, :ORANGE COUNTY:  
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2:, 509.3625, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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JAIL:, 154.8000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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YELLOW:, 460.4250, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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JAIL:, 154.8000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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BLUE:, 460.5000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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SOUTH:, 460.2000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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EVENTS/FIREWORKS:, 464.5125, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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PURPLE:, 460.3000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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OPERATIONS:, 154.9650, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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WHITE:, 460.1500, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
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OPERATIONS:,158.9700,::,POLICE:,CA:,ORANGE COUNTY:  
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COUNTY:  
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FPD:,154.4450,::,FIRE:,CA:,FRESNO COUNTY:  
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SYSTEM:,155.6550,::,POLICE:,CA:,FRESNO COUNTY:  
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SECONDARY:,155.0100,::,POLICE:,CA:,FRESNO COUNTY:  
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COSTA COUNTY:  
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TACTICAL:,155.0400,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
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COUNTY:  
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35:,42.5000,KME274:,POLICE:,CA:,:  
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COUNTY:  
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SECONDARY:,155.7600,::,POLICE:,CA:,BUTTE COUNTY:  
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REPEATER:,154.7250,::,POLICE:,CA:,BUTTE COUNTY:  
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35:,42.8200,KA4993:,POLICE:,CA:,:  
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DISPATCH:,153.8150,::,FIRE:,CA:,BUTTE COUNTY:  
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MEDICS:,154.1750,::,FIRE:,CA:,MONTEREY COUNTY:  
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SECONDARY:,154.3700,::,FIRE:,CA:,MONTEREY COUNTY:  
:PACIFIC GROVE:,PACIFIC GROVE POLICE:,F1 POLICE  
PRIMARY:,155.5350,::,POLICE:,CA:,MONTEREY COUNTY:



:PACIFIC GROVE:,:PACIFIC GROVE POLICE:,:F2 POLICE MONTEREY  
PD:,155.4900,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:PACIFIC GROVE:,:PACIFIC GROVE POLICE:,:F3 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:MONTEREY COUNTY:  
:PACIFICA:,:PACIFICA POLICE:,:F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:PACIFICA:,:PACIFICA POLICE:,:F1 POLICE  
PRIMARY:,488.7375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:PACIFICA:,:PACIFICA FIRE:,:F2 FIRE MUTUAL AID:,154.2800,::,:FIRE:,:CA:,:SAN  
MATEO COUNTY:  
:PACIFICA:,:PACIFICA FIRE:,:F1 FIRE & MEDIC  
PRIMARY:,154.4450,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:PACIFICA:,:PACIFICA POLICE:,:F2 POLICE TACTICAL  
1:,488.8625,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:PACIFICA:,:PACIFICA POLICE:,:F4 POLICE TACTICAL  
2:,488.7125,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:PACIFICA:,:PACIFICA POLICE:,:F5 POLICE PRIMARY  
DIRECT:,488.7375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:PALM DESERT:,:PALM DESERT FIRE:,:FIRE PRIMARY -  
RCFD:,151.1750,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:PALM DESERT:,:PALM DESERT POLICE:,:POLICE - SHERIFF  
CONTRACT:,159.0900,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS FIRE:,:F2 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS FIRE:,:F1 FIRE  
PRIMARY:,154.3550,::,:FIRE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS POLICE:,:POLICE COUNTYWIDE MUTUAL  
AID:,158.9250,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS POLICE:,:POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS POLICE:,:TAC 3 - POLICE MUTUAL  
AID:,460.0250,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS POLICE:,:TAC 2 - POLICE  
SECONDARY:,460.1250,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PALM SPRINGS:,:PALM SPRINGS POLICE:,:TAC 1 - POLICE  
PRIMARY:,460.4500,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PALMDALE:,:PALMDALE FIRE:,:FIRE - LACOFD:,154.4000,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:PALMDALE:,:WILSON AMBULANCE:,:DISPATCH:,47.5400,::,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
:PALMDALE:,:HIGH DESERT RANGERS:,:DISPATCH:,464.5750,::,:OTHER:,:CA:,:LOS  
ANGELES COUNTY:  
:PALMDALE:,:PALMDALE POLICE:,:F5 POLICE - LACOSD  
CONTRACT:,483.8625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PALO ALTO:,:PALO ALTO FIRE:,:F8 FIRE PRIMARY  
DIRECT:,153.7700,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:PALO ALTO:,:PALO ALTO FIRE:,:F2 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:PALO ALTO:,:PALO ALTO FIRE:,:F1 FIRE & MEDICS:,153.7700,::,:FIRE:,:CA:,:SANTA  
CLARA COUNTY:  
:PALO ALTO:,:PALO ALTO POLICE:,:F2 POLICE HILLS  
AREA:,482.8125,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:PALO ALTO:,:PALO ALTO POLICE:,:COMMAND & CONTROL  
TELEPHONE:,860.7125,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:PALO ALTO:,:PALO ALTO FIRE:,:F6 FIRE MUTUAL  
AID:,154.2650,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:PALO ALTO:,:PALO ALTO POLICE:,:F8 POLICE PRIMARY

DIRECT:,482.6125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO FIRE:,F4 FIRE MOUNTAIN VIEW  
FD:,154.0250,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO POLICE:,F1 POLICE  
PRIMARY:,482.6125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO FIRE:,F7 FIREGROUND PORTABLES  
YELLOW:,153.8300,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO FIRE:,F5 FIRE MUTUAL  
AID:,154.2950,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO FIRE:,F3 FIRE COUNTYWIDE MUTUAL AID  
BLUE:,153.8450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO POLICE:,F7 POLICE MUTUAL  
AID:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO POLICE:,F6 POLICE SAN MATEO  
COUNTYWIDE:,488.8875,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO POLICE:,F5 POLICE SAN MATEO SO  
TACTICAL:,488.5375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO POLICE:,F4 POLICE MOUNTAIN VIEW PD  
SECONDARY:,482.7875,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALO ALTO:,PALO ALTO POLICE:,F3 POLICE MOUNTAIN VIEW PD  
PRIMARY:,482.5125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:PALOS VERDES:,ASSOCIATED  
AMBULANCE:,DISPATCH:,155.2200,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
:PALOS VERDES ESTATES:,PALOS VERDES ESTATES FIRE:,FIRE -  
LACOFD:,154.4300,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:PALOS VERDES ESTATES:,PALOS VERDES ESTATES POLICE:,POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:PALOS VERDES ESTATES:,PALOS VERDES ESTATES POLICE:,F1 POLICE  
PRIMARY:,45.6600,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:PARADISE:,PARADISE FIRE:,F2 FIRE COUNTY  
FIRE:,154.1900,::,FIRE:,CA:,BUTTE COUNTY:  
:PARADISE:,PARADISE FIRE:,FIRE PROTECTION DISTRICT DISPATCH  
1:,153.9500,::,FIRE:,CA:,BUTTE COUNTY:  
:PARADISE:,PARADISE POLICE:,F1 POLICE  
PRIMARY:,155.7150,::,POLICE:,CA:,BUTTE COUNTY:  
:PARADISE:,PARADISE POLICE:,F2 POLICE SHERIFF  
REPEATER:,154.7250,::,POLICE:,CA:,BUTTE COUNTY:  
:PARKER DAM:,PARKER DAM VFD (RECLAMATION BUREAU),FIRE  
DISPATCH:,164.5750,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:PARLIER:,PARLIER FIRE:,FIRE - MID VALLEY  
FPD:,154.4450,::,FIRE:,CA:,FRESNO COUNTY:  
:PARLIER:,PARLIER POLICE:,POLICE - SHERIFF  
SYSTEM:,155.6550,::,POLICE:,CA:,FRESNO COUNTY:  
:PASADENA:,PASADENA FIRE:,FIRE & MEDIC SECONDARY TAC  
2:,154.2050,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:PASADENA:,MEDIVAC PARAMEDICS:,DISPATCH:,47.6600,::,MEDICAL:,CA:,LOS  
ANGELES COUNTY:  
:PASADENA:,PASADENA FIRE:,FIRE & MEDIC ALT/CMDR TAC  
3:,153.7700,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:PASADENA:,GUARDIAN AMBULANCE PARAMEDICS:,DISPATCH  
1:,37.9000,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
:PASADENA:,PASADENA FIRE:,FIRE MUTUAL AID WHITE 3 TAC  
6:,154.2950,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:PASADENA:,GUARDIAN AMBULANCE BUSINESS:,DISPATCH  
2:,35.9800,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
:PASADENA:,PASADENA FIRE:,F2 FIRE DATA  
DISPATCH:,859.2375,::,FIRE:,CA:,LOS ANGELES COUNTY:

:PASADENA:,:PASADENA POLICE:,:F3 POLICE  
DETECTIVES:,:482.5375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA FIRE:,:LA COUNTY FIRE VALLEY TAC  
7:,:154.3400,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA COMMUNITY COLLEGE  
POLICE:,:SECONDARY:,:154.6500,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:LIFEFLIGHT:,:DISPATCH:,:155.4000,::,:MEDICAL:,:CA:,:LOS ANGELES  
COUNTY:  
:PASADENA:,:PASADENA FIRE:,:F1 FIRE - VERDUGO FIRE (30)  
DISPATCH:,:46.1000,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA FIRE:,:FIRE & MEDIC PRIMARY TAC  
1:,:153.8900,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA FIRE:,:FIRE MUTUAL AID WHITE 1 TAC  
4:,:154.2800,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA FIRE:,:FIRE MUTUAL AID WHITE 2 TAC  
5:,:154.2650,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA COMMUNITY COLLEGE  
POLICE:,:DISPATCH:,:460.0500,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA POLICE:,:F4 POLICE NARCOTICS SECURE  
VOICE:,:482.6375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA POLICE:,:F1 POLICE PRIMARY  
DISPATCH:,:482.3375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA POLICE:,:F2 POLICE  
TACTICAL:,:482.4375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASADENA:,:PASADENA POLICE?:,:TACTICAL COMMON & UTILITY  
COMMON:,:155.9550,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PASO ROBLES:,:PASO ROBLES FIRE:,:F2 FIREGROUND:,:155.9400,::,:FIRE:,:CA:,:SAN  
LUIS OBISBO COUNTY:  
:PASO ROBLES:,:PASO ROBLES FIRE:,:F3 FIRE DIRECT:,:155.0400,::,:FIRE:,:CA:,:SAN  
LUIS OBISBO COUNTY:  
:PASO ROBLES:,:PASO ROBLES FIRE:,:F1 FIRE  
PRIMARY:,:155.0400,::,:FIRE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PASO ROBLES:,:PASO ROBLES POLICE:,:F2 YELLOW POLICE  
SECONDARY:,:460.4750,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PASO ROBLES:,:PASO ROBLES POLICE:,:F1 GREEN POLICE  
PRIMARY:,:460.1250,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PASO ROBLES:,:PASO ROBLES POLICE:,:F4 POLICE MUTUAL  
AID:,:460.0250,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PASO ROBLES:,:PASO ROBLES POLICE:,:F3 POLICE  
EMERGENCY:,:460.0500,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PATTERSON:,:PATTERSON POLICE:,:POLICE  
PRIMARY:,:158.7300,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
:PATTERSON:,:PATTERSON FIRE:,:FIRE - W STANISLAUS  
FPD:,:153.7700,::,:FIRE:,:CA:,:STANISLAUS COUNTY:  
:PENINSULA:,:PENINSULA FPD:,:DISPATCH:,:154.1300,::,:FIRE:,:CA:,:PLUMAS COUNTY:  
:PERRIS:,:PERRIS FIRE:,:F1 FIRE LOCAL:,:153.7700,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:PERRIS:,:PERRIS FIRE:,:F3 FIRE MUTUAL AID:,:154.2800,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:PERRIS:,:PERRIS FIRE:,:FIRE PRIMARY - CDF:,:151.3850,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:PERRIS:,:PERRIS FIRE:,:F2 FIREGROUND:,:154.1450,::,:FIRE:,:CA:,:RIVERSIDE  
COUNTY:  
:PERRIS:,:PERRIS POLICE:,:F3 POLICE  
TACTICAL:,:158.9700,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PERRIS:,:PERRIS POLICE:,:F2 POLICE  
SHERIFF:,:158.8500,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:

:PERRIS:,:PERRIS POLICE:,:F1 POLICE  
PRIMARY:,:158.9550,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
:PETALUMA:,:PETALUMA FIRE:,:FIRE MEDIC NET:,:155.1000,::,:FIRE:,:CA:,:SONOMA  
COUNTY:  
:PETALUMA:,:PETALUMA FIRE:,:MARINA:,:156.4250,::,:FIRE:,:CA:,:SONOMA COUNTY:  
:PETALUMA:,:PETALUMA POLICE:,:POLICE  
PRIMARY:,:155.5950,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:PETALUMA:,:PETALUMA POLICE:,:POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:PETALUMA:,:PETALUMA FIRE:,:FIRE & MEDICS RED:,:154.0250,::,:FIRE:,:CA:,:SONOMA  
COUNTY:  
:PETALUMA:,:PETALUMA POLICE:,:POLICE COMMON:,:154.8900,::,:POLICE:,:CA:,:SONOMA  
COUNTY:  
:PETALUMA:,:PETALUMA POLICE:,:HEY BOB, HOPE THEY CAN KEEP UP WITH YOU OUT  
THERE - DAVE:,:155.5950,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:PETALUMA:,:PETALUMA POLICE:,:POLICE  
TACTICAL:,:155.0700,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:PICO RIVERA:,:PICO RIVERA FIRE:,:FIRE -  
LACOFD:,:154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:PICO RIVERA:,:PICO RIVERA POLICE:,:F13 POLICE - LACOSD  
CONTRACT:,:483.7625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:PIEDMONT:,:PIEDMONT POLICE:,:F1 POLICE PRIMARY  
(7):,:155.6100,::,:POLICE:,:CA:,:ALAMEDA COUNTY:  
:PINOLE:,:PINOLE FIRE:,:FIRE PRIMARY:,:46.4800,::,:FIRE:,:CA:,:CONTRA COSTA  
COUNTY:  
:PINOLE:,:DOCTORS HOSPITAL:,:DISPATCH:,:155.4000,::,:MEDICAL:,:CA:,:CONTRA  
COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:F9 POLICE  
MARTINEZ:,:460.4750,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:F3 POLICE MUTUAL AID  
WEST:,:460.0250,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:POLICE MUTUAL AID:,:154.9200,::,:POLICE:,:CA:,:CONTRA  
COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:F3-F4 POLICE MUTUAL  
AID:,:460.0250,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:F7 POLICE SAN  
PABLO:,:460.1500,::,:POLICE:,:CA:,:CONTRA COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:POLICE PRIMARY:,:460.3250,::,:POLICE:,:CA:,:CONTRA  
COSTA COUNTY:  
:PINOLE:,:PINOLE POLICE:,:F5 POLICE COMMON:,:460.1000,::,:POLICE:,:CA:,:CONTRA  
COSTA COUNTY:  
:PISMO BEACH:,:PISMO BEACH FIRE:,:F2 FIRE COUNTY  
FIRE:,:154.3850,::,:FIRE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PISMO BEACH:,:PISMO BEACH FIRE:,:F1 FIRE  
PRIMARY:,:154.1450,::,:FIRE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PISMO BEACH:,:PISMO BEACH FIRE:,:F3 FIRE MUTUAL  
AID:,:154.2800,::,:FIRE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PISMO BEACH:,:PISMO BEACH POLICE:,:F4 WHITE POLICE MUTUAL  
AID:,:460.0250,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PISMO BEACH:,:PISMO BEACH POLICE:,:F3 RED POLICE  
EMERGENCY:,:460.0500,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PISMO BEACH:,:PISMO BEACH POLICE:,:F2 YELLOW POLICE  
SECONDARY:,:460.4750,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PISMO BEACH:,:PISMO BEACH POLICE:,:F1 GREEN POLICE  
PRIMARY:,:460.6000,::,:POLICE:,:CA:,:SAN LUIS OBISBO COUNTY:  
:PITTSBURG:,:DOW CHEMICAL CO FIRE  
DEPARTMENT:,:DISPATCH:,:153.0500,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:

:PITTSBURG:, :USS-POSCO INDUSTRIES  
FD:, :DISPATCH:, 153.1400, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG FIRE:, :FIRE - RIVERVIEW  
FPD:, 154.3850, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :LOS MEDANOS  
HOSPITAL:, :DISPATCH:, 155.4000, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F7 POLICE WALNUT  
CREEK:, 460.3250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F5 POLICE PLEASANT  
HILL:, 460.5000, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F2 POLICE  
TACTICAL:, 460.1750, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F4 POLICE  
CONCORD:, 460.2500, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F8 POLICE  
MARTINEZ:, 460.4750, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F1 POLICE  
PRIMARY:, 460.3750, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:CONTRA COSTA COUNTY:, :CONTRA COSTA COUNTY COMMUNITY COLLEGE DISTRICT:, :POLICE  
LOS MEDANOS:, 860.2375, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F3 POLICE  
CONCORD:, 460.1500, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F10 POLICE MUTUAL AID  
CENTRAL:, 460.0250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F6 POLICE WALNUT  
CREEK:, 460.4250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :F9 POLICE  
COMMON:, 460.1000, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PITTSBURG:, :PITTSBURG POLICE:, :POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PLACENTIA:, :PLACENTIA POLICE:, :POLICE PRIMARY  
GREEN:, 460.3250, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
:PLACENTIA:, :PLACENTIA POLICE:, :POLICE SECONDARY ORANGE  
NORTH:, 460.4000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F2 SEARCH &  
RESCUE:, 155.1600, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F5 CDF N-Y-P  
LOCAL:, 151.3250, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F1 FIRE DISPATCH  
DIRECT:, 154.3550, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :FIRE MUTUAL AID  
OPTIONAL:, 154.2650, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F5 FIREGROUND  
EAST:, 154.0100, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F4 PLACER EAST  
PLANNED:, 154.4000, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F1 FIRE  
PRIMARY:, 46.1800, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F3 FIREGROUND  
WEST:, 154.1750, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :F2 FIREGROUND  
COMMON:, 46.4200, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY SHERIFF:, :F2 SPECIAL EQUIPMENT TEAM - SET  
POLICE MUTUAL AID:, 154.9350, ::, :POLICE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY FIRE:, :SEARCH & RESCUE  
OPTIONAL:, 155.1600, ::, :FIRE:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY SHERIFF:, :F3 SPECIAL EQUIPMENT TEAM - SET

POLICE MUTUAL AID:,154.9200,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY FIRE:,F3 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F4 SPECIAL EQUIPMENT TEAM - SET  
MOBILE EXTENDERS:,155.0100,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY FIRE:,F3 NORTH TAHOE  
PRIMARY:,46.4800,::,FIRE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,MOBILE EXTENDERS AUBURN  
B:,155.0100,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY EMS:,MED 9 MOUNT  
PLUTO:,462.9500,::,MEDICAL:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F6 SPECIAL EQUIPMENT TEAM - SET  
CALCORD:,156.0750,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY EMS:,MEDIC MOBILE  
EXTENDER:,458.1750,::,MEDICAL:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F1 SPECIAL EQUIPMENT TEAM - SET  
TACTICAL OPERATIONS:,154.8900,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY EMS:,MEDIC MOBILE  
EXTENDER:,458.0250,::,MEDICAL:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,MOBILE EXTENDERS TAHOE CITY  
A:,155.7150,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY EMS:,MED 4 ROSEVILLE  
COMMUNITY:,463.0750,::,MEDICAL:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F5 SIERRA COUNTY  
OPERATIONS:,39.8600,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,LAKE TAHOE MARINE FREQUENCIES:,COAST GUARD  
AUXILIARY:,157.1750,::,OTHER:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F4 TRUCKEE-NEVADA COUNTY EAST  
OPERATIONS:,39.3400,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,LAKE TAHOE MARINE FREQUENCIES:,COAST GUARD  
SECONDARY:,157.1000,::,OTHER:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F3 NEVADA CITY-NEVADA COUNTY WEST  
OPERATIONS:,39.7600,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,LAKE TAHOE MARINE FREQUENCIES:,COAST GUARD  
PRIMARY:,157.0500,::,OTHER:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,CENTRAL DETENTION  
SECURITY:,155.1900,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY FIRE:,FIRE MOBILE EXTENDERS  
F1:,153.8300,::,FIRE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F2 TAHOE CITY-PLACER COUNTY EAST  
OPERATIONS:,39.6800,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY EMS:,MEDIC MOBILE  
EXTENDER:,458.1250,::,MEDICAL:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F1 AUBURN-PLACER COUNTY WEST  
OPERATIONS:,39.8400,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY EMS:,MED 3 DONNER  
PEAK:,463.0500,::,MEDICAL:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F6 POLICE TACTICAL  
COMMON:,45.1800,::,POLICE:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,LAKE TAHOE MARINE FREQUENCIES:,MARINAS & YACHT  
CLUBS:,156.4250,::,OTHER:,CA:,PLACER COUNTY:  
:PLACER COUNTY:,PLACER COUNTY SHERIFF:,F5 SPECIAL EQUIPMENT TEAM - SET  
SEARCH & RESCUE:,155.1600,::,POLICE:,CA:,PLACER COUNTY:  
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OPTIONAL:,154.2950,::,FIRE:,CA:,PLACER COUNTY:  
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CENTER:,463.0250,::,MEDICAL:,CA:,PLACER COUNTY:

:PLACER COUNTY:, :PLACER COUNTY EMS:, :MED 10 DONNER  
PEAK:, 462.9750, ::, :MEDICAL:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :LAKE TAHOE MARINE FREQUENCIES:, :SAFETY &  
CALLING:, 156.8000, ::, :OTHER:, :CA:, :PLACER COUNTY:  
:PLACER COUNTY:, :PLACER COUNTY EMS:, :MED 6 MOUNT  
PLUTO:, 463.1250, ::, :MEDICAL:, :CA:, :PLACER COUNTY:  
:PLACERVILLE:, :PLACERVILLE FIRE:, :FIRE REMOTE LINK FOR  
46.420:, 460.6125, ::, :FIRE:, :CA:, :EL DORADO COUNTY:  
:PLACERVILLE:, :PLACERVILLE FIRE:, :FIRE PRIMARY:, 46.4200, ::, :FIRE:, :CA:, :EL  
DORADO COUNTY:  
:PLACERVILLE:, :MARSHALL HOSPITAL  
SECURITY:, :DISPATCH:, 155.3550, ::, :MEDICAL:, :CA:, :EL DORADO COUNTY:  
:PLACERVILLE:, :PLACERVILLE POLICE:, :F2 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:PLACERVILLE:, :PLACERVILLE POLICE:, :F1 POLICE  
PRIMARY:, 154.9650, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:PLACERVILLE:, :PLACERVILLE POLICE:, :F3 POLICE  
SECONDARY:, 154.7550, ::, :POLICE:, :CA:, :EL DORADO COUNTY:  
:PLACERVILLE:, :CALIFORNIA HIGHWAY PATROL:, :GREEN BASE OFFICE #  
44:, 42.5400, :KMD935:, :POLICE:, :CA:, ::  
:PLACERVILLE:, :CALIFORNIA HIGHWAY PATROL:, :GREEN MOBILE OFFICE #  
44:, 42.2400, :KA4993:, :POLICE:, :CA:, ::  
:PLEASANT HILL:, :PLEASANT HILL FIRE:, :FIRE - CONSOLIDATED  
FPD:, 46.3200, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
:PLEASANT HILL:, :PLEASANT HILL POLICE:, :F2 POLICE  
MARTINEZ:, 460.4750, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PLEASANT HILL:, :PLEASANT HILL POLICE:, :F3 POLICE MUTUAL AID  
CENTRAL:, 460.0250, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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COMMON:, 460.1000, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
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PRIMARY:, 460.5000, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PLEASANT HILL:, :PLEASANT HILL POLICE:, :POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:PLEASANTON:, :PLEASANTON FIRE:, :F1 FIRE PRIMARY  
(6) :, 154.2350, ::, :FIRE:, :CA:, :ALAMEDA COUNTY:  
:PLEASANTON:, :PLEASANTON POLICE:, :F3 POLICE  
SECONDARY:, 155.5800, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:PLEASANTON:, :PLEASANTON POLICE:, :F2 POLICE  
PRIMARY:, 156.0300, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY FIRE:, :FIRE COUNTYWIDE  
DISPATCH:, 154.1900, ::, :FIRE:, :CA:, :PLUMAS COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY EMS:, :MED 7 DYER  
MOUNTAIN:, 463.1500, ::, :MEDICAL:, :CA:, :PLUMAS COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY EMS:, :MOUNT HOUGH-BECKWOURTH PEAK  
LINK:, 456.1500, ::, :MEDICAL:, :CA:, :PLUMAS COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY EMS:, :MOUNT HOUGH-BECKWOURTH PEAK  
LINK:, 451.0500, ::, :MEDICAL:, :CA:, :PLUMAS COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY EMS:, :MED 8 BECKWOURTH  
PEAK:, 463.1750, ::, :MEDICAL:, :CA:, :PLUMAS COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY EMS:, :MED 6 MOUNT  
HOUGH:, 463.1250, ::, :MEDICAL:, :CA:, :PLUMAS COUNTY:  
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OPERATIONS:, 156.0900, ::, :POLICE:, :CA:, :PLUMAS COUNTY:  
:PLUMAS COUNTY:, :PLUMAS COUNTY SHERIFF:, :F3 LAW MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :PLUMAS COUNTY:  
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RESCUE,, :DISPATCH:,155.1600,,,:POLICE:, :CA:, :PLUMAS COUNTY:  
:AMADOR COUNTY:, :AMADOR COUNTY SHERIFF:, :POLICE -  
SHERIFF:,45.6000,,,:POLICE:, :CA:, :AMADOR COUNTY:  
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F2:,45.5400,,,:POLICE:, :CA:, :AMADOR COUNTY:  
:POINT ARENA:, :POINT ARENA FIRE:, :FIRE  
PRIMARY:,153.7700,,,:FIRE:, :CA:, :MENDOCINO COUNTY:  
:POINT ARENA:, :POINT ARENA POLICE:, :POLICE -  
SHERIFF:,154.7550,,,:POLICE:, :CA:, :MENDOCINO COUNTY:  
:POMONA:, :POMONA FIRE:, :FIRE PRIMARY RED 1:,154.0700,,,:FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:POMONA:, :POMONA FIRE:, :F3 FIRE COORDINATION:,153.8600,,,:FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:POMONA:, :POMONA FIRE:, :F2 FIRE MUTUAL AID:,154.2800,,,:FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:POMONA:, :COLE-SCHAEFFER AMBULANCE:, :DISPATCH:,47.5800,,,:MEDICAL:, :CA:, :LOS  
ANGELES COUNTY:  
:POMONA:, :CRIPPEN AMBULANCE:, :DISPATCH:,47.6200,,,:MEDICAL:, :CA:, :LOS ANGELES  
COUNTY:  
:POMONA:, :POMONA POLICE:, :POLICE RECORDS BROWN  
2:,153.9350,,,:POLICE:, :CA:, :LOS ANGELES COUNTY:  
:POMONA:, :POMONA POLICE:, :POLICE TACTICAL ORANGE  
3:,153.8600,,,:POLICE:, :CA:, :LOS ANGELES COUNTY:  
:POMONA:, :POMONA POLICE:, :POLICE HELO PRECOM:,155.5950,,,:POLICE:, :CA:, :LOS  
ANGELES COUNTY:  
:POMONA:, :POMONA POLICE:, :POLICE MUTUAL AID GOLD  
4:,154.9200,,,:POLICE:, :CA:, :LOS ANGELES COUNTY:  
:POMONA:, :POMONA POLICE:, :POLICE DETECTIVE TACTICAL  
5:,155.2500,,,:POLICE:, :CA:, :LOS ANGELES COUNTY:  
:POMONA:, :POMONA POLICE:, :POLICE PRIMARY BLUE  
1:,155.5500,,,:POLICE:, :CA:, :LOS ANGELES COUNTY:  
:PORTERVILLE:, :CALIFORNIA HIGHWAY PATROL:, :PINK BASE OFFICE #  
40:,42.4400,, :KBQ742:, :POLICE:, :CA:, :  
:PORTERVILLE:, :CALIFORNIA HIGHWAY PATROL:, :PINK MOBILE OFFICE #  
40:,42.7600,, :KA4993:, :POLICE:, :CA:, :  
:PORTOLA:, :PORTOLA FIRE:, :FIRE DEPARTMENT:,154.1900,,,:FIRE:, :CA:, :PLUMAS  
COUNTY:  
:PORTOLA:, :PORTOLA POLICE:, :POLICE -  
SHERIFF:,156.0900,,,:POLICE:, :CA:, :PLUMAS COUNTY:  
:PORTOLA VALLEY:, :PORTOLA VALLEY POLICE:, :POLICE -  
SHERIFF:,488.9875,,,:POLICE:, :CA:, :SAN MATEO COUNTY:  
:PORTOLA VALLEY:, :PORTOLA VALLEY FIRE:, :FIRE - WOODSIDE  
FPD:,153.8900,,,:FIRE:, :CA:, :SAN MATEO COUNTY:  
:POWAY:, :POWAY FIRE:, :FIRE & MEDICS:,154.3100,,,:FIRE:, :CA:, :SAN DIEGO  
COUNTY:  
:POWAY:, :POWAY POLICE:, :POLICE - SHERIFF  
CONTRACT:,453.5000,,,:POLICE:, :CA:, :SAN DIEGO COUNTY:  
:QUINCY:, :QUINCY FIRE:, :FIRE PRIMARY:,154.1900,,,:FIRE:, :CA:, :PLUMAS COUNTY:  
:QUINCY:, :QUINCY FIRE:, :FIRE - OES LOCAL  
GOVERNMENT:,153.7550,,,:FIRE:, :CA:, :PLUMAS COUNTY:  
:QUINCY:, :QUINCY POLICE:, :POLICE - SHERIFF:,156.0900,,,:POLICE:, :CA:, :PLUMAS  
COUNTY:  
:QUINCY:, :CALIFORNIA HIGHWAY PATROL:, :BLUE MOBILE OFFICE #  
20:,42.1800,, :KA4993:, :POLICE:, :CA:, :  
:QUINCY:, :CALIFORNIA HIGHWAY PATROL:, :BLUE BASE OFFICE #  
20:,42.3400,,,:POLICE:, :CA:, :  
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FPD:,154.0250,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:RANCHO CUCAMONGA:,RANCHO CUCAMONGA POLICE:,POLICE - SHERIFF  
CONTRACT:,155.9100,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:RANCHO MIRAGE:,RANCHO MIRAGE FIRE:,FIRE PRIMARY -  
RCFD:,151.1750,::,FIRE:,CA:,RIVERSIDE COUNTY:  
:RANCHO MIRAGE:,RANCHO MIRAGE POLICE:,POLICE - SHERIFF  
CONTRACT:,159.0900,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:RANCHO PALOS VERDES:,RANCHO PALOS VERDES POLICE:,F7 POLICE -  
LACOSD:,484.0375,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:RANCHO PALOS VERDES:,RANCHO PALOS VERDES FIRE:,FIRE -  
LACOFD:,154.4300,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:RANCHO SANTA FE:,RANCHO SANTA FE  
POLICE:,OPERATIONS:,856.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:RANCHO SANTA FE:,RANCHO SANTA FE  
POLICE:,OPERATIONS:,858.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
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POLICE:,OPERATIONS:,859.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
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POLICE:,OPERATIONS:,857.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:RANCHO SANTA FE:,RANCHO SANTA FE POLICE:,FRIENDSHIP MANOR  
POLICE:,460.5250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:RANCHO SANTA FE:,RANCHO SANTA FE POLICE:,EL CAJON GROSSMONT CUYAMACA CCD  
PD:,155.5800,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:RANCHO SANTA FE:,RANCHO SANTA FE  
POLICE:,OPERATIONS:,860.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:RED BLUFF:,CALIFORNIA HIGHWAY PATROL:,RED MOBILE OFFICE #  
36:,42.2800,KA4993:,POLICE:,CA:,:  
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36:,42.4400,KMD493:,POLICE:,CA:,:  
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37:,42.4400,KMD494:,POLICE:,CA:,:  
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37:,42.2800,KA4993:,POLICE:,CA:,:  
:REDDING:,REDDING POLICE:,F2 PUBLIC SAFETY  
TRUNKED:,857.9625,::,POLICE:,CA:,SHASTA COUNTY:  
:REDDING:,REDDING AIRPORT  
SECURITY:,OPERATIONS:,453.7000,::,POLICE:,CA:,SHASTA COUNTY:  
:REDDING:,REDDING FIRE:,F2 FIRE SECONDARY:,154.4000,::,FIRE:,CA:,SHASTA  
COUNTY:  
:REDDING:,SHASTA-TEHAMA-TRINITY COLLEGE DISTRICT:,POLICE OPERATIONS  
(DISCONTINUED),155.5350,::,POLICE:,CA:,SHASTA COUNTY:  
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COMMON:,155.7000,::,POLICE:,CA:,SHASTA COUNTY:  
:REDDING:,REDDING POLICE:,F4 POLICE  
TACTICAL:,154.8150,::,POLICE:,CA:,SHASTA COUNTY:  
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TRUNKED:,856.9625,::,POLICE:,CA:,SHASTA COUNTY:  
:REDDING:,SHASTA-TEHAMA-TRINITY COLLEGE DISTRICT:,FIRE  
PRIMARY:,154.4300,::,FIRE:,CA:,SHASTA COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,SHASTA COUNTY:  
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TRUNKED:,858.9625,::,POLICE:,CA:,SHASTA COUNTY:  
:REDDING:,REDDING POLICE:,F2 POLICE  
TACTICAL:,154.8600,::,POLICE:,CA:,SHASTA COUNTY:  
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TRUNKED:,859.9625,::,POLICE:,CA:,SHASTA COUNTY:  
:REDDING:,REDDING POLICE:,F5 PUBLIC SAFETY  
TRUNKED:,860.9625,::,POLICE:,CA:,SHASTA COUNTY:  
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COUNTY:  
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FD:,154.3850,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:REDLANDS:,REDLANDS FIRE:,F1 FIRE PRIMARY:,154.1900,::,FIRE:,CA:,SAN  
BERNARDINO COUNTY:  
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TERMINALS:,857.2625,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:REDLANDS:,REDLANDS POLICE:,F4 POLICE DIRECT:,154.8000,::,POLICE:,CA:,SAN  
BERNARDINO COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
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BLACK:,155.8050,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
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PRIMARY:,154.8000,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:REDLANDS:,REDLANDS POLICE:,F5 POLICE  
TACTICAL:,154.7400,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:REDONDO BEACH:,REDONDO BEACH FIRE:,F2 FIRE  
SECONDARY:,855.7375,::,FIRE:,CA:,LOS ANGELES COUNTY:  
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PRIMARY:,855.9625,::,FIRE:,CA:,LOS ANGELES COUNTY:  
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C:,154.8600,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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B:,154.9350,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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SECONDARY:,460.4750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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PRIMARY:,460.0750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
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D:,155.4750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:REDWOOD CITY:,CALIFORNIA HIGHWAY PATROL:,SILVER BASE OFFICE #  
91:,42.0800,KAY845:,POLICE:,CA:,::  
:REDWOOD CITY:,CALIFORNIA HIGHWAY PATROL:,SILVER MOBILE OFFICE #  
91:,42.2800,KA4993:,POLICE:,CA:,::  
:REDWOOD CITY:,REDWOOD CITY FIRE:,F4 FIRE MENLO PARK  
FPD:,154.3700,::,FIRE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY FIRE:,F1 FIRE & MEDIC  
PRIMARY:,153.8900,::,FIRE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY POLICE:,F5 POLICE PRIMARY  
DIRECT:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY POLICE:,F4 POLICE TACTICAL  
2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY POLICE:,F2 POLICE TACTICAL  
3:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:REDWOOD CITY:,REDWOOD CITY POLICE:,F1 POLICE  
PRIMARY:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:

:REDWOOD CITY:,:REDWOOD CITY FIRE:,:F3 FIRE MUTUAL  
AID:,154.2650,::,:FIRE:,:CA:,:SAN MATEO COUNTY:  
:REEDLEY:,:REEDLEY FIRE:,:F1 FIRE PRIMARY:,154.1450,::,:FIRE:,:CA:,:FRESNO  
COUNTY:  
:REEDLEY:,:REEDLEY FIRE:,:F2 FIRE MUTUAL AID:,154.2800,::,:FIRE:,:CA:,:FRESNO  
COUNTY:  
:REEDLEY:,:REEDLEY POLICE:,:POLICE PRIMARY:,155.7900,::,:POLICE:,:CA:,:FRESNO  
COUNTY:  
:REEDLEY:,:STATE CENTER COMMUNITY COLLEGE:,:F1 POLICE  
PRIMARY:,155.6850,::,:POLICE:,:CA:,:FRESNO COUNTY:  
:RIALTO:,:RIALTO FIRE:,:MUNICIPAL AIRPORT:,155.1600,::,:FIRE:,:CA:,:SAN  
BERNARDINO COUNTY:  
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FD:,154.3850,::,:FIRE:,:CA:,:SAN BERNARDINO COUNTY:  
:RIALTO:,:RIALTO FIRE:,:F1 FIRE & MEDICS:,154.1900,::,:FIRE:,:CA:,:SAN  
BERNARDINO COUNTY:  
:RIALTO:,:RIALTO POLICE:,:F4 POLICE MUTUAL AID:,154.9200,::,:POLICE:,:CA:,:SAN  
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BRIGADE:,:DISPATCH:,451.9750,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
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HOSPITAL:,:DISPATCH:,464.7750,::,:MEDICAL:,:CA:,:CONTRA COSTA COUNTY:  
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COSTA COUNTY:  
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74:,453.3000,::,:FIRE:,:CA:,:KERN COUNTY:  
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AID:,154.9200,::,:POLICE:,:CA:,:KERN COUNTY:  
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:RIO DELL:,:RIO DELL FIRE:,:FIRE PROTECTION  
DISTRICT:,33.7000,::,:FIRE:,:CA:,:HUMBOLDT COUNTY:  
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TELEPHONE:,154.8000,::,POLICE:,CA:,HUMBOLDT COUNTY:  
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PRIMARY:,155.2500,::,POLICE:,CA:,HUMBOLDT COUNTY:  
:RIO VISTA:,RIO VISTA POLICE:,F3 POLICE  
PRIMARY:,154.8300,::,POLICE:,CA:,SOLANO COUNTY:  
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1:,155.4900,::,POLICE:,CA:,SOLANO COUNTY:  
:RIO VISTA:,RIO VISTA FIRE:,F2 FIRE  
SECONDARY:,154.3400,::,FIRE:,CA:,SOLANO COUNTY:  
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COUNTY:  
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SECONDARY:,159.0900,::,POLICE:,CA:,STANISLAUS COUNTY:  
:RIVERBANK:,RIVERBANK POLICE:,F3 POLICE OAKDALE  
PD:,158.7600,::,POLICE:,CA:,STANISLAUS COUNTY:  
:RIVERBANK:,RIVERBANK FIRE:,FIRE  
PRIMARY:,153.7700,::,FIRE:,CA:,STANISLAUS COUNTY:  
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SECONDARY:,460.6000,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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SPECIAL:,460.0875,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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FIREGROUND:,460.6250,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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B:,154.2650,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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A:,154.2800,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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REPEATER:,460.0875,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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C:,154.2950,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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SPECIAL:,465.1125,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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PD:,460.4500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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SPECIAL:,465.0875,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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DIRECT:,460.6000,::,FIRE:,CA:,RIVERSIDE COUNTY:  
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DIRECT:,460.1750,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:RIVERSIDE:,RIVERSIDE POLICE:,F8 POLICE TASK FORCE  
TACTICAL:,460.0500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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DIRECT:,460.4750,::,POLICE:,CA:,RIVERSIDE COUNTY:

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PRIMARY:, 460.5750, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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TACTICAL:, 460.4750, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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DIRECT:, 460.2500, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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COMMAND:, 460.1250, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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DIRECT:, 460.6250, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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SOUTH:, 460.3250, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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AID:, 158.9250, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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(TF) :, 460.2500, ::, :POLICE:, :CA:, :RIVERSIDE COUNTY:  
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INTERSYSTEM:, 154.1300, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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AID:, 154.2800, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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LOCAL:, 154.4150, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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AREA:, 463.0500, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
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OPERATIONS WEST:, 151.3850, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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MEDIC:, 155.2950, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
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LOCAL:, 154.4450, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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AMBULANCES:, :DISPATCH:, 46.0000, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
:RIVERSIDE COUNTY:, :RIVERSIDE COUNTY FIRE:, :F1 MURIETTA FIRE OPERATIONS  
LOCAL:, 154.1450, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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EMERGENCY:, 155.3400, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
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HOSPITAL:, 155.2650, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
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AREA:, 463.0250, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
:RIVERSIDE COUNTY:, :RIVERSIDE COUNTY FIRE:, :F2 IDYLLWILD FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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AID:, 154.2800, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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AREA:, 463.0750, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
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EAST:, 151.1750, ::, :FIRE:, :CA:, :RIVERSIDE COUNTY:  
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ALTERNATE:, 156.0750, ::, :MEDICAL:, :CA:, :RIVERSIDE COUNTY:  
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AREA:,463.0000,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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HOSPITALS:,DISPATCH:,155.2650,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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AMBULANCES:,DISPATCH:,155.2950,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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INDIO:,155.2050,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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COMMUNITIES:,151.1750,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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LIAISON:,42.3400,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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HOSPITALS:,DISPATCH:,155.3400,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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SECONDARY:,159.4500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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LIAISON:,42.4400,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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SECURITY:,154.9200,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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LIAISON:,42.5400,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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PRIMARYM:,158.9700,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:RIVERSIDE COUNTY:,RIVERSIDE COUNTY SHERIFF:,F1 COURT HOUSE SECURITY  
DETAIL:,460.2250,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:RIVERSIDE COUNTY:,RIVERSIDE COUNTY SHERIFF:,F2 BLYTHE  
PRIMARY:,159.0900,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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LINK:,453.1375,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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PRIMARY:,158.8500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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LINK:,453.4625,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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PRIMARY:,158.8200,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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SHERIFF:,LINK:,453.4375,::,POLICE:,CA:,RIVERSIDE COUNTY:  
:RIVERSIDE COUNTY:,RIVERSIDE COUNTY EMS:,MED 5 PALM SPRINGS  
AREA:,463.1000,::,MEDICAL:,CA:,RIVERSIDE COUNTY:  
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DETAIL:,460.3500,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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CLERS:,158.7900,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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AID:,158.9250,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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PRIMARY:,158.7600,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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TACTICAL:,158.7750,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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PRIMARY:,159.0900,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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SHERIFF:,CLERS:,158.7900,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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HILL:,453.4375,::,POLICE:,CA:,RIVERSIDE COUNTY:  
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MOUNTAIN:,453.0875,::,POLICE:,CA:,RIVERSIDE COUNTY:

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LIAISON:,:42.3400,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
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LINK:,:453.1625,::,:POLICE:,:CA:,:RIVERSIDE COUNTY:  
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COUNTY:  
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PRIMARY:,:156.0300,::,:POLICE:,:CA:,:PLACER COUNTY:  
:ROCKLIN:,:SIERRA COLLEGE:,:F2 OPERATIONS:,:151.8950,::,:POLICE:,:CA:,:PLACER  
COUNTY:  
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COUNTY:  
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AUBURN:,:154.6500,::,:POLICE:,:CA:,:PLACER COUNTY:  
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DEPARTMENT:,:DISPATCH:,:48.9000,::,:FIRE:,:CA:,:CONTRA COSTA COUNTY:  
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PRIMARY:,:154.1000,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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AID:,:154.2800,::,:FIRE:,:CA:,:SONOMA COUNTY:  
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SECONDARY:,:154.8900,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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AID:,:154.9200,::,:POLICE:,:CA:,:SONOMA COUNTY:  
:ROHNERT PARK:,:ROHNERT PARK FIRE:,:F1 FIRE  
PRIMARY:,:154.1000,::,:FIRE:,:CA:,:SONOMA COUNTY:  
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LACOFD:,:154.4300,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:ROLLING HILLS:,:ROLLING HILLS POLICE:,:POLICE - LACOSD CONTRACT  
F7:,:484.0375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:ROLLING HILLS ESTATES:,:ROLLING HILLS ESTATES FIRE:,:FIRE - LACFD STATION  
106:,:154.4300,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:ROLLING HILLS ESTATES:,:ROLLING HILLS ESTATES POLICE:,:POLICE - LACOSD  
CONTRACT F7:,:484.0375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:ROSEMEAD:,:ROSEMEAD FIRE:,:FIRE - LACOFD:,:154.3400,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:ROSEMEAD:,:ROSEMEAD POLICE:,:POLICE - F11 LACOSD  
CONTRACT:,:482.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:ROSEVILLE:,:SOUTHERN PACIFIC FD:,:DISPATCH:,:161.4000,::,:FIRE:,:CA:,:PLACER  
COUNTY:  
:ROSEVILLE:,:ROSEVILLE FIRE:,:F2 FIRE WEST  
DISTRICTS:,:154.3550,::,:FIRE:,:CA:,:PLACER COUNTY:  
:ROSEVILLE:,:ROSEVILLE FIRE:,:F1 FIRE PRIMARY:,:154.0400,::,:FIRE:,:CA:,:PLACER  
COUNTY:  
:ROSEVILLE:,:FOOTHILL AMBULANCE:,:DISPATCH:,:155.2050,::,:MEDICAL:,:CA:,:PLACER  
COUNTY:  
:ROSEVILLE:,:ROSEVILLE COMMUNITY  
HOSPITAL:,:DISPATCH:,:155.3400,::,:MEDICAL:,:CA:,:PLACER COUNTY:  
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PRIMARY:,:155.5650,::,:POLICE:,:CA:,:PLACER COUNTY:  
:ROSEVILLE:,:ROSEVILLE POLICE:,:POLICE  
TACTICAL:,:465.1375,::,:POLICE:,:CA:,:PLACER COUNTY:  
:ROSEVILLE:,:ROSEVILLE POLICE:,:F3 POLICE AUBURN  
PD:,:154.6500,::,:POLICE:,:CA:,:PLACER COUNTY:  
:ROSEVILLE:,:ROSEVILLE POLICE:,:F2 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:PLACER COUNTY:  
:ROSS:,:ROSS FIRE:,:F2 FIRE COUNTYWIDE MUTUAL

AID:,46.1200,::, :FIRE:, :CA:, :MARIN COUNTY:  
:ROSS:, :ROSS FIRE:, :F1 FIRE & MEDICS:,46.5000,::, :FIRE:, :CA:, :MARIN COUNTY:  
:ROSS:, :ROSS POLICE:, :F2 POLICE COUNTYWIDE MUTUAL  
AID:,39.5200,::, :POLICE:, :CA:, :MARIN COUNTY:  
:ROSS:, :ROSS POLICE:, :F3 POLICE TACTICAL:,39.3000,::, :POLICE:, :CA:, :MARIN  
COUNTY:  
:ROSS:, :ROSS POLICE:, :F1 POLICE PRIMARY:,39.4400,::, :POLICE:, :CA:, :MARIN  
COUNTY:  
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PORTABLE:,153.8300,::, :FIRE:, :CA:, :SACRAMENTO COUNTY:  
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COUNTY:,154.4450,::, :FIRE:, :CA:, :SACRAMENTO COUNTY:  
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DATA:,857.2125,::, :FIRE:, :CA:, :SACRAMENTO COUNTY:  
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AMBULANCE:,155.1600,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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HOSPITAL:,155.3400,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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MOUNTAIN:,463.0000,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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8:,153.7850,::,FIRE:,CA:,SACRAMENTO COUNTY:  
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AMBULANCE:,155.2200,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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6:,154.1000,::,FIRE:,CA:,SACRAMENTO COUNTY:  
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MEDIC:,153.9500,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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MEDICS:,154.1300,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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OPS:,123.0500,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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AMBULANCE:,155.2650,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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CENTER:,155.3400,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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MEDICS:,154.1900,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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AMBULANCE:,155.4000,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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TACTICAL:,460.5750,::,FIRE:,CA:,SACRAMENTO COUNTY:  
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AMBULANCE:,155.2950,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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DATA:,460.6250,::,FIRE:,CA:,SACRAMENTO COUNTY:  
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HILL:,463.0750,::,MEDICAL:,CA:,SACRAMENTO COUNTY:  
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NET:,154.2200,::,FIRE:,CA:,SACRAMENTO COUNTY:

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AMBULANCE:, 155.2650, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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NET:, 154.1600, ::, :FIRE:, :CA:, :SACRAMENTO COUNTY:  
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FLIGHT:, 155.2800, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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MEDICS:, 153.9950, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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VACA:, 463.1000, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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AID:, 154.2800, ::, :FIRE:, :CA:, :SACRAMENTO COUNTY:  
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7:, 154.4000, ::, :FIRE:, :CA:, :SACRAMENTO COUNTY:  
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MEDIC:, 154.1900, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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HOSPITAL:, 173.5625, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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MEDICS:, 154.1900, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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DISPATCH:, 462.9750, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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DISPATCH:, 462.9500, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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CENTER:, 463.1750, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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MOUNTAIN:, 463.1500, ::, :MEDICAL:, :CA:, :SACRAMENTO COUNTY:  
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SECONDARY REPEATER:, 453.2500, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SACRAMENTO COUNTY:, :RANCHO SECO NUCLEAR POWER PLANT:, :LECN LAW ENFORCEMENT  
SECO 1-4:, 453.5750, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
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PRIMARY REPEATER:, 453.9000, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SACRAMENTO COUNTY:, :RANCHO SECO NUCLEAR POWER PLANT:, :RMCN RADIOLOGICAL  
MONITORING:, 453.7250, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SACRAMENTO COUNTY:, :SACRAMENTO COUNTY SHERIFF:, :MOBILE COMPUTER  
TERMINALS:, 453.6250, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
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SECURITY:, 453.7500, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
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SECURITY OPERATIONS TACTICAL:, 453.4750, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
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TACTICAL (TASK FORCES), 453.6750, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
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PRIMARY REPEATER:, 453.5750, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SACRAMENTO COUNTY:, :RANCHO SECO NUCLEAR POWER PLANT:, :EMCN EMERGENCY  
MANAGEMENT:, 453.0500, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SACRAMENTO COUNTY:, :SACRAMENTO COUNTY SHERIFF:, :PROBATION & WELFARE  
FRAUD:, 453.7250, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SACRAMENTO COUNTY:, :SACRAMENTO COUNTY SHERIFF:, :F6 AIRPORT & JAIL SECURITY  
OPERATIONS:, 453.9500, ::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
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COUNTY:  
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COUNTY:

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FD:, 154.3700, ::, :FIRE:, :CA:, :MONTEREY COUNTY:  
:SALINAS:, :SALINAS FIRE:, :F4 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :MONTEREY COUNTY:  
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DETECTIVES:, 453.8750, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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TACTICAL:, 460.3750, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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PRIMARY:, 460.1750, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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SECONDARY:, 460.0250, ::, :POLICE:, :CA:, :MONTEREY COUNTY:  
:SAMOA:, :FAIRHAVEN FIRE:, :F1 PRIMARY:, 154.4000, ::, :FIRE:, :CA:, :HUMBOLDT  
COUNTY:  
:SAN ANDREAS:, :CALIFORNIA HIGHWAY PATROL:, :WHITE BASE OFFICE #  
49:, 42.5600, :KDF573:, :POLICE:, :CA:, ::  
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49:, 42.7200, :KA4993:, :POLICE:, :CA:, ::  
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C:, 154.2800, ::, :FIRE:, :CA:, :MARIN COUNTY:  
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AID:, 46.1200, ::, :FIRE:, :CA:, :MARIN COUNTY:  
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B:, 154.2650, ::, :FIRE:, :CA:, :MARIN COUNTY:  
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A:, 154.2950, ::, :FIRE:, :CA:, :MARIN COUNTY:  
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MEDICS:, 46.5000, ::, :FIRE:, :CA:, :MARIN COUNTY:  
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AID:, 39.5200, ::, :POLICE:, :CA:, :MARIN COUNTY:  
:SAN ANSELMO:, :SAN ANSELMO POLICE:, :F3 POLICE FAIRFAX  
PD:, 39.3000, ::, :POLICE:, :CA:, :MARIN COUNTY:  
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TACTICAL:, 39.7000, ::, :POLICE:, :CA:, :MARIN COUNTY:  
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PRIMARY:, 39.4400, ::, :POLICE:, :CA:, :MARIN COUNTY:  
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CDF:, 151.2500, ::, :FIRE:, :CA:, :SAN BENITO COUNTY:  
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AMBULANCE:, 155.2800, ::, :MEDICAL:, :CA:, :SAN BENITO COUNTY:  
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HOLLISTER:, 463.0750, ::, :MEDICAL:, :CA:, :SAN BENITO COUNTY:  
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MOUNTAIN:, 463.0250, ::, :MEDICAL:, :CA:, :SAN BENITO COUNTY:  
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PEAK:, 463.0000, ::, :MEDICAL:, :CA:, :SAN BENITO COUNTY:  
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REPEATERS:, 158.7750, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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DIRECT:, 158.7750, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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2:, 155.8050, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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EXTENDERS:, 458.2000, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:

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AID:, 154.2800, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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DIRECT:, 151.2500, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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TACTICAL:, 151.0250, ::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
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BERNARDINO:, 154.3850, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :TAC4 WHITE 2 FIRE MUTUAL  
AID:, 154.2950, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
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EAST:, 151.3250, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :COMM CENTER SAN  
BERNARDINO-FOREST FALLS LINK:, 75.9000, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :CDF SAN BERNARDINO  
WEST:, 151.4450, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :NORTON AFB FD:, :FIRE DISPATCH:, 413.3750, ::, :FIRE:, :CA:, :SAN  
BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO FIRE:, :F1 FIRE &  
MEDICS:, 154.3850, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :M2 MOUNTAIN BLUE FIRE  
PRIMARY:, 33.4400, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO FIRE:, :FIRE HAZMAT ENTRY TEAMS &  
SPECIAL:, 453.3875, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :M3 MOUNTAIN RED FIRE  
MUTUAL AID:, 33.7600, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :YELLOW DESERT  
DISTRICTS:, 154.0700, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :M4 FIREGROUND  
MOBILE:, 33.4200, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :M1 MOUNTAIN YELLOW FIRE  
WEST DISTRICTS:, 33.6400, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :BLUE FIRE WEST  
CITIES:, 154.0250, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :WATER TANKER  
RESERVE:, 153.6800, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :GREEN FIRE CENTRAL  
CITIES:, 154.1900, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :BUCKSKIN FIRE COLORADO  
RIVER PRIMARY:, 154.0700, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO FIRE:, :F4 FIRE CENTRAL  
CITIES:, 154.1900, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :BROWN FIREGROUND  
PORTABLES:, 154.2950, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :MOUNTAIN BLUE MOUNTAIN  
AREA:, 33.4400, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :TAC16 FIREGROUND  
COUNTYWIDE:, 151.2500, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :GRAY APPLE  
VALLEY:, 154.2050, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :TAC5 YELLOW FIRE DESERT  
DISTRICTS:, 154.0700, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :FOOTHILL FPD MOBILE  
EXTENDERS:, 453.5500, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :BLUE WEST  
CITIES:, 154.0250, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY FIRE:, :TAC6 WHITE 3 FIRE MUTUAL

AID PORTABLES:,154.2650,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY FIRE:,BLUE CENTRAL  
CITIES:,154.1900,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY FIRE:,GRAY FIRE APPLE  
VALLEY:,154.2050,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY FIRE:,MOUNTAIN YELLOW WEST  
DISTRICTS:,33.6400,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY FIRE:,CDF BATTALION 4 COLORADO  
RIVER:,154.0700,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY FIRE:,TAC2 RED FIRE COUNTYWIDE  
MUTUAL AID:,154.3250,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY FIRE:,TAC3 WHITE 1 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,FONTANA REGIONAL  
PARAMEDIC:,155.2200,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,CHINO  
LIFELIGHT:,155.2050,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,HOSPITAL  
EMERGENCY:,155.3400,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,NEEDLES-HAYDEN PEAK  
LINK:,462.2750,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,NEEDLES DESERT  
AMBULANCE:,155.2800,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,F2 WEST VALLEY  
PRIMARY:,155.9100,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,VICTORVILLE VALLEY  
MEDICAL TRANSPORTATION:,155.2800,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY  
SHERIFF:,CLERS:,158.7900,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,BIG BEAR LAKE MOUNTAIN  
AMBULANCE:,155.1600,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,F9 COUNTYWIDE  
PORTABLES:,154.8450,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,JOSHUA TREE  
AMBULANCE:,155.2050,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,SKYLAND PEAK  
REPEATER:,159.2100,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,RIALTO INLAND  
AMBULANCE:,155.2200,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,F7 VICTORVILLE -  
APPLE VALLEY PRIMARY:,155.5650,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,BARSTOW DESERT  
AMBULANCE:,155.2800,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,F8 COUNTYWIDE COMMON  
BROWN:,155.4750,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,MED 2 MEDIC-  
HOSPITAL:,463.0250,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,F10 COUNTYWIDE  
PORTABLES:,155.5500,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,MED 1 MEDIC-  
HOSPITAL:,463.0000,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,AVIATION DIVISION  
AIR-AIR:,122.7500,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,MED 5 MEDIC-  
HOSPITAL:,463.1000,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY SHERIFF:,AVIATION DIVISION  
SEARCH & RESCUE:,122.9000,::,POLICE:,CA:,SAN BERNARDINO COUNTY:

:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :MED 7 MEDIC-HOSPITAL  
COMMON:, 463.1500, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :LAW ENFORCEMENT &  
RESCUE CHEMEHUEVI INDIAN TRIBE PD:, 155.6550, ::, :POLICE:, :CA:, :SAN BERNARDINO  
COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :ONTARIO B & B  
AMBULANCE:, 47.6200, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :LAW ENFORCEMENT &  
RESCUE SEARLES VALLEY MOUNTED PATROL:, 155.1600, ::, :POLICE:, :CA:, :SAN  
BERNARDINO COUNTY:  
:SAN BERNARDINO:, :BARSTOW DESERT RESCUE  
SQUAD:, :DISPATCH:, 155.1600, ::, :OTHER:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :COUNTYWIDE TACTICAL  
ALTERNATE:, 154.7400, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO POLICE:, :F2 POLICE  
SECONDARY:, 156.2100, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :F6 MORONGO - SOUTH  
MOJAVE DESERT PRIMARY:, 155.9700, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :F1 REDLANDS HOWARD  
AMBULANCE:, 46.0000, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO POLICE:, :SCHOOLS  
POLICE:, 460.0750, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :LOMA LINDA LOMA LINDA  
UNIVERSITY MEDICS:, 155.2200, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO POLICE:, :F4 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :FONTANA MERCY  
AMBULANCE:, 155.2200, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO POLICE:, :F3 POLICE  
TACTICAL:, 154.7400, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :F2 HOWARD  
AMBULANCE:, 46.0400, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :F4 BIG BEAR SAN  
GABRIEL MOUNTAINS PRIMARY:, 154.7400, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :SAN BERNARDINO COURTESY  
AMBULANCE:, 155.2800, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :COMM CENTER DATA SAN  
BERNARDINO BARSTOW:, 453.2500, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :MEDIC DISPATCH AMBULANCE-  
MEDIC PRIMARY:, 155.4000, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :FONTANA-SAN SEVAINE  
PEAK LINK:, 453.2875, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :MED 3 MEDIC-  
HOSPITAL:, 463.0500, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :F1 EAST VALLEY  
PRIMARY:, 155.9700, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY EMS:, :MED 4 MEDIC-  
HOSPITAL:, 463.0750, ::, :MEDICAL:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO POLICE:, :F1 POLICE  
PRIMARY:, 155.6550, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :F5 BARSTOW - EAST  
MOJAVE DESERT PRIMARY:, 154.7550, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:, :SAN BERNARDINO POLICE:, :COMMUNITY COLLEGE  
POLICE:, 460.1500, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY PARKS:, :PARKS DEPARTMENT  
REPEATERS 453.200:, 453.2000, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:, :SAN BERNARDINO COUNTY SHERIFF:, :F3 POLICE MUTUAL

AID:,154.9200,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,MED 6 MEDIC-  
HOSPITAL:,463.1250,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,MED 8 MEDIC-  
HOSPITAL:,463.1750,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY EMS:,BIG BEAR LAKE BEAR VALLEY  
COMMUNITY MEDICS:,155.2050,::,MEDICAL:,CA:,SAN BERNARDINO COUNTY:  
:SAN BERNARDINO:,BIG BEAR CSD:,DISPATCH:,155.8800,::,OTHER:,CA:,SAN  
BERNARDINO COUNTY:  
:SAN BERNARDINO COUNTY:,SAN BERNARDINO COUNTY MARSHALLS:,MARSHALS DEPARTMENT  
REPEATERS:,155.1150,::,POLICE:,CA:,SAN BERNARDINO COUNTY:  
:SAN BRUNO:,SAN BRUNO POLICE:,F1 POLICE  
PRIMARY:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO POLICE:,F4 POLICE TACTICAL  
2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO POLICE:,F5 POLICE PRIMARY  
DIRECT:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO FIRE:,F1 FIRE PRIMARY:,154.0400,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO FIRE:,F2 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO FIRE:,F3 FIRE MUTUAL AID:,154.2650,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO FIRE:,F4 FIRE MUTUAL AID:,154.2950,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN BRUNO:,SAN BRUNO POLICE:,F2 POLICE TACTICAL  
1:,488.8625,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS POLICE:,F2 POLICE TACTICAL  
3:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS POLICE:,F1 POLICE  
PRIMARY:,488.4875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS POLICE:,F3 POLICE COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS FIRE:,F1 FIRE - SOUTH COUNTY  
FPD:,153.8900,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS POLICE:,F5 POLICE PRIMARY  
DIRECT:,488.4875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN CARLO:,SAN CARLOS POLICE:,F4 POLICE TACTICAL  
2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN CLEMENTE:,SAN CLEMENTE POLICE:,POLICE SECONDARY ORANGE  
SOUTH:,460.2000,::,POLICE:,CA:,ORANGE COUNTY:  
:SAN CLEMENTE:,SAN CLEMENTE POLICE:,POLICE PRIMARY  
GREEN:,460.1750,::,POLICE:,CA:,ORANGE COUNTY:  
:SAN CLEMENTE:,SAN CLEMENTE POLICE:,POLICE BORDER PATROL  
COORDINATION:,163.7250,::,POLICE:,CA:,ORANGE COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,F5 FIRE COUNTYWIDE MUTUAL AID  
RED:,155.0850,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,F7 FIREGROUND TACTICAL WHITE  
3:,154.2950,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,LIFEGUARD POINT  
LOMA:,453.7750,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,LIFEGUARD:,154.9950,::,FIRE:,CA:,SAN DIEGO  
COUNTY:

:SAN DIEGO:, :SAN DIEGO FIRE:, :LIFEGUARD  
PORTABLES:, 453.3875, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F8 FIREGROUND TACTICAL  
TAC:, 153.8750, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F6 FIRE COUNTYWIDE MUTUAL AID  
RED:, 155.0850, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :LIFEGUARD:, 453.6500, ::, :FIRE:, :CA:, :SAN DIEGO  
COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F5 FIRE MUTUAL AID WHITE  
1:, 154.2800, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F4 FIRE INCIDENT  
TAC:, 154.4300, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F3 FIRE INCIDENT RESPONSE  
GOLD:, 153.7850, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :LIFEGUARD  
PORTABLES:, 453.4375, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F2 FIRE INCIDENT  
RESPONSE:, 154.1450, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :FIRE UNDETERMINED:, 460.5875, ::, :FIRE:, :CA:, :SAN  
DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :FIRE DIGITAL  
DISPATCH:, 154.0850, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :FIRE MDT PLANNED:, 856.0250, ::, :FIRE:, :CA:, :SAN  
DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :LIFEGUARD  
PORTABLES:, 453.4125, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F1 FIRE DISPATCH:, 154.3100, ::, :FIRE:, :CA:, :SAN  
DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :F9 FIRE SOUTH BAY  
PRIMARY:, 154.4150, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :FIRE UNDETERMINED:, 460.6125, ::, :FIRE:, :CA:, :SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY FIRE:, :ZONE 6 AIR  
OPERATIONS:, 151.2950, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :ZONE 7 INLAND  
VOLUNTEER:, 154.1750, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :JACUMBA CSA #25:, 46.4600, ::, :FIRE:, :CA:, :SAN  
DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :ZONE 6 GREENBELT -  
CDF:, 151.1900, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO:, :SAN DIEGO FIRE:, :RANCHO SANTA FE FPD:, 46.4600, ::, :FIRE:, :CA:, :SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY EMS:, :AIR-EVAC  
AMBULANCE:, 462.0500, ::, :MEDICAL:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY EMS:, :F3  
HOSPITALS:, 155.3250, ::, :MEDICAL:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY FIRE:, :ZONE 7 MOUNTAIN AREA FIREGROUND  
TAC1 WHT 3:, 154.2950, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY EMS:, :OCEANSIDE AMERICAN  
AMBULANCE:, 155.1600, ::, :MEDICAL:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY FIRE:, :ZONE 4 CENTRAL INLAND FIREGROUND  
TAC2 YEL:, 153.8900, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY EMS:, :F1 STATION X EMS TRAUMA  
DISPATCH:, 155.0250, ::, :MEDICAL:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY FIRE:, :ZONE 3 CENTRAL FIRE  
DISPATCH:, 154.3100, ::, :FIRE:, :CA:, :SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:, :SAN DIEGO COUNTY EMS:, :CHULA VISTA BAY CITIES



AMBULANCE:,155.2800,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ZONE 8 INLAND  
VOLUNTEER:,154.1750,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 4 PARADISE VALLEY  
HOSPITAL:,463.0750,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,CREST FPD EL CAJON:,46.1200,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,SAN DIEGO HARTSON  
AMBULANCE:,155.2050,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ZONE 4 HEARTLAND:,154.2050,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,F6 HOSPITAL  
EMERGENCY:,155.3400,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ZONE 3  
METROPOLITAN:,154.3100,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,F2 MEDIC-  
HOSPITAL:,155.1750,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ZONE 2 COASTAL:,154.3850,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 7 UC SAN DIEGO MEDICAL  
CENTER:,463.1500,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,GENERAL DYNAMICS - CONVAIR  
FD:,DISPATCH:,153.3200,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 2 MERCY HOSPITAL MED  
CENTER:,463.0250,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F8 IMPERIAL BEACH  
NOLF:,140.3000,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,F4 HOSPITAL  
ADMINISTRATION:,155.3850,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F6 MIRAMAR  
NAS:,140.2500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,ENCINITAS SAN DIEGUITO AMBULANCE  
DISTRICT:,154.2350,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F4 MARINE CORPS  
DEPOT:,140.8750,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,SAN DIEGO SCHAEFFERS GOLD  
CROSS:,155.2200,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F2 NAVAL  
STATION:,140.4500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,LA MESA SCHAEFFERS GOLD  
CROSS:,47.5800,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,DISPATCH:,138.6000,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,F1 EMS  
TRAUMA:,155.0250,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,COUNTYWIDE MUTUAL AID  
RED:,155.0850,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY:,F4 POLICE HOTLINE  
BLUE:,153.9950,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,FIRE MUTUAL AID WHITE  
2:,154.2650,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 3 GROSSMONT  
HOSPITAL:,463.0500,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 7 MOUNTAIN AREA FIREGROUND  
TAC4 GLD:,154.4300,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 4 TRI CITY MEDICAL  
CENTER:,463.0750,::,MEDICAL:,CA:,SAN DIEGO COUNTY:

:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 7 MOUNTAIN AREA FIREGROUND  
TAC2 GRY:,:154.3550,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY EMS:,:MED 5 LYONS PEAK  
COMMON:,:463.1000,,:,:MEDICAL:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 2 NO. COASTAL FIREGROUND TAC1  
GRY:,:154.3550,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY EMS:,:NAVY REGIONAL HEALTH  
CENTER:,:149.6250,,:,:MEDICAL:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 6 FIRE CDF  
1:,:151.3550,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:F2 POLICE NORTH & NORTHEAST DISTRICT 1 &  
2:,:158.9700,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 6 FIREGROUND  
TACTICAL:,:159.2500,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
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5:,:159.0450,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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TAC4 GLD:,:154.4300,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F3 NORTH INLAND  
PRIMARY:,:453.9250,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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TAC2 GRY:,:154.3550,,:KM8396:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
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DETENTION:,:453.8250,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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PRIMARY:,:154.2350,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY COUNTY MARSHAL:,:F2 OPERATIONS  
TACTICAL:,:158.8650,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:FIREGROUND TACTICAL 2  
YELLOW:,:153.8900,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY COUNTY MARSHAL:,:F1 STATION L OPERATIONS  
DISPATCH YELLOW:,:155.7150,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO FIRE:,:ZONE AVOCADO:,:154.2350,,:,:FIRE:,:CA:,:SAN DIEGO  
COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY DISTRICT ATTORNEY:,:F2 OPERATIONS  
TACTICAL:,:159.0300,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:F2 FIRE DISPATCH &  
OPERATIONS:,:857.2500,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY DISTRICT ATTORNEY:,:F1 STATION M  
OPERATIONS DISPATCH YELLOW:,:155.7150,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:F4 FIRE DISPATCH &  
OPERATIONS:,:859.2500,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
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PAGING:,:37.0400,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:F6 FIRE DISPATCH &  
OPERATIONS:,:860.2375,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:VISTA NORTH COUNTY  
DETENTION:,:453.3250,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 5 SOUTH COASTAL FIRE  
DISPATCH:,:154.4150,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:SOUTH BAY DETENTION  
TACTICAL:,:453.8500,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:FIREGROUND TACTICAL 4  
GOLD:,:154.4300,,:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:CHULA VISTA SOUTH BAY  
DETENTION:,:453.2750,,:,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 2 NO. COASTAL FIRE

PRIMARY:,154.3850,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,SANTEE LAS COLINAS WOMENS  
CENTER:,37.0400,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 4 CENTRAL INLAND FIREGROUND  
TAC4 GLD:,154.4300,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,SAN DIEGO CENTRAL DETENTION  
PAGING:,37.0400,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 4 CENTRAL INLAND FIRE  
DISPATCH:,154.2050,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,CONVENTION CENTER  
SECURITY:,458.8000,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 10  
LIFEFLIGHT:,462.9750,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,SAN DIEGO CENTRAL  
DETENTION:,453.6250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,BALBOA NAVAL REGIONAL  
MC:,43.5250,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F7 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,SOUTHERN CAL EDISON  
ERT:,155.3400,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,BARRETT HONOR CAMP  
TACTICAL:,453.8250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,LA JOLLA VETERANS ADMINISTRATION  
HOSPITAL:,168.5250,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,ALPINE BARRETT HONOR  
CAMP:,453.3250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,NATIONAL CITY AARON  
AMBULANCE:,155.2650,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY  
SHERIFF:,CLERS:,453.6750,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,CAMP PENDLETON FD-  
OCEANSIDE:,138.6000,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,INTERAGENCY HOT LINE  
BLUE:,153.9950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 2 NO. COASTAL FIREGROUND TAC4  
GLD:,154.4300,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,POLICE MUTUAL  
AID:,155.4750,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ZONE 5 SOUTH BAY:,154.4150,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,COMM CENTER POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 2 NO. COASTAL FIREGROUND TAC3  
BRO:,154.2500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,SED (SPECIAL ENFORCEMENT  
DETAIL):,453.2500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,GENERAL ATOMIC TECHNOLOGY  
FD:,DISPATCH:,153.3200,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,COMMUNITY COLLEGE PD STATION  
D:,453.4500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F7 IMPERIAL BEACH  
NOLF:,140.1000,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,COUNTYWIDE TACTICAL VHF  
LOW:,39.3800,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F3 OCEAN SYSTEMS CENTER POINT  
LOMA:,140.8250,::,FIRE:,CA:,SAN DIEGO COUNTY:

:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:COUNTYWIDE TACTICAL  
VHF:,:155.4150,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:DONOVAN CORRECTIONAL FACILITY  
FD:,:DISPATCH:,:138.6000,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:COUNTYWIDE TACTICAL  
OPERATIONS:,:453.9750,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:FIRE MUTUAL AID WHITE  
1:,:154.2800,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F12 SOUTH TACTICAL  
DIRECT:,:453.8250,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 7 MOUNTAIN AREA FIRE  
DISPATCH:,:154.1750,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F11 NORTH TACTICAL  
DIRECT:,:453.4250,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 6 FIREGROUND  
TACTICAL:,:151.2200,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
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OPERATIONS:,:453.8250,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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TAC3 BRN:,:154.2500,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
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OPERATIONS:,:453.4250,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:FIREGROUND TACTICAL 1  
GRAY:,:154.3550,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F8 CENTRAL SECONDARY  
OPERATIONS:,:453.1000,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:F1 FIRE DISPATCH &  
OPERATIONS:,:856.2500,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F7 RECORDS  
INQUIRY:,:453.5750,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
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GLD:,:154.4300,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
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OPERATIONS:,:453.4000,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 3 CENTRAL FIREGROUND TAC3  
YEL:,:153.8900,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F5 SOUTH BAY  
PRIMARY:,:453.9500,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 4 CENTRAL INLAND ALPINE &  
CREST BLK:,:46.1200,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY  
SHERIFF:,:CENTRAL/EAST:,:45.4200,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 4 CENTRAL INLAND FIREGROUND  
TAC3 GRY:,:154.3550,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY  
SHERIFF:,:CENTRAL/EAST:,:45.9400,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY EMS:,:MED 6 SHARP MEMORIAL  
HOSPITAL:,:463.1250,::,:MEDICAL:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:CITY COLLEGE:,:464.6750,::,:POLICE:,:CA:,:SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY EMS:,:MED 1 SCRIPPS MEMORIAL  
HOSPITAL:,:463.0000,::,:MEDICAL:,:CA:,:SAN DIEGO COUNTY:  
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SECURITY:,:151.1150,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 4 CENTRAL INLAND FIREGROUND  
TAC1 BRN:,:154.2500,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY SHERIFF:,:F4 CENTRAL INLAND

PRIMARY:,453.5000,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ALPINE FPD ALPINE:,46.1200,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,F2 COASTAL  
PRIMARY:,453.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F9 EMERGENCY MEDICAL  
SERVICES:,143.5250,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F8 POLICE  
RECORDS:,154.0550,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F1 NORTH ISLAND  
NAS:,140.0500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F9 POLICE  
TACTICAL:,155.6850,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 7 MOUNTAIN AREA FIREGROUND  
TAC3 BRN:,154.2500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY SHERIFF:,F1 OPERATIONS  
DIRECT:,453.7250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 6 FIRE DISPATCH  
REPEATER:,151.1900,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,SCHOOL DISTRICT  
POLICE:,453.3000,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,FIREGROUND TACTICAL 3  
BROWN:,154.2500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,SCHOOL DISTRICT  
POLICE:,453.3500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 3 CENTRAL FIREGROUND TAC2 WH  
3:,154.2950,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,ZOO SECURITY:,151.8950,::,POLICE:,CA:,SAN  
DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 3 CENTRAL FIREGROUND TAC4  
BRN:,154.2500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F6 POLICE SOUTH DISTRICT  
7:,158.9100,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 8 PALOMAR MEMORIAL  
HOSPITAL:,463.1750,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F5 POLICE WEST DISTRICT  
6:,158.8950,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO FIRE:,ZONE 9 AVOCADO  
VOLUNTEER:,154.1750,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F1 POLICE SOUTHEAST DISTRICT  
4:,158.7300,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,FEDERAL FIRE DEPARTMENT:,F5 NAVAL TRAINING  
CENTER:,140.2250,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F3 POLICE EAST DISTRICT  
3:,159.0900,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,ZONE 6 FIRE CDF  
2:,151.2650,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,POLICE  
UNDETERMINED:,460.2625,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY FIRE:,F3 FIRE DISPATCH &  
OPERATIONS:,858.2500,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,F11 POLICE MUTUAL  
AID:,155.4750,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,SAN DIEGO COUNTY EMS:,MED 8 BAY GENERAL  
HOSPITAL:,463.1750,::,MEDICAL:,CA:,SAN DIEGO COUNTY:  
:SAN DIEGO:,SAN DIEGO POLICE:,SPECIAL WEAPONS & TACTICS  
SWAT:,154.9350,::,POLICE:,CA:,SAN DIEGO COUNTY:

:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 2 NO. COASTAL FIREGROUND TAC2  
YEL:,:153.8900,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:ZONE 5 SOUTH COASTAL FIREGROUND  
TAC1 YEL:,:153.8900,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:F5 FIRE DISPATCH &  
OPERATIONS:,:860.2500,::,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY EMS:,:F5 HOSPITAL  
TACTICAL:,:155.1600,::,:MEDICAL:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO COUNTY:,:SAN DIEGO COUNTY FIRE:,:FIRE MUTUAL AID WHITE  
3:,:154.2950,,:KM8396:,:FIRE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:POLICE  
SURVEILLANCE:,:856.0500,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:F10 POLICE  
INVESTIGATORS:,:154.7250,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:HOMICIDE  
DETAIL:,:152.0300,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:POLICE  
TACTICAL:,:155.0100,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:HOMICIDE  
DETAIL:,:152.1800,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:POLICE  
UNDETERMINED:,:460.0875,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:NARCOTICS ENFORCEMENT TEAM  
NET:,:155.4300,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:POLICE  
UNDETERMINED:,:460.5250,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:POLICE  
TACTICAL:,:154.9000,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIEGO:,:SAN DIEGO POLICE:,:POLICE  
TACTICAL:,:155.1300,::,:POLICE:,:CA:,:SAN DIEGO COUNTY:  
:SAN DIMAS:,:SAN DIMAS FIRE:,:FIRE - LACOFD:,:154.3400,::,:FIRE:,:CA:,:LOS  
ANGELES COUNTY:  
:SAN DIMAS:,:PROFESSIONAL AMBULANCE:,:DISPATCH:,:46.0000,::,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
:SAN DIMAS:,:MEDIC 1 AMBULANCE:,:DISPATCH:,:33.0400,::,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
:SAN DIMAS:,:SAN DIMAS POLICE:,:F6 POLICE - LACOSD  
CONTRACT:,:482.9375,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SAN FERNANDO:,:SAN FERNANDO FIRE:,:FIRE - LA CITY  
FD:,:858.4375,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:SAN FERNANDO:,:MAURAN AMBULANCE:,:DISPATCH:,:155.1750,::,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
:SAN FERNANDO:,:SAN FERNANDO POLICE:,:F2 POLICE  
PRIMARY:,:156.0300,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SAN FERNANDO:,:SAN FERNANDO POLICE:,:F1 POLICE  
SECONDARY:,:155.5950,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SAN FERNANDO:,:SAN FERNANDO POLICE:,:F3 POLICE MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO INTERNATIONAL AIRPORT:,:CONTROL TOWER  
PRIMARY:,:120.5000,::,:AIRCRAFT:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO FIRE:,:OES AREA:,:154.2200,::,:FIRE:,:CA:,:SAN  
FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO FIRE:,:OES STATE:,:154.1600,::,:FIRE:,:CA:,:SAN  
FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO FIRE:,:OES D & C:,:153.7550,::,:FIRE:,:CA:,:SAN  
FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO FIRE:,:FIREBOATS TO COAST

GUARD:,157.0500,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,FIREBOATS TO COAST  
GUARD:,157.1000,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F4 PUBLIC HEALTH  
LIAISON:,155.3850,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F1 DOWNTOWN DIVISION 1  
PRIMARY:,488.3625,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,FIREBOAT PHOENIX/PORT  
AUTHORITY:,464.4625,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F3 N-EAST S-WEST DIVISION 3  
PRIMARY:,488.7625,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F6 FIREGROUND MUTUAL  
AID:,154.2950,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F5 CITYWIDE FIRE  
PREVENTION:,489.1875,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F5 BART  
UNDERGROUND:,154.2950,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F1 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,FIRE RESERVE PORTABLES  
RED:,153.8300,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F3 POLICE MUTUAL  
AID:,154.9200,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F4 FIREGROUND  
REPEATER:,489.1625,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F6 MECS (MAYORS EMERG COMM  
SYSTEM):,489.1125,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F2 COAST GUARD  
LIAISON:,157.1000,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F2 NORTHWEST DIVISION 2  
PRIMARY:,488.5625,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,FIRE TRAINING  
DIVISION:,460.5875,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F2 FIREGROUND TACTICAL  
LIMITED:,458.6500,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO FIRE:,F1 FIREGROUND TACTICAL  
LIMITED:,458.5500,::,FIRE:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO INTERNATIONAL AIRPORT:,F3 FIRE &  
CRASH:,453.7750,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO INTERNATIONAL AIRPORT:,F1 DISASTER RECOVERY  
SFFD:,489.1125,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO INTERNATIONAL AIRPORT:,FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO EMS:,LAGUNA HONDA HOSPITAL  
PAGING:,163.2500,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,RALPH K DAVIES MEDICAL  
CENTER:,DISPATCH:,155.2350,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO EMS:,LAGUNA HONDA HOSPITAL  
SECURITY:,155.2200,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SHRINERS CHILDRENS  
HOSPITAL:,DISPATCH:,155.2350,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO EMS:,SF GENERAL PAT  
IMPROVEMENT:,853.3125,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,KING AMERICAN AMBULANCE MEDIC 1-  
15:,DISPATCH:,155.2800,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,SAN FRANCISCO EMS:,SF GENERAL HOSPITAL  
PAGING:,462.9000,::,MEDICAL:,CA:,SAN FRANCISCO COUNTY:

:SAN FRANCISCO:, :U S PUBLIC HEALTH  
SERVICE:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :SF GENERAL HOSPITAL  
SECURITY:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :MERCY PENINSULA  
AMBULANCE:, :DISPATCH:, 33.0800, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :F2 HOSPITAL EMERGENCY  
LOCAL:, 155.3850, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :MOUNT ZION HOSPITAL  
MC:, :DISPATCH:, 151.6550, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :F1 MEDICAL HOSPITAL EMERGENCY  
REGION:, 155.3400, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :ST MARYS HUMANA HOSPITAL  
MC:, :DISPATCH:, 155.2350, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :MED 10 PRIVATE  
AMBULANCE:, 462.9750, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO AMBULANCE  
(100):, :DISPATCH:, 155.2950, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :MED 9 CITY AMBULANCE  
DISPATCH:, 462.9500, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :LAGUNA HONDA  
HOSPITAL:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :MED 8 CITY  
AMBULANCE:, 463.1750, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :N CAL EMERGENCY MEDICAL  
AIRCRAFT:, 150.7750, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :MED 6 CITY  
AMBULANCE:, 463.1250, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :ST FRANCIS MEMORIAL  
HOSPITAL:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :MED 2 TWIN  
PEAKS:, 463.0250, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :UNIVERSITY OF CA MEDICAL  
CENTER:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :MOBILE ASSISTANCE  
PATROL:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO GENERAL  
HOSPITAL:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :MOBILE ASSISTANCE  
PATROL:, :DISPATCH:, 155.5500, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :LETTERMAN ARMY MEDICAL  
CENTER:, :DISPATCH:, 148.6750, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SF PUBLIC HEALTH DEPARTMENT PARAMEDIC DIVISION:, :F2 CITY  
AMBULANCE DISPATCH SECONDARY:, 158.7600, ::, :MEDICAL:, :CA:, :SAN FRANCISCO  
COUNTY:  
:SAN FRANCISCO:, :PACIFIC PRESBYTERIAN MEDICAL  
CENTER:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO PUBLIC  
HEALTH:, :DISPATCH:, 155.3850, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :ST LUKES HUMANA  
HOSPITAL:, :DISPATCH:, 155.2800, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO EMS:, :N CAL EMERGENCY MEDICAL  
AIRCRAFT:, 150.7900, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :VETERANS  
ADMINISTRATION:, :DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SF PUBLIC HEALTH DEPARTMENT PARAMEDIC DIVISION:, :F1 CITY  
AMBULANCE DISPATCH PRIMARY:, 155.3850, ::, :MEDICAL:, :CA:, :SAN FRANCISCO COUNTY:



:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 1 POTRERO-INGELSDIE  
DISPATCH:,:460.2250,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 2 - MISSION STATION  
DISPATCH:,:460.1250,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 6 NORTHERN DISPATCH (TOW CH.  
VARIES):,:460.3500,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 3 CENTRAL SOUTHERN (NORTHERN)  
STATIONS:,:460.5000,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 4 - NORTHERN DISPATCH  
(WARRANTS) (VARIES):,:460.0750,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:LIBRARY SECURITY:,:OPERATIONS:,:156.0000,:,:POLICE:,:CA:,:SAN  
FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 5 - TOW CHANNEL (SPECIAL  
OPS):,:460.4500,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:COMMUNITY COLLEGE  
POLICE:,:DISPATCH:,:154.5150,:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 8 WARRANT CHECK (VARIES-  
SPECIAL OPS):,:460.5500,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:UNIVERSITY OF SAN FRANCISCO:,:F1 OPERATIONS  
SECURITY:,:463.4750,:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:LOW BAND 1 POTRERO  
CARS:,:45.4600,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO INTERNATIONAL AIRPORT:,:F3 POLICE  
TACTICAL:,:860.4375,:,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 8 -  
RECORDS:,:460.5500,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:UNIVERSITY OF  
PACIFIC:,:POLICE:,:855.2375,:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:LOW BAND 4 - METRO DIVISION  
NORTHERN/PARK:,:45.4600,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:CALIFORNIA HIGHWAY PATROL:,:PINK BASE OFFICE #  
32:,:42.4400,:KMA962:,:POLICE:,:CA:,:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 2 -  
MISSION:,:460.1250,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:CALIFORNIA HIGHWAY PATROL:,:PINK MOBILE OFFICE #  
32:,:42.7600,:KA4993:,:POLICE:,:CA:,:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:PIC ZONE 5 - TOW &  
IMPOUND:,:460.4500,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO INTERNATIONAL AIRPORT:,:F2 POLICE  
PRIMARY:,:859.4375,:,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:LOW BAND 3 - METRO DIVISION  
CENTRAL/SOUTHERN:,:45.5800,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO INTERNATIONAL AIRPORT:,:F2 SAN MATEO  
SHERIFF:,:488.3875,:,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:LOW BAND 1 - GOLDEN GATE DIV.  
RICHMOND/INGLESIDE/TARAVAL:,:45.1000,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO  
COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO INTERNATIONAL AIRPORT:,:F3 SAN MATEO  
SHERIFF:,:488.8875,:,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SAN FRANCISCO:,:S F BALLE  
SECURITY:,:OPERATIONS:,:464.5500,:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO INTERNATIONAL AIRPORT:,:F1 TRAFFIC CONTROL  
OFFICERS:,:860.4625,:,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:SPECIAL POLICE OFFICERS  
ASSN:,:463.2500,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:,:SAN FRANCISCO POLICE:,:G TASK FORCE  
CACHE:,:465.1875,:KMA438:,:POLICE:,:CA:,:SAN FRANCISCO COUNTY:

:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :F TASK FORCE  
CACHE:, 460.5125, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :C TASK FORCE  
CACHE:, 460.3875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :PIC ZONE 1 -  
POTRERO/RICHMOND/INGLESIDE/TARAVAL/PARK:, 460.2250, :KMA438:, :POLICE:, :CA:, :SAN  
FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :E TASK FORCE  
CACHE:, 460.4875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :POLICE  
ACADEMY:, 45.3000, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
SAN FRANCISCO COUNTY:, :SAN FRANCISCO COUNTY SHERIFF:, :F3 COUNTY JAIL/COURT  
SECURITY OPERATIONS:, 488.6875, :, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :UC HASTINGS COLLEGE PUBLIC SAFETY:, :PRIMARY  
DISPATCH:, 463.8500, :KNA0632:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO COUNTY:, :SAN FRANCISCO COUNTY SHERIFF:, :F1 CIVIL  
TRANSPORTATION:, 488.8125, :, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :LOW BAND 3 - CENTRAL SOUTHERN  
CARS:, 45.5800, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :K TASK FORCE  
CACHE:, 465.4875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :LOW BAND 2 INGELSIDE PARK STATION  
CARS:, 45.1400, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :I TASK FORCE  
CACHE:, 465.3875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :PIC ZONE 6 - TACTICAL  
OPERATIONS:, 460.3500, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :B TASK FORCE  
CACHE:, 460.2875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :PIC ZONE 4 - CENTRAL  
NORTHERN/PARK:, 460.0750, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO COUNTY:, :SAN FRANCISCO COUNTY SHERIFF:, :F4 CITY JAIL/SUPERIOR  
COURT OPERATIONS:, 488.8375, :, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :PIC ZONE 7 - SPECIAL  
OPERATIONS:, 460.5250, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :L TASK FORCE  
CACHE:, 465.5125, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :H TASK FORCE  
CACHE:, 465.2875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :D TASK FORCE  
CACHE:, 460.4625, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO COUNTY:, :SAN FRANCISCO COUNTY SHERIFF:, :F2 CITY HALL/CITY JAIL  
OPERATIONS:, 488.8125, :, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :J TASK FORCE  
CACHE:, 465.4625, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :PIC ZONE 3 -  
CENTRAL/SOUTHERN/NORTHERN:, 460.5000, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO  
COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :LOW BAND 2 - GOLDEN GATE DIVISION  
POTRERO:, 45.1400, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :DAVIES SYMPHONY HALL  
SECURITY:, :OPERATIONS:, 453.6125, :, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :F9 POLICE MUTUAL  
AID:, 460.0250, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO:, :SAN FRANCISCO POLICE:, :A TASK FORCE  
CACHE:, 460.1875, :KMA438:, :POLICE:, :CA:, :SAN FRANCISCO COUNTY:  
:SAN FRANCISCO COUNTY:, :BAY AREA RAPID TRANSIT DISTRICT:, :FIRE UNDERGROUND

(RADIAX),154.2950,::,FIRE,,CA,,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO COUNTY:,BAY AREA RAPID TRANSIT DISTRICT:,F1 POLICE  
OPERATIONS:,453.1500,::,POLICE,,CA,,SAN FRANCISCO COUNTY:  
:SAN FRANCISCO COUNTY:,BAY AREA RAPID TRANSIT DISTRICT:,F3 POLICE  
SURVEILLANCE:,453.4250,::,POLICE,,CA,,SAN FRANCISCO COUNTY:  
:SAN GABRIEL:,SAN GABRIEL FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE,,CA,,LOS ANGELES COUNTY:  
:SAN GABRIEL:,SAN GABRIEL FIRE:,F1 FIRE  
PRIMARY:,153.9950,::,FIRE,,CA,,LOS ANGELES COUNTY:  
:SAN GABRIEL:,SAN GABRIEL POLICE:,POLICE MUTUAL  
AID:,154.9200,::,POLICE,,CA,,LOS ANGELES COUNTY:  
:SAN GABRIEL:,SAN GABRIEL POLICE:,F2 POLICE  
TACTICAL:,460.0750,::,POLICE,,CA,,LOS ANGELES COUNTY:  
:SAN GABRIEL:,SAN GABRIEL POLICE:,F1 POLICE  
PRIMARY:,460.1750,::,POLICE,,CA,,LOS ANGELES COUNTY:  
:SAN JACINTO:,SAN JACINTO FIRE:,F1 FIRE  
PRIMARY:,158.8950,::,FIRE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO FIRE:,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO POLICE:,F4 POLICE TACTICAL  
ALTERNATE:,158.8200,::,POLICE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO POLICE:,F2 POLICE  
SHERIFF:,158.8500,::,POLICE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO POLICE:,F5 POLICE  
TACTICAL:,158.7600,::,POLICE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO POLICE:,F3 POLICE  
TACTICAL:,158.9700,::,POLICE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO POLICE:,F6 POLICE COUNTYWIDE MUTUAL  
AID:,158.9250,::,POLICE,,CA,,RIVERSIDE COUNTY:  
:SAN JACINTO:,SAN JACINTO POLICE:,F1 POLICE  
PRIMARY:,158.8950,::,POLICE,,CA,,RIVERSIDE COUNTY:  
:SAN JOAQUIN:,SAN JOAQUIN FIRE:,FIRE - MID VALLEY  
FPD:,154.4450,::,FIRE,,CA,,FRESNO COUNTY:  
:SAN JOAQUIN:,SAN JOAQUIN POLICE:,POLICE - SHERIFF  
SYSTEM:,155.5800,::,POLICE,,CA,,FRESNO COUNTY:  
:SAN JOSE:,CALIFORNIA HIGHWAY PATROL:,BROWN BASE OFFICE #  
24:,42.5000,::,KMH700:,POLICE,,CA,,:  
:SAN JOSE:,SAN JOSE POLICE:,F11 POLICE DETECTIVES &  
TACTICAL:,460.0500,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,F12 POLICE DETECTIVES  
DIRECT:,460.0500,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,F10 POLICE SOUTHEAST  
DIRECT:,460.1000,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,SPECIAL ACTIVITIES  
A:,155.9250,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,F1 POLICE NORTHEAST DISTRICT R &  
W:,460.2000,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,POLICE OFFICERS  
ASSOCIATION:,462.6000,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,F3 POLICE  
TACTICAL:,460.4250,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,F5 POLICE CENTRAL DISTRICT K L &  
M:,460.4000,::,POLICE,,CA,,SANTA CLARA COUNTY:  
:SAN JOSE:,SAN JOSE FIRE:,F1 FIRE MUTUAL AID:,154.2800,::,FIRE,,CA,,SANTA  
CLARA COUNTY:  
:SAN JOSE:,SAN JOSE POLICE:,F13 POLICE DETECTIVES  
PLANNED:,460.5500,::,POLICE,,CA,,SANTA CLARA COUNTY:

:SAN JOSE:, :SAN JOSE POLICE:, :F2 POLICE NORTHWEST DISTRICT N &  
S:, 460.3250, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :POLICE MOBILE  
DATA:, 857.7125, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :F6 POLICE SOUTH  
PLANNED:, 460.2500, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :F7 POLICE  
TACTICAL:, 460.0250, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :F8 POLICE TACTICAL  
MERGE:, 460.0250, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :SPECIAL ACTIVITIES  
B:, 155.8800, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :F9 POLICE SOUTHEAST DISTRICT P X &  
Y:, 460.1000, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :INTERNATIONAL BUSINESS MACHINES  
FD:, :DISPATCH:, 153.3500, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE POLICE:, :F4 POLICE SOUTHWEST DISTRICT A &  
T:, 460.4750, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F2 FIRE PRIMARY  
DISPATCH:, 154.0100, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE SEARCH AND RESCUE:, :F2 OPERATIONS WITH SAN  
JOSE:, 155.9250, ::, :OTHER:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE SEARCH AND RESCUE:, :F2 OPERATIONS  
RED:, 155.1600, ::, :OTHER:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE SEARCH AND RESCUE:, :F1 OPERATIONS  
YELLOW:, 155.2350, ::, :OTHER:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE SEARCH AND RESCUE:, :F1 OPERATIONS  
PRIMARY:, 155.1600, ::, :OTHER:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F12 FIRE OES TACTICAL  
1:, 154.1600, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F4 FIRE COMMAND 2:, 153.9800, ::, :FIRE:, :CA:, :SANTA  
CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE AIRPORT POLICE:, :F3 AIRPORT OPERATIONS  
DIRECT:, 453.5750, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE AIRPORT POLICE:, :F4 AIRPORT  
OPERATIONS:, 453.5750, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE AIRPORT POLICE:, :F5 AIRPORT  
TACTICAL:, 453.7250, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE SCHOOL POLICE:, :F1 SCHOOLS  
SHARED:, 851.2875, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE AIRPORT POLICE:, :F2 AIRPORT  
POLICE:, 453.6750, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE AIRPORT POLICE:, :F1 AIRPORT POLICE  
DIRECT:, 453.6750, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F14 ON-SCENE COORDINATION  
CALCORD:, 156.0750, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE CITY COLLEGE:, :TACTICAL  
TRAINING:, 151.8950, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE CITY COLLEGE:, :CRIMINAL JUSTICE  
TC:, 484.2875, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE SEARCH AND RESCUE:, :F3 OPERATIONS  
BLUE:, 155.2200, ::, :OTHER:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F13 FIRE OES TACTICAL  
2:, 154.2200, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F3 FIRE COMMAND 1:, 154.1150, ::, :FIRE:, :CA:, :SANTA  
CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F6 FIREGROUND TACTICAL 2

YELLOW:,153.8300,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F7 FIRE COUNTYWIDE MUTUAL AID  
BLUE:,153.8450,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F5 FIREGROUND TACTICAL  
1:,155.8800,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F9 FIRE MUTUAL AID:,154.2650,::, :FIRE:, :CA:, :SANTA  
CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F10 FIRE MUTUAL AID WHITE  
3:,154.2950,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F8 FIRE CDF FIREGROUND  
RED:,155.2200,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JOSE:, :SAN JOSE FIRE:, :F11 FIREMARS WHITE  
2:,153.8300,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:SAN JUAN:, :SAN JUAN UNIFIED SCHOOL DISTRICT:, :POLICE  
DISPATCH:,860.7125,::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SAN JUAN:, :SAN JUAN UNIFIED SCHOOL DISTRICT:, :POLICE  
DISPATCH:,859.7125,::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SAN JUAN:, :SAN JUAN UNIFIED SCHOOL DISTRICT:, :POLICE  
DISPATCH:,858.7125,::, :POLICE:, :CA:, :SACRAMENTO COUNTY:  
:SAN JUAN BAUTISTA:, :SAN JUAN BAUTISTA POLICE:, :POLICE - SHERIFF  
CONTRACT:,158.7750,::, :POLICE:, :CA:, :SAN BENITO COUNTY:  
:SAN JUAN CAPISTRANO:, :SAN JUAN CAPISTRANO POLICE:, :POLICE - SHERIFF BEAT 30-  
33 YELLOW:,460.4250,::, :POLICE:, :CA:, :ORANGE COUNTY:  
:SAN LEANDRO:, :PHYSICIANS COMMUNITY  
HOSPITAL:, :DISPATCH:,461.9250,::, :MEDICAL:, :CA:, :ALAMEDA COUNTY:  
:SAN LEANDRO:, :FAIRMONT  
HOSPITAL:, :DISPATCH:,155.2200,::, :MEDICAL:, :CA:, :ALAMEDA COUNTY:  
:SAN LEANDRO:, :SAN LEANDRO POLICE:, :POLICE MUTUAL AID GOLD  
4:,154.9200,::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:SAN LEANDRO:, :SAN LEANDRO POLICE:, :POLICE SECONDARY BROWN  
2:,154.9650,::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:SAN LEANDRO:, :SAN LEANDRO POLICE:, :POLICE PRIMARY (20) GRAY  
1:,154.8000,::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:SAN LEANDRO:, :SAN LEANDRO POLICE:, :POLICE REPEATER ON DEMAND  
5:,155.6550,::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:SAN LEANDRO:, :SAN LEANDRO POLICE:, :POLICE TACTICAL GREEN  
3:,155.0700,::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F3 FIRE MUTUAL  
AID:,154.2800,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :FIRE WITH CAL POLY  
FD:,155.1450,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F5 FIRE OES  
1:,154.1600,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :FIRE SECONDARY  
LINK:,453.5625,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :CAL POLY UNIVERSITY  
FD:, :DISPATCH:,154.2050,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F9 FIRE MUTUAL  
AID:,154.2650,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :CALIFORNIA MENS COLONY  
FD:, :DISPATCH:,154.2350,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F2 FIRE COUNTY  
FIRE:,154.3850,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F1 FIRE SECONDARY MDT &  
PAGING:,154.3100,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F8 FIREMANS ASSOCIATION  
UTILITY:,151.9250,::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:

:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F4 FIRE & MEDICS  
PRIMARY:, 155.1450, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F12 FIRE MOBILEPHONE  
CHANNEL:, 152.0600, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F6 FIRE CDF LOCAL  
NET:, 151.3250, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO FIRE:, :F7  
FIREGROUND:, 154.9650, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F6 BLUE SHERIFF  
PRIMARY:, 460.1500, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F5 GREEN POLICE  
SECONDARY:, 460.4750, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :B POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F7 GOLD CAL POLY  
PRIMARY:, 460.2500, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :A POLICE  
TACTICAL:, 155.4900, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F4 WHITE POLICE MUTUAL  
AID:, 460.0250, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F11 POLICE  
DETECTIVES:, 155.4900, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F3 RED POLICE  
EMERGENCY:, 460.0500, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F1 GREEN POLICE  
PRIMARY:, 460.3750, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO:, :SAN LUIS OBISPO POLICE:, :F2 YELLOW POLICE  
SECONDARY:, 460.4750, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :F3 FIRE MUTUAL  
AID:, 154.2650, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :F4 FIRE MUTUAL  
AID:, 154.2950, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :F2 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :F1 COUNTY  
FIRE:, 154.3850, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :CDF  
2:, 151.2650, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :SAN LUIS OBISPO COUNTY  
FD - CDF:, 151.3250, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY FIRE:, :CDF  
1:, 151.3550, ::, :FIRE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY EMS:, :MED 2 CUESTA  
PEAK:, 463.0250, ::, :MEDICAL:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY EMS:, :MED 3 CUESTA  
PEAK:, 463.0500, ::, :MEDICAL:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY EMS:, :MED 1 ROCKY BUTTE DAVIS  
PEAK:, 463.0000, ::, :MEDICAL:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY EMS:, :ARROYO GRANDE - FIVE  
CITIES AMBULANCE:, 155.2350, ::, :MEDICAL:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY EMS:, :MED 4 BLACK  
MOUNTAIN:, 463.0750, ::, :MEDICAL:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY SHERIFF:, :F1 BLUE CONTROL 20  
OPERATIONS PRIMARY:, 460.1500, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY SHERIFF:, :F3 RED 3 POLICE  
EMERGENCY:, 460.0500, ::, :POLICE:, :CA:, :SAN LUIS OBISBO COUNTY:  
:SAN LUIS OBISPO COUNTY:, :SAN LUIS OBISPO COUNTY SHERIFF:, :F2 YELLOW

OPERATIONS SECONDARY:,460.4750,::,POLICE:,CA:,SAN LUIS OBISPO COUNTY:  
:SAN LUIS OBISPO COUNTY:,SAN LUIS OBISPO COUNTY SHERIFF:,F4 WHITE POLICE  
MUTUAL AID:,460.0250,::,POLICE:,CA:,SAN LUIS OBISPO COUNTY:  
:SAN LUIS OBISPO COUNTY:,SAN LUIS OBISPO COUNTY SHERIFF:,4WD & PORTABLES  
SEARCH & RESCUE:,155.1600,::,POLICE:,CA:,SAN LUIS OBISPO COUNTY:  
:SAN LUIS OBISPO COUNTY:,SAN LUIS OBISPO COUNTY SHERIFF:,4WD & PORTABLES  
CLEMARS SPECIAL EVENTS:,154.9200,::,POLICE:,CA:,SAN LUIS OBISPO COUNTY:  
:SAN LUIS OBISPO COUNTY:,SAN LUIS OBISPO COUNTY  
SHERIFF:,DETECTIVES:,460.5500,::,POLICE:,CA:,SAN LUIS OBISPO COUNTY:  
:SAN LUIS OBISPO COUNTY:,SAN LUIS OBISPO COUNTY SHERIFF:,F1 JAIL &  
COURTHOUSE CUSTODY BUREAU PORTABLES:,460.3000,::,POLICE:,CA:,SAN LUIS  
OBISPO COUNTY:  
:SAN MARCOS:,SAN MARCOS FIRE:,F3 FIREGROUND  
YELLOW:,153.8900,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN MARCOS:,SAN MARCOS FIRE:,F2 FIREGROUND  
GRAY:,154.3550,::,FIRE:,CA:,SAN DIEGO COUNTY:  
:SAN MARCOS:,SAN MARCOS FIRE:,F1 FIRE PRIMARY:,154.2350,::,FIRE:,CA:,SAN  
DIEGO COUNTY:  
:SAN MARCOS:,SAN MARCOS POLICE:,POLICE - SHERIFF  
CONTRACT:,453.9250,::,POLICE:,CA:,SAN DIEGO COUNTY:  
:SAN MARINO:,SAN MARINO FIRE:,F2 FIRE  
COORDINATION:,153.9950,::,FIRE:,CA:,LOS ANGELES COUNTY:  
:SAN MARINO:,SAN MARINO FIRE:,F1 FIRE PRIMARY:,154.1750,::,FIRE:,CA:,LOS  
ANGELES COUNTY:  
:SAN MARINO:,SAN MARINO POLICE:,F1 POLICE  
PRIMARY:,156.3300,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:SAN MARINO:,SAN MARINO POLICE:,F3 POLICE MUTUAL  
AID:,155.4750,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:SAN MARINO:,SAN MARINO POLICE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,B4 NORTH FIRE DISPATCH SAN  
BRUNO:,154.0400,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A2 COAST FIRE DISPATCH HALF MOON  
BAY:,154.3400,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,COUNTYWIDE MUTUAL  
AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F13 HILLSBOROUGH  
PD:,488.3375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,B7 COAST FIREGROUND HALF MOON  
BAY:,154.3400,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,COMM CENTER LAW MUTUAL AID  
MONTARA RIDGE:,154.9200,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,B8 COUNTYWIDE CDF  
DIRECT:,151.3700,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F14 SAN BRUNO  
PD:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,HALF MOON BAY  
FPD:,154.3400,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F14 MILLBRAE  
PD:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,F1 MOSS BEACH POINT MONTARA FPD  
PRIMARY:,46.1400,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F15 BURLINGAME  
PD:,488.0875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,POINT MONTARA FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F16 SAN MATEO

PD:,488.3125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,WOODSIDE  
FPD:,153.8900,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F17 FOSTER CITY  
PD:,488.9375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY EMS:,BLUE 2 MEDIC-  
HOSPITAL:,482.7625,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F18 HALF MOON BAY  
PD:,488.3875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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HOSPITAL:,463.0000,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F19 BELMONT  
PD:,488.4875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY EMS:,MED 4 SEQUOIA  
HOSPITAL:,463.0750,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F19 SAN CARLOS  
PD:,488.4875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY EMS:,S SAN FRANCISCO KAISER FOUNDATION  
HOSPITAL NORTH:,464.8750,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F20 REDWOOD CITY  
PD:,488.7875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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CENTER:,155.3400,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
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2:,488.7125,::,POLICE:,CA:,SAN MATEO COUNTY:  
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AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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CENTER:,155.3400,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY EMS:,DALY CITY MERCY PENINSULA  
AMBULANCE:,33.0800,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,B3 NORTH FIREGROUND DALY  
CITY:,156.1350,::,FIRE:,CA:,SAN MATEO COUNTY:  
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FIREGROUND:,153.8300,::,FIRE:,CA:,SAN MATEO COUNTY:  
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TERMINALS:,45.6200,::,POLICE:,CA:,SAN MATEO COUNTY:  
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FORCE:,45.6600,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F21 ATHERTON  
PD:,489.0875,::,POLICE:,CA:,SAN MATEO COUNTY:  
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AID:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F22 MENLO PARK  
PD:,488.3375,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F2 WAS SF AIRPORT DETAIL  
BROWN:,488.3875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F23 EAST PALO ALTO  
PD:,488.3875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F4 TACTICAL 1  
NORTH:,488.8625,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,F13 COAST FIRE DISPATCH  
PACIFICA:,154.4450,::,FIRE:,CA:,SAN MATEO COUNTY:  
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SOUTH:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:



:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F12 COAST FIRE DISPATCH HALF MOON  
BAY: ,154.3400,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F8 PACIFICA  
PD: ,488.7375,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
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BRUNO: ,154.0400,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F10 COLMA  
PD: ,488.4625,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
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2: ,154.2650,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F11 DALY CITY  
PD: ,488.9375,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
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FIREGROUND: ,153.9200,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
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1: ,488.8625,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
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FIREGROUND: ,154.2950,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
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FPD: ,154.0100,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F7 WHITE 1 COUNTYWIDE FIRE  
COMMAND: ,154.2800,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F2 POINT MONTARA FPD  
SECONDARY: ,45.4000,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F6 FIRE DISPATCH MENLO  
PARK: ,154.3700,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
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DISPATCH: ,482.3125,::, :MEDICAL: ,:CA: ,:SAN MATEO COUNTY:  
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COUNTY: ,153.8900,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
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CENTER: ,463.0250,::, :MEDICAL: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F4  
FIREGROUND: ,155.8950,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
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HOSPITAL SOUTH: ,464.5250,::, :MEDICAL: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F3 FIRE DISPATCH SAN  
MATEO: ,153.9500,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:B5 COAST FIRE DISPATCH  
PACIFICA: ,154.4450,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:F2 FIREGROUND DALY  
CITY: ,154.1000,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F1 COUNTY OPERATIONS  
PRIMARY: ,488.9875,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
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FRANCISCO: ,154.0100,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F5 TACTICAL 2  
CENTRAL: ,488.7125,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
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CDF: ,151.3700,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F9 BROADMOOR  
PPD: ,488.4875,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:FIRE MUTUAL AID MONTARA  
RIDGE: ,154.2800,::, :FIRE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY SHERIFF:,:F12 BRISBANE  
PD: ,488.3875,::, :POLICE: ,:CA: ,:SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,:SAN MATEO COUNTY FIRE:,:A1 CENTRAL FIRE DISPATCH SAN

MATEO:,153.9500,::,FIRE:,CA:,SAN MATEO COUNTY:  
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FPD:,154.3700,::,FIRE:,CA:,SAN MATEO COUNTY:  
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3:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:  
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DIRECT:,482.3125,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
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DIRECT:,151.3700,::,FIRE:,CA:,SAN MATEO COUNTY:  
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CITY:,156.1350,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,F15 COAST FIRE DIRECT HALF MOON  
BAY:,154.3400,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F3 COUNTYWIDE MUTUAL AID  
GREEN:,488.8875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A8 COUNTYWIDE  
FIREGROUND:,154.2600,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F10 SOUTH SAN FRANCISCO  
PD:,488.4625,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A7 COUNTYWIDE  
FIREGROUND:,154.2800,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,SAN CARLOS SOUTH COUNTY  
FPD:,153.8900,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY SHERIFF:,F7 OPERATIONS  
DIRECT:,488.9875,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A3 SOUTH FIRE DISPATCH SOUTH  
COUNTY:,153.8900,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY EMS:,SAN MATEO CHOPE COMMUNITY  
HOSPITAL:,453.5500,::,MEDICAL:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A6 NORTH FIRE DISPATCH DALY  
CITY:,154.1000,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A5 NORTH FIRE DISPATCH S SAN  
FRANCISCO:,154.0100,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,A4 SOUTH FIRE DISPATCH MENLO  
PARK:,154.3700,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,B6 CENTRAL FIREGROUND SAN  
MATEO:,153.9200,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO COUNTY:,SAN MATEO COUNTY FIRE:,B1 COUNTYWIDE  
FIREGROUND:,154.2950,::,FIRE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO:,SAN MATEO FIRE:,F3 FIRE MUTUAL AID:,154.2650,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN MATEO:,SAN MATEO FIRE:,F5 FIRE LOW POWER:,153.8300,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN MATEO:,SAN MATEO POLICE:,F8 POLICE PRIMARY  
DIRECT:,488.3125,::,POLICE:,CA:,SAN MATEO COUNTY:  
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PRIMARY:,488.3125,::,POLICE:,CA:,SAN MATEO COUNTY:  
:SAN MATEO:,SAN MATEO FIRE:,F2 FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN MATEO:,SAN MATEO FIRE:,F1 FIRE & MEDIC:,153.9500,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
:SAN MATEO:,SAN MATEO FIRE:,F4 FIRE MUTUAL AID:,154.2950,::,FIRE:,CA:,SAN  
MATEO COUNTY:  
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3:,488.5375,::,POLICE:,CA:,SAN MATEO COUNTY:  
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DIRECT:,488.9375,::,POLICE:,CA:,SAN MATEO COUNTY:

:SAN MATEO:, :SAN MATEO POLICE:, :F5 POLICE TACTICAL  
1:, 488.8625, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SAN MATEO:, :SAN MATEO POLICE:, :F4 POLICE FOSTER CITY  
PD:, 488.9375, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SAN MATEO:, :SAN MATEO POLICE:, :F3 POLICE COUNTYWIDE MUTUAL  
AID:, 488.8875, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
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2:, 488.7125, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SAN MATEO COUNTY:, :MID-PENINSULA OPEN SPACES DISTRICT:, :F4 FIRE MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:SAN MATEO COUNTY:, :MID-PENINSULA OPEN SPACES DISTRICT:, :SAN MATEO COUNTY  
PARKS:, 151.4750, ::, :OTHER:, :CA:, :SAN MATEO COUNTY:  
:SAN MATEO COUNTY:, :MID-PENINSULA OPEN SPACES DISTRICT:, :POLICE  
PLANNED:, 151.1450, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SAN MATEO COUNTY:, :MID-PENINSULA OPEN SPACES DISTRICT:, :POLICE OPERATIONS  
F2:, 151.1450, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SAN MIGUEL:, :CAMP ROBERTS FD:, :DISPATCH:, 165.0625, ::, :FIRE:, :CA:, :SAN LUIS  
OBISBO COUNTY:  
:SAN MIGUEL:, :SAN MIGUEL FPD:, :DISPATCH:, 154.3850, ::, :FIRE:, :CA:, :SAN LUIS  
OBISBO COUNTY:  
:CONTRA COSTA COUNTY:, :CONTRA COSTA COUNTY COMMUNITY COLLEGE DISTRICT:, :CCC  
DISPATCH:, 154.5150, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO FIRE:, :FIRE - WEST COUNTY  
FPD:, 46.0600, ::, :FIRE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F4 POLICE MUTUAL AID  
WEST:, 460.0250, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F1 POLICE  
RICHMOND:, 460.3000, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F5 POLICE EL  
CERRITO:, 460.3750, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F2 POLICE  
RICHMOND:, 460.4000, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F3 POLICE  
SECONDARY:, 460.4750, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F7 POLICE  
COMMON:, 460.1000, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :SAN PABLO POLICE:, :F6 POLICE  
PRIMARY:, 460.1500, :WXA612:, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:SAN PABLO:, :BROOKSIDE MEDICAL  
CENTER:, :DISPATCH:, 155.4000, ::, :MEDICAL:, :CA:, :CONTRA COSTA COUNTY:  
:SAN RAFAEL:, :SAN RAFAEL FIRE:, :F2 FIRE COUNTYWIDE MUTUAL  
AID:, 46.1200, ::, :FIRE:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :SAN RAFAEL FIRE:, :F1 FIRE &  
MEDICS:, 46.2000, ::, :FIRE:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :MARIN GENERAL HOSPITAL:, :F2  
DISPATCH:, 155.3400, ::, :MEDICAL:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :KAISER FOUNDATION  
HOSPITAL:, :DISPATCH:, 464.5250, ::, :MEDICAL:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :MARIN GENERAL HOSPITAL:, :F1  
DISPATCH:, 155.2200, ::, :MEDICAL:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :SAN RAFAEL POLICE:, :POLICE  
TACTICAL:, 155.8950, ::, :POLICE:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :SAN RAFAEL POLICE:, :POLICE  
PLANNED:, 857.4375, ::, :POLICE:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :SAN RAFAEL POLICE:, :POLICE  
PLANNED:, 858.4375, ::, :POLICE:, :CA:, :MARIN COUNTY:  
:SAN RAFAEL:, :SAN RAFAEL POLICE:, :F1 POLICE PRIMARY

REPEATER:,39.1600,:::,POLICE:,CA:,MARIN COUNTY:  
:SAN RAFAEL:,SAN RAFAEL POLICE:,F4 POLICE  
TACTICAL:,39.4800,:::,POLICE:,CA:,MARIN COUNTY:  
:SAN RAFAEL:,SAN RAFAEL POLICE:,F2 POLICE COUNTYWIDE MUTUAL  
AID:,39.5200,:::,POLICE:,CA:,MARIN COUNTY:  
:SAN RAMON:,SAN RAMON FIRE:,FIRE - SAN RAMON VALLEY  
FPD:,46.4400,:::,FIRE:,CA:,CONTRA COSTA COUNTY:  
:SAN RAMON:,SAN RAMON FIRE:,FIRE - DOUGHERTY REGIONAL  
FIRE:,154.2350,:::,FIRE:,CA:,CONTRA COSTA COUNTY:  
:SAN RAMON:,SAN RAMON POLICE (CCSO CONTRACT):,F8 POLICE SAN RAMON  
PD:,155.2500,:::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:SAN RAMON:,SAN RAMON PD (CCSO CONTRACT):,F8 ALAMEDA COUNTY  
LIAISON:,155.2500,:::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:SAN RAMON:,SAN RAMON POLICE (CCSO CONTRACT):,POLICE -  
SHERIFF:,155.6400,:::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:SAN RAMON:,SAN RAMON POLICE (CCSO CONTRACT):,F5 POLICE  
TACTICAL:,155.0400,:::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:SAND CITY:,SAND CITY FIRE:,FIRE - SEASIDE  
FIRE:,154.2350,:::,FIRE:,CA:,MONTEREY COUNTY:  
:SAND CITY:,SAND CITY FIRE:,FIRE TACTICAL:,153.8600,:::,FIRE:,CA:,MONTEREY  
COUNTY:  
:SAND CITY:,SAND CITY POLICE:,POLICE - SEASIDE  
PD:,155.6850,:::,POLICE:,CA:,MONTEREY COUNTY:  
:SANGER:,SANGER FIRE:,F2 FIRE:,859.7125,:::,FIRE:,CA:,FRESNO COUNTY:  
:SANGER:,SANGER FIRE:,FIRE MUTUAL AID:,154.2800,:::,FIRE:,CA:,FRESNO  
COUNTY:  
:SANGER:,SANGER POLICE:,F1 POLICE PRIMARY:,858.7125,:::,POLICE:,CA:,FRESNO  
COUNTY:  
:SANJOSE:,CALIFORNIA HIGHWAY PATROL:,BROWN MOBILE OFFICE #  
24:,42.8200,KA4993,:::,POLICE:,CA:,::  
:SANTA ANA:,SANTA ANA UNIFIED SCHOOL DISTRICT  
POLICE:,DISPATCH:,155.1750,:::,POLICE:,CA:,ORANGE COUNTY:  
:SANTA ANA:,SANTA ANA POLICE:,POLICE MOBILE  
DATA:,855.2125,:::,POLICE:,CA:,ORANGE COUNTY:  
:SANTA ANA:,SANTA ANA POLICE:,POLICE PRIMARY  
GREEN:,460.4750,:::,POLICE:,CA:,ORANGE COUNTY:  
:SANTA ANA:,SANTA ANA POLICE:,POLICE SECONDARY ORANGE  
SOUTH:,460.2000,:::,POLICE:,CA:,ORANGE COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,C4 SFS LOS PADRES 1  
DIRECT:,170.5500,:::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,C5 USFS LOS PADRES 3  
TACTICAL:,170.4750,:::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY SHERIFF:,F7 POLICE COUNTYWIDE  
MUTUAL AID:,460.4000,:::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,C6 USFS LOS PADRES 4  
TACTICAL:,172.3500,:::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY SHERIFF:,F9 SANTA MARIA/SANTA  
BARBARA PD:,460.1000,:::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,C7 USFS AIR-  
GROUND:,170.0000,:::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY SHERIFF:,F11 CARPINTERIA  
PD:,460.1750,:::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,C8 CDF SAN LUIS OBISPO  
TACTICAL:,151.4450,:::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY SHERIFF:,F1 DETENTION JAIL  
SECURITY:,453.3250,:::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,D1 VEN VENTURA COUNTY FD

1:,154.0100,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY SHERIFF::,F3  
TRANSPORTATION:,453.6000,::,POLICE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D2 VEN VENTURA COUNTY FD  
2:,154.3250,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY SHERIFF::,F2 LOS PADRES SEARCH &  
RESCUE:,155.2200,::,POLICE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D3 CDF CDF 2  
DIRECT:,151.2650,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY SHERIFF::,F4 AMATEUR RADIO  
EMERGENCY SERVICE:,146.7900,::,POLICE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D4 LOS ANGELES COUNTY  
ANTELOPE:,154.4000,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,A2 YELLOW CHANNEL FIRE  
PRIMARY DIRECT:,153.7700,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D5 USFS ANGELES  
1:,171.5750,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,A4 FIRE ADMINISTRATION  
DIRECT:,153.9050,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D6 ATASCADERO VENTURA  
FD:,154.3700,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY SHERIFF::,F5 OPERATIONS DIRECT  
PURPLE:,460.2750,::,POLICE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D7 USFS LOS PADRES  
2:,170.5500,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,A8 SANTA BARBARA SANTA  
MARIA FD:,154.4450,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,D8 LOS LOS ANGELES CO SAN  
GABRIEL:,154.3400,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,B2 BLUE CHANNEL MONTECITO  
& CARP-SUMMERLAND FD:,154.1900,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,F1 FIRE PRIMARY  
BLUE:,154.1900,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,B4 SANTA MARIA  
FD:,154.4450,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,F2 FIRE MUTUAL  
AID:,154.2800,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,B6 CDF TACTICAL  
RED:,151.2200,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,F3 FIRE MUTUAL  
AID:,154.2650,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,B8 OES WHITE  
3:,154.2950,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,F4 FIRE MUTUAL  
AID:,154.2950,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,C2 CDF SAN LUIS OBISPO  
DIRECT:,151.3250,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,SANTA BARBARA MONTECITO  
FPD:,154.1900,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY SHERIFF::,F6 OPERATIONS DIRECT  
BROWN:,460.3250,::,POLICE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY FIRE::,ORCUTT ORCUTT  
FPD:,154.1900,::,FIRE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY SHERIFF::,F10 SANTA BARBARA PD  
SECONDARY:,460.3250,::,POLICE::,CA::,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY::,SANTA BARBARA COUNTY EMS::,MED 1 GOLETA VALLEY  
HOSPITAL:,463.0000,::,FIRE::,CA::,SANTA BARBARA COUNTY:

:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F2 JAIL  
SECURITY:,:458.9500,,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:MED 3 COTTAGE  
HOSPITAL:,:463.0500,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F3 LOMPOC SEARCH &  
RESCUE:,:155.2350,,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:MED 5 ST FRANCIS  
HOSPITAL:,:463.1000,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:A3 RED CHANNEL FIRE  
ADMINISTRATION REPEATER:,:153.9050,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:MED 6 SANTA YNEZ VALLEY  
HOSPITAL:,:463.1250,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:A7 FIRE MUTUAL AID WHITE  
1:,:154.2800,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:MED 8 MEDIC-  
HOSPITAL:,:463.1750,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:B3 VANDENBERG AFB  
FIRE:,:148.1000,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:MED 10 MEDIC  
DISPATCH:,:462.9750,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:B7 USFS CREW  
NET:,:168.2000,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:SANTA MARIA MARIAN  
HOSPITAL:,:155.3400,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:C3 SLO SAN LUIS OBISPO  
COUNTY FD:,:154.3850,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:SANTA BARBARA SANTA BARBARA  
COTTAGE HOSPITAL:,:155.2800,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F12 GUADALUPE  
PD:,:460.2250,,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:SANTA BARBARA SANTA BARBARA  
GENERAL HOSPITAL:,:155.3400,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:A1 ORANGE CHANNEL FIRE  
PRIMARY REPEATER:,:153.7700,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:LOMPOC COMMUNITY  
AMBULANCE:,:155.3550,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:B1 SOLVANG  
MID:,:153.9650,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:SANTA BARBARA 911 EMERGENCY  
SERVICES:,:47.5800,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:C1 CDF CDF 1  
DIRECT:,:151.3550,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F1 SEARCH & RESCUE  
COMMON:,:155.1600,,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:A5 GREEN CHANNEL FIRE  
SECONDARY REPEATER:,:153.9800,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY FIRE:,:B5 LOMPOC  
FD:,:154.4300,,:FIRE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F8 FOMPOC  
PD:,:460.1250,,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:SANTA MARIA 911 EMERGENCY  
SERVICES:,:47.5800,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY EMS:,:HEAR HOSPITAL  
EMERGENCY:,:155.3400,,:MEDICAL:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F4 POLICE MUTUAL AID  
WHITE:,:460.0250,,:POLICE:,:CA:,:SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,:SANTA BARBARA COUNTY SHERIFF:,:F3 POLICE EMERGENCY

RED:,460.0500,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY SHERIFF:,F2 OPERATIONS SECONDARY  
YELLOW:,460.3250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY FIRE:,A6 FIRE SECONDARY  
DIRECT:,153.9800,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA COUNTY:,SANTA BARBARA COUNTY SHERIFF:,F1 OPERATIONS PRIMARY  
ORANGE:,460.2750,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F7 POLICE SECONDARY  
DIRECT:,460.3250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,CITY COLLEGE  
SECURITY:,461.2500,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F6 POLICE  
TACTICAL:,460.4000,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA FIRE:,F3 FIRE MUTUAL AID  
WHITE:,154.2800,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA FIRE:,F1 FIRE PRIMARY  
GREEN:,154.4450,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F8 POLICE SHERIFF  
DIRECT:,460.2750,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA FIRE:,F4  
FIREGROUND:,154.2950,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA FIRE:,F2 FIRE SECONDARY  
BLUE:,154.1900,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F5 POLICE MOBILE  
DATA:,460.5500,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F1 POLICE PRIMARY  
GREEN:,460.1000,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F2 POLICE SECONDARY  
YELLOW:,460.3250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F3 POLICE EMERGENCY  
RED:,460.0500,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA BARBARA:,SANTA BARBARA POLICE:,F4 POLICE MUTUAL AID  
WHITE:,460.0250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F7 CONTROL 7 LAW-RELATED  
UTILITY:,154.7400,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F14 CFONTROL 14 FIRE MUTUAL  
AID:,154.2800,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F16 DETECTIVES  
TACTICAL:,155.0700,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F13 MORGAN HILL MORGAN HILL  
FIRE PRIMARY:,154.1450,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,1 HQ MORGAN HILL  
CDF:,151.4450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,HQ DRIFTWOOD SAN  
JOSE:,154.2500,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,F8 MORGAN HILL  
FD:,154.1450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,F7 FIREGROUND  
YELLOW:,153.8300,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,F6 FIRE MUTUAL AID WHITE  
2:,154.2950,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F12 CONTROL 12 COUNTY PARKS  
RANGERS:,151.1450,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,F5 FIRE COUNTYWIDE MUTUAL AID  
BLUE:,153.8450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY FIRE:,F4 FIRE MUTUAL AID WHITE  
3:,154.2950,::,FIRE:,CA:,SANTA CLARA COUNTY:

:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:JUVENILE JAIL  
OPERATIONS:,:453.6375,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:WOMENS JAIL  
OPERATIONS:,:453.5125,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:DETENTION MENS JAIL  
OPERATIONS:,:453.3625,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F5 CONTROL 17 DETENTION  
OPERATIONS PRIMARY:,:39.9200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F4 PROBATION DEPARTMENT  
EMERGENCY:,:156.2100,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F3 PROBATION DEPARTMENT  
COMM CENTER ACCESS:,:158.8200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F2 PROBATION DEPARTMENT  
OPERATIONS EVENINGS:,:155.9850,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F1 PROBATION DEPARTMENT  
OPERATIONS DAYS:,:154.7400,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F8 AANET SURVEILLANCE  
OPERATIONS:,:158.8800,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY FIRE:,:F3 CONTROL 14 FIRE MUTUAL  
AID:,:154.2800,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY FIRE:,:F2 CONTROL 8 DISTRICT  
PRIMARY:,:154.4000,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F6 AANET COMM CENTER  
ACCESS:,:158.8200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F1 CONTROL 1 OPERATIONS  
BERRYESSA PRIMARY:,:156.2100,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F2 CONTROL 2 CENTRAL FIRE  
DISTRICT LIAISON:,:154.2500,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY FIRE:,:F1 CONTROL 2 SCC CENTRAL FPD  
PRIMARY:,:154.2500,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F4 LAW MUTUAL  
AID:,:154.9200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:A HOSTAGE RESCUE AND SWAT  
OPERATIONS:,:155.7000,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F6 CONTROL 6 OPERATIONS  
SARATOGA PRIMARY:,:155.7000,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:B HOSTAGE RESCUE AND SWAT  
OPERATIONS:,:154.8750,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F8 CALCORD ON-SCENE  
COORDINATION:,:156.0750,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:C HOSTAGE RESCUE AND SWAT  
OPERATIONS:,:155.4150,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F10 GILROY GILROY POLICE  
PRIMARY:,:154.8300,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:D POLICE MUTUAL  
AID:,:154.9350,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F7 COMM CENTER ACCESS  
DIRECT:,:158.8200,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:COMM CENTER  
CLERS:,:154.7100,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F3 CONTROL 3 OPERATIONS  
BERRYESSA TACTICAL:,:156.1500,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:SAN BENITO  
SHERIFF:,:158.7750,::,:POLICE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY FIRE:,:1 SEQUOIA  
HEADQUARTERS:,:154.4000,::,:FIRE:,:CA:,:SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,:SANTA CLARA COUNTY SHERIFF:,:F11 CONTROL 11 MORGAN HILL



POLICE PRIMARY:,155.1150,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F5 AANET SURVEILLANCE  
OPERATIONS:,154.9350,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F5 CONTROL 5 OPERATIONS  
SARATOGA TACTICAL:,154.8700,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F9 GOLD OPERATIONS  
GILROY:,155.4150,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,CA DOJ  
AANET:,154.6800,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F1 AANET OPERATIONS  
REPEATERS:,154.6800,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F2 AANET OPERATIONS  
DIRECT:,154.6800,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SANTA CLARA COUNTY:,SANTA CLARA COUNTY SHERIFF:,F3 AANET SURVEILLANCE  
OPERATIONS:,154.6650,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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BOULDER CREEK MOBILE EXTENDERS:,460.6250,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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WHITE:,154.9200,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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ORANGE:,156.0300,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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CDF:,151.3700,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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BLACK:,154.0550,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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CDF:,151.3700,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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DIRECT:,155.5650,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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DAVENPORT:,151.3700,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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BLUE:,154.7700,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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SECURITY:,OPERATIONS:,154.5400,::,OTHER:,CA:,SANTA CRUZ COUNTY:  
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CRUZ:,151.3700,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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COLLEGE:,156.0900,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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BEACH:,151.3700,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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EXTENDERS:,155.0100,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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GRADE:,153.2000,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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RESCUE:,:155.1600,::,:POLICE:,:CA:,:SANTA CRUZ COUNTY:  
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SANTA CRUZ LINK:,:453.3875,::,:FIRE:,:CA:,:SANTA CRUZ COUNTY:  
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SECURITY:,155.3100,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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TACTICAL:,154.9050,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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GREEN:,155.0700,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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CRUZ:,155.5050,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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YELLOW:,154.1900,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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GREEN:,155.0700,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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WHITE:,154.9200,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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YELLOW:,155.8800,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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RED:,154.9500,::,POLICE:,CA:,SANTA CRUZ COUNTY:  
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1:,154.2500,::,FIRE:,CA:,LOS ANGELES COUNTY:  
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AMBULANCE:,DISPATCH:,461.5000,::,MEDICAL:,CA:,LOS ANGELES COUNTY:  
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:SANTA FE SPRINGS:,SANTA FE SPRINGS POLICE:,POLICE - LACOSD  
F13:,483.7625,::,POLICE:,CA:,LOS ANGELES COUNTY:  
:SANTA MARIA:,ALLAN HANCOCK COLLEGE  
PD:,DISPATCH:,460.5250,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
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DISTRICT:,467.0875,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
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DISTRICT:,155.7750,::,POLICE:,CA:,SANTA BARBARA COUNTY:  
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AID:,154.2800,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA MARIA:,SANTA MARIA FIRE:,F2 FIRE  
SECONDARY:,154.3550,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
:SANTA MARIA:,SANTA MARIA FIRE:,F1 FIRE  
PRIMARY:,154.4450,::,FIRE:,CA:,SANTA BARBARA COUNTY:

:SANTA MARIA,:SANTA MARIA POLICE,:F5 POLICE MUTUAL  
AID:,154.9200,::,POLICE,:CA,:SANTA BARBARA COUNTY:  
:SANTA MARIA,:SANTA MARIA POLICE,:F4 POLICE MUTUAL AID  
WHITE:,460.0250,::,POLICE,:CA,:SANTA BARBARA COUNTY:  
:SANTA MARIA,:SANTA MARIA POLICE,:F3 POLICE COUNTYWIDE MUTUAL AID  
RED:,460.0500,::,POLICE,:CA,:SANTA BARBARA COUNTY:  
:SANTA MARIA,:SANTA MARIA POLICE,:F2 POLICE SECONDARY  
YELLOW:,460.3250,::,POLICE,:CA,:SANTA BARBARA COUNTY:  
:SANTA MONICA,:SANTA MONICA FIRE,:F2 FIRE:,482.3250,::,FIRE,:CA,:LOS  
ANGELES COUNTY:  
:SANTA MONICA,:SANTA MONICA FIRE,:FIRE MUTUAL AID  
F2:,154.2800,::,FIRE,:CA,:LOS ANGELES COUNTY:  
:SANTA MONICA,:SANTA MONICA FIRE,:F1 FIRE:,482.0125,::,FIRE,:CA,:LOS  
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:SANTA MONICA,:SANTA MONICA FIRE,:F1 FIRE &  
MEDICS:,154.0700,::,FIRE,:CA,:LOS ANGELES COUNTY:  
:SANTA MONICA,:NINE ELEVEN EMS,:DISPATCH:,47.5800,::,MEDICAL,:CA,:LOS  
ANGELES COUNTY:  
:SANTA MONICA,:SANTA MONICA POLICE,:F2 POLICE  
SECONDARY:,471.0875,::,POLICE,:CA,:LOS ANGELES COUNTY:  
:SANTA MONICA,:SANTA MONICA POLICE,:F3 POLICE  
TACTICAL:,471.0125,::,POLICE,:CA,:LOS ANGELES COUNTY:  
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PRIMARY:,471.0625,::,POLICE,:CA,:LOS ANGELES COUNTY:  
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POLICE:,154.6500,::,POLICE,:CA,:LOS ANGELES COUNTY:  
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AID:,154.9200,::,POLICE,:CA,:LOS ANGELES COUNTY:  
:SANTA ROSA,:CALIFORNIA HIGHWAY PATROL,:ORANGE MOBILE OFFICE #  
17:,42.6600,:KA4993,:POLICE,:CA,::  
:SANTA ROSA,:CALIFORNIA HIGHWAY PATROL,:ORANGE BASE OFFICE #  
17:,42.8800,:KMD908,:POLICE,:CA,::  
:SANTA ROSA,:SANTA ROSA POLICE,:F3 POLICE  
TACTICAL:,460.0250,::,POLICE,:CA,:SONOMA COUNTY:  
:SANTA ROSA,:SANTA ROSA JUNIOR COLLEGE,:ESP  
SECURITY:,151.8950,::,POLICE,:CA,:SONOMA COUNTY:  
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OPERATIONS:,151.7150,::,POLICE,:CA,:SONOMA COUNTY:  
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SECONDARY:,460.0500,::,POLICE,:CA,:SONOMA COUNTY:  
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YELLOW:,154.1450,::,FIRE,:CA,:SONOMA COUNTY:  
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DIRECT:,460.3750,::,POLICE,:CA,:SONOMA COUNTY:  
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COUNTY:  
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CONTRACT:,453.5000,::,POLICE,:CA,:SAN DIEGO COUNTY:  
:SARATOGA,:SARATOGA POLICE,:POLICE -  
SHERIFF:,155.7000,::,POLICE,:CA,:SANTA CLARA COUNTY:  
:SARATOGA,:SARATOGA FIRE,:F2 FIRE MUTUAL AID:,154.2800,::,FIRE,:CA,:SANTA  
CLARA COUNTY:  
:SARATOGA,:SARATOGA FIRE,:F1 FIRE PROTECTION

DISTRICT:,154.4000,::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
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COUNTY:  
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CLARA COUNTY:  
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COUNTY:  
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EXTENDER:,458.7250,::, :FIRE:, :CA:, :MARIN COUNTY:  
:SAUSALITO:, :SAUSALITO FIRE:, :FIRE SECONDARY:,482.9375,::, :FIRE:, :CA:, :MARIN  
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AID:,46.1200,::, :FIRE:, :CA:, :MARIN COUNTY:  
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TACTICAL:,39.5600,::, :POLICE:, :CA:, :MARIN COUNTY:  
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RED:,154.3250,::, :FIRE:, :CA:, :SANTA CRUZ COUNTY:  
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RED:,154.9500,::, :POLICE:, :CA:, :SANTA CRUZ COUNTY:  
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YELLOW:,154.1900,::, :FIRE:, :CA:, :SANTA CRUZ COUNTY:  
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BLUE:,154.4150,::, :FIRE:, :CA:, :SANTA CRUZ COUNTY:  
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WHITE:,154.2800,::, :FIRE:, :CA:, :SANTA CRUZ COUNTY:  
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GREEN:,460.1750,::, :POLICE:, :CA:, :ORANGE COUNTY:  
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SOUTH:,460.2000,::, :POLICE:, :CA:, :ORANGE COUNTY:  
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COUNTY:  
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COUNTY:  
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MEDICS:,153.8900,::, :FIRE:, :CA:, :MONTEREY COUNTY:  
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PD:,155.5350,::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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PRIMARY:,155.6850,::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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PD:,155.4900,::, :POLICE:, :CA:, :MONTEREY COUNTY:  
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AID:,154.9200,::, :POLICE:, :CA:, :MONTEREY COUNTY:

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PRIMARY:,:154.8450,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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AID:,:154.9200,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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CALCORD:,:156.0750,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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PRIMARY:,:154.3100,::,:FIRE:,:CA:,:SONOMA COUNTY:  
:SEBASTOPOL:,:SEBASTOPOL FIRE:,:F2 FIREGROUND  
BLACK:,:155.8950,::,:FIRE:,:CA:,:SONOMA COUNTY:  
:SELMA:,:SELMA FIRE:,:F1 FIRE AND MEDICS:,:154.4150,::,:FIRE:,:CA:,:FRESNO  
COUNTY:  
:SELMA:,:SELMA POLICE:,:POLICE PRIMARY:,:155.1300,::,:POLICE:,:CA:,:FRESNO  
COUNTY:  
:SHAFTER:,:SHAFTER FIRE:,:FIRE - KERN COUNTY FD STATION  
32:,:453.3000,::,:FIRE:,:CA:,:KERN COUNTY:  
:SHAFTER:,:SHAFTER POLICE:,:POLICE PRIMARY:,:158.8500,::,:POLICE:,:CA:,:KERN  
COUNTY:  
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AMBULANCE:,:155.1450,::,:POLICE:,:CA:,:KERN COUNTY:  
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AMBULANCE:,:155.3400,::,:MEDICAL:,:CA:,:SHASTA COUNTY:  
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AMBULANCE:,:155.2200,::,:MEDICAL:,:CA:,:SHASTA COUNTY:  
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TACTICAL:,:155.1900,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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AID:,:154.9200,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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MONITOR:,:453.8375,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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SECURITY:,:460.0250,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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OPERATIONS:,:154.7550,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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EXTENDERS:,:154.9050,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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DISPATCH:,:154.4300,::,:FIRE:,:CA:,:SHASTA COUNTY:  
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FIREGROUND:,:154.0100,::,:FIRE:,:CA:,:SHASTA COUNTY:  
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OPERATIONS:,:460.0750,::,:POLICE:,:CA:,:SHASTA COUNTY:  
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AID:,:153.9500,::,:FIRE:,:CA:,:SHASTA COUNTY:  
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AID:,:154.2800,::,:FIRE:,:CA:,:SHASTA COUNTY:  
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CSD:,:153.9500,::,:FIRE:,:CA:,:SHASTA COUNTY:  
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CENTER:,:453.0000,::,:FIRE:,:CA:,:SHASTA COUNTY:  
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AID:,155.4750,::,POLICE:,CA:,SHASTA COUNTY:  
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AMBULANCE:,155.3400,::,MEDICAL:,CA:,SHASTA COUNTY:  
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3:,170.4875,::,POLICE:,CA:,SHASTA COUNTY:  
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PRIMARY:,158.7300,::,POLICE:,CA:,SHASTA COUNTY:  
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GAME:,151.4150,::,POLICE:,CA:,SHASTA COUNTY:  
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16:,156.8000,::,POLICE:,CA:,SHASTA COUNTY:  
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72:,156.6250,::,POLICE:,CA:,SHASTA COUNTY:  
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5:,155.7000,::,POLICE:,CA:,SHASTA COUNTY:  
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CENTER:,155.3400,::,MEDICAL:,CA:,SHASTA COUNTY:  
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DIRECT:,155.7000,::,POLICE:,CA:,SHASTA COUNTY:  
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MOBILE:,150.7900,::,MEDICAL:,CA:,SHASTA COUNTY:  
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TRINITY:,151.1600,::,POLICE:,CA:,SHASTA COUNTY:  
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BOULEVARD:,463.0250,::,MEDICAL:,CA:,SHASTA COUNTY:  
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MOBILE:,150.7750,::,MEDICAL:,CA:,SHASTA COUNTY:  
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MOUNTAIN:,463.0000,::,MEDICAL:,CA:,SHASTA COUNTY:  
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AID:,155.4750,::,POLICE:,CA:,SHASTA COUNTY:  
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TACTICAL:,155.2500,::,POLICE:,CA:,SHASTA COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,SHASTA COUNTY:  
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HUB:,451.1000,::,MEDICAL:,CA:,SHASTA COUNTY:  
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LINK:,452.3750,::,MEDICAL:,CA:,SHASTA COUNTY:  
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BALLY:,462.9750,::,MEDICAL:,CA:,SHASTA COUNTY:  
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MOUNTAIN:,463.0750,::,MEDICAL:,CA:,SHASTA COUNTY:  
:SHASTA COUNTY:,SHASTA COUNTY EMS:,MED 4 BASS  
MOUNTAIN:,463.0750,::,MEDICAL:,CA:,SHASTA COUNTY:  
:SIERRA COUNTY:,SIERRA COUNTY SHERIFF:,F1 AUBURN - PLACER COUNTY WEST  
OPERATIONS:,39.8400,::,POLICE:,CA:,SIERRA COUNTY:  
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HOSPITAL:,463.1000,::,MEDICAL:,CA:,SIERRA COUNTY:  
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OPERATIONS:,39.3400,::,POLICE:,CA:,SIERRA COUNTY:

:SIERRA COUNTY:, :SIERRA COUNTY SHERIFF:, :F2 TAHOE CITY PLACER COUNTY EAST  
OPERATIONS:, 39.6800, ::, :POLICE:, :CA:, :SIERRA COUNTY:  
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OPERATIONS:, 39.7600, ::, :POLICE:, :CA:, :SIERRA COUNTY:  
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PRIMARY:, 39.1800, ::, :FIRE:, :CA:, :SIERRA COUNTY:  
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OPERATIONS:, 39.8600, ::, :POLICE:, :CA:, :SIERRA COUNTY:  
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COMMON:, 45.1800, ::, :POLICE:, :CA:, :SIERRA COUNTY:  
:SIERRA COUNTY:, :SIERRA COUNTY FIRE:, :F2 PIKE CITY VFD MUTUAL  
AID:, 154.2800, ::, :FIRE:, :CA:, :SIERRA COUNTY:  
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VFD:, 154.2350, ::, :FIRE:, :CA:, :SIERRA COUNTY:  
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VFD:, 154.3850, ::, :FIRE:, :CA:, :SIERRA COUNTY:  
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BLUFF:, 463.0750, ::, :MEDICAL:, :CA:, :SIERRA COUNTY:  
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FPD:, 39.1800, ::, :FIRE:, :CA:, :SIERRA COUNTY:  
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#1:, 39.1800, ::, :FIRE:, :CA:, :SIERRA COUNTY:  
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PEAK:, 463.1250, ::, :MEDICAL:, :CA:, :SIERRA COUNTY:  
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PRIMARY:, 154.3700, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:SIERRA MADRE:, :SIERRA MADRE SEARCH & RESCUE  
TEAM:, :DISPATCH:, 155.1600, ::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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PRIMARY:, 158.7300, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:SIGNAL HILL:, :SIGNAL HILL FIRE:, :FIRE - LACOFD:, 154.4300, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
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TACTICAL:, 155.8500, :KMA237:, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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PLANNED:, 856.2875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:SIGNAL HILL:, :SIGNAL HILL POLICE:, :F3 POLICE MOBILE DATA  
F3:, 858.2875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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PRIMARY:, 156.3900, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:SIGNAL HILL:, :SIGNAL HILL POLICE:, :F2 POLICE  
PLANNED:, 857.2875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:SISKIYOU COUNTY:, :SISKIYOU COUNTY SHERIFF:, :F4 TACTICAL OPERATIONS AND  
DETENTION JAIL PORTABLES:, 155.7900, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
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PRIMARY:, 154.3400, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:SISKIYOU COUNTY:, :SISKIYOU COUNTY SHERIFF:, :MARIJUANA ERADICATION  
TEAM:, 460.1000, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:SISKIYOU COUNTY:, :SISKIYOU COUNTY FIRE:, :FIRE MOUNT SHASTA  
AREA:, 154.0400, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:SISKIYOU COUNTY:, :SISKIYOU COUNTY FIRE:, :YREKA FIRE  
DEPARTMENT:, 154.4300, ::, :FIRE:, :CA:, :SISKIYOU COUNTY:  
:SISKIYOU COUNTY:, :SISKIYOU COUNTY SHERIFF:, :F1 OPERATIONS  
REPEATERS:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
:SISKIYOU COUNTY:, :SISKIYOU COUNTY FIRE:, :DUNSMUIR

FPD:,154.0400,::,FIRE:,CA:,SISKIYOU COUNTY:  
:SISKIYOU COUNTY:,SISKIYOU COUNTY FIRE:,WEED FIRE  
DEPARTMENT:,154.3400,::,FIRE:,CA:,SISKIYOU COUNTY:  
:SISKIYOU COUNTY:,SISKIYOU COUNTY FIRE:,FORT JONES FIRE  
DEPARTMENT:,154.3400,::,FIRE:,CA:,SISKIYOU COUNTY:  
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DEPARTMENT:,154.3400,::,FIRE:,CA:,SISKIYOU COUNTY:  
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FPD:,154.0400,::,FIRE:,CA:,SISKIYOU COUNTY:  
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MEDIC:,155.8950,::,FIRE:,CA:,SISKIYOU COUNTY:  
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MEDIC:,33.9800,::,FIRE:,CA:,SISKIYOU COUNTY:  
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SERVICE:,155.1750,::,MEDICAL:,CA:,SISKIYOU COUNTY:  
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PEAK:,468.1750,::,MEDICAL:,CA:,SISKIYOU COUNTY:  
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DIRECT:,155.3100,::,POLICE:,CA:,SISKIYOU COUNTY:  
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FPD:,154.1450,::,FIRE:,CA:,SISKIYOU COUNTY:  
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FPD:,154.2050,::,FIRE:,CA:,SISKIYOU COUNTY:  
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COUNTY:,155.8200,::,FIRE:,CA:,SAN DIEGO COUNTY:  
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CONTRACT:,453.7500,::,POLICE:,CA:,SAN DIEGO COUNTY:  
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DIRECT:,155.4900,::,POLICE:,CA:,SOLANO COUNTY:  
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DISPATCH:,155.4000,::,MEDICAL:,CA:,SOLANO COUNTY:  
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AMBULANCE:,47.6200,::,MEDICAL:,CA:,SOLANO COUNTY:

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RESCUE:, 155.1600, ::, :MEDICAL:, :CA:, :SOLANO COUNTY:  
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CENTER:, 463.0000, ::, :MEDICAL:, :CA:, :SOLANO COUNTY:  
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SECURITY:, 453.1000, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
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FD:, 154.3400, ::, :FIRE:, :CA:, :SOLANO COUNTY:  
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REMOTE:, 155.4000, ::, :MEDICAL:, :CA:, :SOLANO COUNTY:  
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DISPATCH:, 155.2350, ::, :MEDICAL:, :CA:, :SOLANO COUNTY:  
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REMOTE:, 155.4000, ::, :MEDICAL:, :CA:, :SOLANO COUNTY:  
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HOSPITAL:, 155.4000, ::, :MEDICAL:, :CA:, :SOLANO COUNTY:  
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HOSPITAL:,155.4000,::,MEDICAL:,CA:,SOLANO COUNTY:  
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VALLEY:,155.4000,::,MEDICAL:,CA:,SOLANO COUNTY:  
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SERVICE:,155.2350,::,MEDICAL:,CA:,SOLANO COUNTY:  
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SERVICES:,156.0000,::,MEDICAL:,CA:,SOLANO COUNTY:  
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22:,42.4000,KFA408:,POLICE:,CA:,  
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22:,42.1600,KA4993:,POLICE:,CA:,  
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COUNTY:  
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TACTICAL:,155.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
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SECONDARY:,158.9100,::,POLICE:,CA:,MONTEREY COUNTY:  
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PRIMARY:,158.8050,::,POLICE:,CA:,MONTEREY COUNTY:  
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FIRE:,153.7700,::,FIRE:,CA:,SANTA BARBARA COUNTY:  
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BARBARA COUNTY:  
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MEDIC:,154.3100,::,MEDICAL:,CA:,SONOMA COUNTY:  
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MEDIC:,154.3850,::,MEDICAL:,CA:,SONOMA COUNTY:  
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MEDIC:,154.0250,::,MEDICAL:,CA:,SONOMA COUNTY:  
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BLUE:,155.1000,::,MEDICAL:,CA:,SONOMA COUNTY:  
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POWER:,150.7900,::,MEDICAL:,CA:,SONOMA COUNTY:  
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NAPA:,155.4000,::,MEDICAL:,CA:,SONOMA COUNTY:  
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COORDINATION:,155.3250,::,MEDICAL:,CA:,SONOMA COUNTY:  
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HOSPITALS:,155.3550,::,MEDICAL:,CA:,SONOMA COUNTY:  
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ROSA:,155.3400,::,MEDICAL:,CA:,SONOMA COUNTY:

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OPERATIONS:, 151.8650, ::, :MEDICAL:, :CA:, :SONOMA COUNTY:  
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2:, 154.2650, ::, :FIRE:, :CA:, :SONOMA COUNTY:  
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1:, 154.2800, ::, :FIRE:, :CA:, :SONOMA COUNTY:  
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4:, 154.4450, ::, :FIRE:, :CA:, :SONOMA COUNTY:  
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COMMON:, 155.1600, ::, :MEDICAL:, :CA:, :SONOMA COUNTY:  
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JACKSON:,463.0750,::,MEDICAL:,CA:,SONOMA COUNTY:  
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SECURITY:,460.4250,::,POLICE:,CA:,SONOMA COUNTY:  
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HOSPITAL:,155.3400,::,MEDICAL:,CA:,SONOMA COUNTY:  
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ALL SITES:,75.6200,::,POLICE:,CA:,SONOMA COUNTY:  
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B:,154.8900,::,POLICE:,CA:,SONOMA COUNTY:  
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C:,155.1600,::,POLICE:,CA:,SONOMA COUNTY:  
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D:,155.0700,::,POLICE:,CA:,SONOMA COUNTY:  
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E:,157.1000,::,POLICE:,CA:,SONOMA COUNTY:  
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K:,460.2750,::,POLICE:,CA:,SONOMA COUNTY:

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DIRECT:,460.2750,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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TACTICAL:,460.2250,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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AID:,460.0250,::,:POLICE:,:CA:,:SONOMA COUNTY:  
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COUNTY:  
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61:,42.3000,:KA4993:,:POLICE:,:CA:,::  
:SONORA:,:CALIFORNIA HIGHWAY PATROL:,:YELLOW BASE OFFICE #  
61:,42.5200,:KDE718:,:POLICE:,:CA:,::  
:SOUTH EL MONTE:,:SOUTH EL MONTE POLICE:,:POLICE - LACOSD CONTRACT  
F11:,482.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
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90:,154.3400,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:SOUTH GATE:,:SOUTH GATE POLICE:,:F2 POLICE MUTUAL  
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:SOUTH GATE:,:SOUTH GATE POLICE:,:F1 POLICE  
PRIMARY:,155.6700,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SOUTH GATE:,:SOUTH GATE POLICE:,:F3 POLICE  
TACTICAL:,156.0000,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SOUTH GATE:,:ADAMS AMBULANCE:,:DISPATCH:,155.2200,::,:MEDICAL:,:CA:,:LOS  
ANGELES COUNTY:  
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ANGELES COUNTY:  
:SOUTH LAKE TAHOE:,:SOUTH LAKE TAHOE HIGH SIERRA  
PATROL:,:154.5150,::,:POLICE:,:CA:,:EL DORADO COUNTY:  
:SOUTH LAKE TAHOE:,:SOUTH LAKE TAHOE POLICE:,:F2  
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MEDICS:,156.0300,::,:POLICE:,:CA:,:EL DORADO COUNTY:  
:SOUTH LAKE TAHOE:,:SOUTH LAKE TAHOE FIRE:,:F1 FIRE &  
MEDICS:,153.9500,::,:POLICE:,:CA:,:EL DORADO COUNTY:  
:SOUTH LAKE TAHOE:,:SOUTH LAKE TAHOE FIRE:,:F2 FIRE MUTUAL  
AID:,154.2800,::,:POLICE:,:CA:,:EL DORADO COUNTY:  
:SOUTH LAKE TAHOE:,:SOUTH LAKE TAHOE POLICE:,:F3 POLICE MUTUAL  
AID:,154.9200,::,:POLICE:,:CA:,:EL DORADO COUNTY:  
:SOUTH LAKE TAHOE:,:SOUTH LAKE TAHOE ANIMAL  
CONTROL:,:DISPATCH:,158.9550,::,:POLICE:,:CA:,:EL DORADO COUNTY:  
:SOUTH PASADENA:,:SOUTH PASADENA FIRE:,:F1 FIRE  
PRIMARY:,153.9950,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:SOUTH PASADENA:,:SOUTH PASADENA POLICE:,:F1 POLICE  
PRIMARY:,470.9875,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:SOUTH PASADENA:,:SOUTH PASADENA FIRE:,:F2 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:LOS ANGELES COUNTY:  
:SOUTH SACRAMENTO:,:CALIFORNIA HIGHWAY PATROL:,:BLACK BASE OFFICE #  
112:,42.4600,:KMJ552:,:POLICE:,:CA:,::  
:SOUTH SACRAMENTO:,:CALIFORNIA HIGHWAY PATROL:,:BLACK MOBILE OFFICE #  
112:,42.7000,:KA4993:,:POLICE:,:CA:,::  
:SOUTH SAN FRANCISCO:,:SOUTH SAN FRANCISCO POLICE:,:F3 POLICE COUNTYWIDE  
MUTUAL AID:,488.8875,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SOUTH SAN FRANCISCO:,:SOUTH SAN FRANCISCO POLICE:,:SCHOOLS  
SECURITY:,464.2375,::,:POLICE:,:CA:,:SAN MATEO COUNTY:  
:SOUTH SAN FRANCISCO:,:SOUTH SAN FRANCISCO FIRE:,:F2 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:SAN MATEO COUNTY:



:SOUTH SAN FRANCISCO:, :SOUTH SAN FRANCISCO FIRE:, :F1 FIRE & MEDIC  
PRIMARY:, 154.0100, ::, :FIRE:, :CA:, :SAN MATEO COUNTY:  
:SOUTH SAN FRANCISCO:, :SOUTH SAN FRANCISCO POLICE:, :F4 POLICE PRIMARY  
DIRECT:, 488.4625, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SOUTH SAN FRANCISCO:, :SOUTH SAN FRANCISCO POLICE:, :F1 POLICE  
PRIMARY:, 488.4625, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:SOUTH SAN FRANCISCO:, :SOUTH SAN FRANCISCO POLICE:, :F2 POLICE TACTICAL  
1:, 488.8625, ::, :POLICE:, :CA:, :SAN MATEO COUNTY:  
:ST HELENA:, :ST HELENA FIRE:, :FIRE PRIMARY:, 155.8050, ::, :FIRE:, :CA:, :NAPA  
COUNTY:  
:ST HELENA:, :ST HELENA POLICE:, :POLICE  
PRIMARY:, 155.5200, ::, :POLICE:, :CA:, :NAPA COUNTY:  
:ST HELENA:, :ST HELENA POLICE:, :POLICE SHERIFF  
LIAISON:, 155.4300, ::, :POLICE:, :CA:, :NAPA COUNTY:  
:ST HELENA:, :ST HELENA POLICE:, :POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :NAPA COUNTY:  
:STANFORD:, :STANFORD UNIVERSITY FIRE  
MARSHAL:, :DISPATCH:, 153.7700, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :F4 POLICE TACTICAL  
DIRECT:, 483.3375, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :F1 POLICE - SHERIFF  
CONTRACT:, 482.6125, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :F3 POLICE  
TACTICAL:, 483.3375, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :FIRE - PALO ALTO  
FD:, 153.7700, ::, :FIRE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :MEDICAL CENTER  
SECURITY:, 155.1600, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :MEDICAL CENTER OPERATING  
ROOM:, 461.4875, ::, :MEDICAL:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :CHILDRENS  
HOSPITAL:, 463.3125, ::, :MEDICAL:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :SHOPPING CENTER  
SECURITY:, 486.6875, :483.6875:, :POLICE:, :OT:, ::  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :SHOPPING CENTER SECURITY  
PHONE:, 461.5875, :466.5875:, :POLICE:, :OT:, ::  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :F5 POLICE SAN MATEO SHERIFF  
GREEN:, 488.8875, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:STANFORD:, :LELAND STANFORD JR UNIVERSITY:, :F2 POLICE  
SECONDARY:, 482.8125, ::, :POLICE:, :CA:, :SANTA CLARA COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F2 SCENIC GENERAL  
HOSPITAL:, 155.4000, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :MED 6 DEL PUERTO  
HOSPITAL:, 463.1250, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F1 MODESTO DOCTORS AMBULANCE  
PRIMARY:, 155.2950, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
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SECONDARY:, 155.2200, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
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FLIGHT:, 155.2200, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F1 SEARCH &  
RESCUE:, 155.1600, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F2 EMANUEL MEDICAL  
CENTER:, 155.1750, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F3  
UNDETERMINED:, 155.2200, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :MED 5 EMANUEL

HOSPITAL:,463.1000,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F5  
UNDETERMINED:,155.2250,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F6 WESTSIDE COMMUNITY  
HOSPITAL:,155.2650,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F7 LODI COMMUNITY  
HOSPITAL:,155.2800,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,MODESTO MEMORIAL HOSPITALS  
ASSOCIATION:,155.3250,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F1 MODESTO - MOBILE LIFE SUPPORT  
PRIMARY:,155.2950,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F9 MEDI-FLIGHT  
PRIMARY:,155.3250,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F11 STANISLAUS  
MEDICS:,155.3850,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F12 SAN JOAQUIN  
MEDICS:,155.4000,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F8 TUOLUMNE  
MEDICS:,155.2950,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F10 LOS BANOS COMMUNITY  
HOSPITAL:,155.3550,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F2 MOBILE LIFE SUPPORT  
SECONDARY:,155.2200,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,OAKDALE - OAK VALLEY DISTRICT  
HOSPITAL:,155.1750,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,PATTERSON  
AMBULANCE:,155.2650,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,TURLOCK CITY  
AMBULANCE:,155.2200,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,WATERFORD COMMUNITY  
AMBULANCE:,155.2950,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F2 OAK VALLEY DISTRICT  
HOSPITAL:,155.1750,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,F5 FIRE MUTUAL  
AID:,154.2650,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F1 MODESTO - SCENIC GENERAL  
HOSPITAL:,155.3850,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,F4 FIRE MUTUAL  
AID:,154.2800,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,MED 3 MEDIC-  
HOSPITAL:,463.0500,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,F3  
FIREGROUND:,153.8900,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F2 AMBULANCE-HOSPITAL  
VHF:,155.3850,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,CONTROL 2 COUNTY FIRE  
SECONDARY:,154.4300,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,TURLOCK  
FPD:,154.1900,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,CONTROL 1 COUNTY FIRE  
PRIMARY:,153.7700,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,MODESTO  
FD:,155.9400,::,FIRE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY SHERIFF:,COMM CENTER  
CLERS:,154.7100,::,POLICE:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY FIRE:,COMM CENTER  
MODESTO:,955.5000,::,FIRE:,CA:,STANISLAUS COUNTY:

:STANISLAUS COUNTY:, :STANISLAUS COUNTY SHERIFF:, :PATTERSON JAIL FARM  
SECURITY:, 453.7625, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY FIRE:, :F6 FIRE MUTUAL  
AID:, 154.2950, ::, :FIRE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY SHERIFF:, :JUVENILE HALL  
B:, 155.8800, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :MED 1 MOUNT  
OSO:, 463.0000, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY SHERIFF:, :DETENTION COUNTY JAIL  
SECURITY A:, 154.9350, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY FIRE:, :OAKDALE  
FD:, 154.3250, ::, :FIRE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY FIRE:, :FIREGROUND MODESTO  
AREA:, 154.3700, ::, :FIRE:, :CA:, :STANISLAUS COUNTY:  
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HOSPITAL:, 463.0750, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
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DISPATCH:, 155.2950, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
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FD:, 154.4300, ::, :FIRE:, :CA:, :STANISLAUS COUNTY:  
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TACTICAL:, 158.7900, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
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DIRECT:, 158.8650, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY SHERIFF:, :F3 OPERATIONS  
SECONDARY:, 158.8650, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY SHERIFF:, :F2 OPERATIONS  
DIRECT:, 158.7300, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY SHERIFF:, :F1 OPERATIONS  
PRIMARY:, 158.7300, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F1 OAKDALE - OAK VALLEY DISTRICT  
HOSPITAL:, 155.3850, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :MODESTO CITY  
HOSPITAL:, 155.3850, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F2 MEMORIAL MEDICAL  
CENTER:, 155.4000, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F1 MODESTO - MEMORIAL MEDICAL  
CENTER:, 155.3850, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :CERES MEMORIAL HOSPITAL  
SOUTH:, 155.3850, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :MED 8 MOUNT  
OSO:, 463.1750, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F1 DEL PUERTO  
HOSPITAL:, 155.3850, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
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HOSPITAL:, 155.3850, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F2 DEL PUERTO  
HOSPITAL:, 155.2650, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :MED 10 MEDIC DISPATCH  
UHF:, 462.9750, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :NEWMAN - WESTSIDE COMMUNITY  
SERVICES:, 155.2650, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
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EXTENDERS:, 150.7900, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :NEWMAN WESTSIDE COMMUNITY  
HOSPITAL:, 155.2650, ::, :MEDICAL:, :CA:, :STANISLAUS COUNTY:  
:STANISLAUS COUNTY:, :STANISLAUS COUNTY EMS:, :F1 TURLOCK EMANUEL MEDICAL

CENTER:,155.3850,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
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CENTER:,155.1750,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANISLAUS COUNTY:,STANISLAUS COUNTY EMS:,F4 WAS TURLOCK COMMUNITY  
HOSPITAL:,155.2200,::,MEDICAL:,CA:,STANISLAUS COUNTY:  
:STANTON POLICE:,STANTON POLICE:,POLICE - SHERIFF BEAT 21-26  
YELLOW:,460.4250,::,POLICE:,CA:,ORANGE COUNTY:  
:STOCKTON:,CALIFORNIA HIGHWAY PATROL:,WHITE MOBILE OFFICE #  
62:,42.7200,KA4993:,POLICE:,CA:,  
:STOCKTON:,CALIFORNIA HIGHWAY PATROL:,WHITE BASE OFFICE #  
62:,42.5600,KMA501:,POLICE:,CA:,  
:SUISUN CITY:,SUISUN CITY FIRE:,F2 FIRE  
SECONDARY:,154.2050,::,FIRE:,CA:,SOLANO COUNTY:  
:SUISUN CITY:,SUISUN CITY POLICE:,F4 POLICE  
SECONDARY:,155.0850,::,POLICE:,CA:,SOLANO COUNTY:  
:SUISUN CITY:,SUISUN CITY POLICE:,F3 POLICE  
PRIMARY:,155.5200,::,POLICE:,CA:,SOLANO COUNTY:  
:SUISUN CITY:,SUISUN CITY POLICE:,F2 POLICE MUTUAL  
AID:,154.9200,::,POLICE:,CA:,SOLANO COUNTY:  
:SUISUN CITY:,SUISUN CITY POLICE:,F1 POLICE - SHERIFF  
1:,155.4900,::,POLICE:,CA:,SOLANO COUNTY:  
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PRIMARY:,154.1750,::,FIRE:,CA:,SOLANO COUNTY:  
:SUNNYVALE:,SUNNYVALE FIRE:,F8 FIRE MUTUAL  
AID:,154.2950,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SUNNYVALE:,SUNNYVALE POLICE:,POLICE MOBILE  
DATA:,482.4125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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BLUE:,153.8450,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SUNNYVALE:,SUNNYVALE POLICE:,F3 POLICE FIRE & STAR(STRATEGIC TACTICS AND  
RESCUE) TEAM:,483.1625,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SUNNYVALE:,SUNNYVALE POLICE:,F4 POLICE MUTUAL AID  
DIRECT:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SUNNYVALE:,SUNNYVALE POLICE:,F2 FIRE PRIMARY  
(40):,482.7125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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PRIMARY:,482.9625,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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PLANNED:,859.7125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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AID:,154.9200,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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AID:,482.3375,::,POLICE:,CA:,SANTA CLARA COUNTY:  
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AID:,154.2650,::,FIRE:,CA:,SANTA CLARA COUNTY:  
:SUNNYVALE:,SUNNYVALE FIRE:,FIRE MUTUAL AID:,154.2800,::,FIRE:,CA:,SANTA  
CLARA COUNTY:  
:SUNNYVALE:,SUNNYVALE POLICE:,F6 POLICE  
TACTICAL:,485.4125,::,POLICE:,CA:,SANTA CLARA COUNTY:  
:SUSANVILLE:,SUSANVILLE FIRE:,FIRE UTILITY  
F2:,154.3250,::,FIRE:,CA:,LASSEN COUNTY:  
:SUSANVILLE:,SUSANVILLE POLICE:,POLICE PRIMARY  
F1:,154.8750,::,POLICE:,CA:,LASSEN COUNTY:  
:SUSANVILLE:,COMMUNITY COLLEGE  
SECURITY:,DISPATCH:,155.7750,::,POLICE:,CA:,LASSEN COUNTY:  
:SUSANVILLE:,SUSANVILLE FIRE:,FIRE PRIMARY  
F1:,154.4450,::,FIRE:,CA:,LASSEN COUNTY:

:SUSANVILLE:, :SUSANVILLE POLICE:, :F4 POLICE  
SECONDARY:, 155.7750, ::, :POLICE:, :CA:, :LASSEN COUNTY:  
:SUSANVILLE:, :SUSANVILLE POLICE:, :F3 POLICE  
COMMON:, 155.7000, ::, :POLICE:, :CA:, :LASSEN COUNTY:  
:SUSANVILLE:, :SUSANVILLE POLICE:, :POLICE MOBILE  
EXTENDERS:, 460.0250, ::, :POLICE:, :CA:, :LASSEN COUNTY:  
:SUSANVILLE:, :SUSANVILLE POLICE:, :F2 POLICE - SHERIFF  
LIAISON:, 154.8750, ::, :POLICE:, :CA:, :LASSEN COUNTY:  
:SUSANVILLE:, :CALIFORNIA HIGHWAY PATROL:, :BLUE MOBILE OFFICE #  
38:, 42.1800, :KA4993:, :POLICE:, :CA:, ::  
:SUSANVILLE:, :CALIFORNIA HIGHWAY PATROL:, :BLUE BASE OFFICE #  
38:, 42.3400, :KME543:, :POLICE:, :CA:, ::  
:SUTTER COUNTY:, :SUTTER COUNTY EMS:, :MED 6 OREGON  
PEAK:, 463.1250, ::, :MEDICAL:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY EMS:, :MED 7 WOLF  
MOUNTAIN:, 463.1500, ::, :MEDICAL:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY FIRE:, :F4 FIRE MUTUAL AID WHITE  
2:, 154.2650, ::, :FIRE:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY FIRE:, :F1 FIRE & MEDIC PRIMARY  
RED:, 154.2500, ::, :FIRE:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY EMS:, :YUBA CITY SUTTER COMMUNITY  
HOSPITAL:, 155.3400, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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2:, 153.7700, ::, :FIRE:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY SHERIFF:, :F3 OPERATIONS  
TACTICAL:, 460.1750, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY FIRE:, :F3 FIRE MUTUAL AID WHITE  
1:, 154.2800, ::, :FIRE:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY SHERIFF:, :F5 POLICE MUTUAL  
AID:, 460.0250, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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SHERIFF:, :CLERS:, 155.0700, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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SECONDARY:, 460.5000, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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LIAISON:, 460.1000, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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PRIMARY:, 460.2250, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
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3:, 154.2950, ::, :FIRE:, :CA:, :SUTTER COUNTY:  
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CENTER:, 155.3400, ::, :POLICE:, :CA:, :SUTTER COUNTY:  
:SUTTER COUNTY:, :SUTTER COUNTY EMS:, :HOSPITAL  
EMERGENCY:, 155.3400, ::, :MEDICAL:, :CA:, :SUTTER COUNTY:  
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F2:, 45.5400, ::, :POLICE:, :CA:, :AMADOR COUNTY:  
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SHERIFF:, 45.6000, ::, :POLICE:, :CA:, :AMADOR COUNTY:  
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:TAHOE CITY:, :TAHOE CITY FPD:, :DISPATCH:, 46.0800, ::, :FIRE:, :CA:, :PLACER  
COUNTY:  
:TAHOE CITY:, :TAHOE CITY FIRE:, :F2 FIREGROUND  
COMMON:, 46.4200, ::, :FIRE:, :CA:, :PLACER COUNTY:  
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PRIMARY:,46.0800,::, :FIRE:, :CA:, :PLACER COUNTY:  
:TAHOE CITY:, :TAHOE DONNER  
AMBULANCE:, :DISPATCH:,155.1750,::, :MEDICAL:, :CA:, :PLACER COUNTY:  
:TAHOE CITY:, :TAHOE CITY POLICE:, :POLICE -  
SHERIFF:,39.6800,::, :POLICE:, :CA:, :PLACER COUNTY:  
:TEHACHAPI:, :TEHACHAPI POLICE:, :F2 POLICE VALLEY  
WHITE:,453.2750,::, :POLICE:, :CA:, :KERN COUNTY:  
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CWMA:,453.2250,::, :POLICE:, :CA:, :KERN COUNTY:  
:TEHACHAPI:, :TEHACHAPI POLICE:, :POLICE - SHERIFF  
(TEMPO):,453.4000,::, :POLICE:, :CA:, :KERN COUNTY:  
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COUNTY:  
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CONTRACT:,482.9875,::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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ANGELES COUNTY:  
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AID:,39.5200,::, :POLICE:, :CA:, :MARIN COUNTY:  
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COUNTY:  
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COUNTY:  
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AID:,46.1200,::, :FIRE:, :CA:, :MARIN COUNTY:  
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COUNTY:  
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:TORRANCE:, :TORRANCE POLICE:, :F1 POLICE PRIMARY  
GREEN:,155.7000,::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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DISPATCH:,506.0125,::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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GOLD:,154.9200,::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
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ANGELES COUNTY:  
:TORRANCE:, :TORRANCE POLICE:, :F3 POLICE & FIRE COMMON  
BLUE:,155.1000,::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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BLUE:,155.1000,::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:TORRANCE:, :TORRANCE FIRE:, :F1 FIRE & MEDICS RED:,154.1300,::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:TORRANCE:, :TORRANCE FIRE:, :F4 FIRE MUTUAL AID  
WHITE:,154.2800,::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
:TORRANCE:, :TORRANCE POLICE:, :F4 POLICE NEW  
DETECTIVES:,506.2625,::, :POLICE:, :CA:, :LOS ANGELES COUNTY:

:TORRANCE:,:TORRANCE POLICE:,:F2 POLICE TACTICAL  
BROWN:,154.8600,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:TORRANCE:,:TORRANCE POLICE:,:F3 POLICE NEW NARCOTICS (SECURE  
DIGITAL):,506.1125,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:TORRANCE:,:TORRANCE POLICE:,:F2 POLICE NEW PATROL  
TACTICAL:,506.0625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:TORRANCE:,:TORRANCE POLICE:,:MOBILE DATA  
TERMINALS:,857.2625,::,:POLICE:,:CA:,:LOS ANGELES COUNTY:  
:TRACY:,:CALIFORNIA HIGHWAY PATROL:,:YELLOW MOBILE OFFICE #  
103:,42.3000,:KA4993:,:POLICE:,:CA:,::  
:TRACY:,:CALIFORNIA HIGHWAY PATROL:,:YELLOW BASE OFFICE #  
103:,42.5200,:KRO412:,:POLICE:,:CA:,::  
:TRINIDAD:,:TRINIDAD POLICE:,:POLICE -  
SHERIFF:,154.7400,::,:POLICE:,:CA:,:HUMBOLDT COUNTY:  
:TRINITY COUNTY:,:TRINITY COUNTY FIRE DEPARTMENTS:,:DOUGLAS CITY  
FD:,154.3700,::,:FIRE:,:CA:,:TRINITY COUNTY:  
:TRINITY COUNTY:,:TRINITY COUNTY SHERIFFS DEPARTMENT:,:POLICE COMMON  
F3:,155.7000,::,:POLICE:,:CA:,:TRINITY COUNTY:  
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FD:,155.2200,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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FD:,155.4450,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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CENTER:,154.0700,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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COMMON:,154.4300,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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F2:,155.1150,::,:POLICE:,:CA:,:TRINITY COUNTY:  
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F1:,155.9250,::,:POLICE:,:CA:,:TRINITY COUNTY:  
:TRINITY COUNTY:,:TRINITY COUNTY SHERIFFS DEPARTMENT:,:MUTUAL AID  
F4:,154.9200,::,:POLICE:,:CA:,:TRINITY COUNTY:  
:TRINITY RIVER (WEAVERVILLE):,:CALIFORNIA HIGHWAY PATROL:,:RED MOBILE OFFICE #  
90:,42.2800,:KA4993:,:POLICE:,:CA:,::  
:TRINITY RIVER (WEAVERVILLE):,:CALIFORNIA HIGHWAY PATROL:,:RED BASE OFFICE #  
90:,42.4400,:KUG589:,:POLICE:,:CA:,::  
:TRONA:,:KERR-MCGEE CHEMICAL COMPANY FD:,:FIRE  
DISPATCH:,152.9450,::,:FIRE:,:CA:,:SAN BERNARDINO COUNTY:  
:TRUCKEE:,:CALIFORNIA HIGHWAY PATROL:,:GRAY BASE OFFICE #  
80:,42.4800,:KAZ604:,:POLICE:,:CA:,::  
:TRUCKEE:,:CALIFORNIA HIGHWAY PATROL:,:GRAY MOBILE OFFICE #  
80:,42.6800,:KA4993:,:POLICE:,:CA:,::  
:TULELAKE:,:TULELAKE POLICE:,:F1 POLICE PRIMARY  
REPEATER:,154.0250,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:TULELAKE:,:TULELAKE POLICE:,:F2 POLICE PRIMARY  
DIRECT:,154.0250,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:TULELAKE:,:TULELAKE POLICE:,:F3 POLICE  
COMMON:,155.7000,::,:POLICE:,:CA:,:SISKIYOU COUNTY:  
:TULELAKE:,:TULELAKE FIRE:,:FIRE PROTECTION  
DISTRICT:,33.9800,::,:FIRE:,:CA:,:SISKIYOU COUNTY:  
:TURLOCK:,:TURLOCK FIRE:,:F3 FIRE MUTUAL  
AID:,154.2800,::,:FIRE:,:CA:,:STANISLAUS COUNTY:  
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PRIMARY:,158.8500,::,:POLICE:,:CA:,:STANISLAUS COUNTY:  
:TURLOCK:,:TURLOCK FIRE:,:F2 FIRE COUNTY  
FIRE:,153.7700,::,:FIRE:,:CA:,:STANISLAUS COUNTY:  
:TURLOCK:,:TURLOCK FIRE:,:F1 FIRE PRIMARY:,154.1900,::,:FIRE:,:CA:,:STANISLAUS

COUNTY:

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AID:, 154.9200, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:TURLOCK:, :TURLOCK POLICE:, :F3 POLICE  
TACTICAL:, 158.9100, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:TURLOCK:, :TURLOCK POLICE:, :F2 POLICE  
SHERIFF:, 158.7300, ::, :POLICE:, :CA:, :STANISLAUS COUNTY:  
:TUSTIN:, :TUSTIN POLICE:, :POLICE PRIMARY  
GREEN:, 460.3250, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
:TUSTIN:, :TUSTIN POLICE:, :POLICE SECONDARY ORANGE  
SOUTH:, 460.2000, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
:TWENTYNINE PALMS:, :TWENTYNINE PALMS FIRE:, :FIRE PROTECTION  
DISTRICT:, 154.0700, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:TWENTYNINE PALMS:, :U.S. MARINE CORPS CENTER FD:, :FIRE  
DISPATCH:, 140.0250, ::, :FIRE:, :CA:, :SAN BERNARDINO COUNTY:  
:TWENTYNINE PALMS:, :TWENTYNINE PALMS POLICE:, :POLICE - SHERIFF  
CONTRACT:, 155.9700, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:UKIAH:, :CALIFORNIA HIGHWAY PATROL:, :WHITE MOBILE OFFICE #  
18:, 42.7200, :KA4993:, :POLICE:, :CA:, ::  
:UKIAH:, :CALIFORNIA HIGHWAY PATROL:, :WHITE BASE OFFICE #  
18:, 42.5600, :KDA712:, :POLICE:, :CA:, ::  
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AID:, 154.9200, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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PRIMARY:, 154.8600, ::, :POLICE:, :CA:, :MENDOCINO COUNTY:  
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COUNTY:  
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AID:, 153.9500, ::, :FIRE:, :CA:, :MENDOCINO COUNTY:  
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COUNTY:  
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PRIMARY:, 482.3625, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
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GREEN:, 155.0700, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
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(12):, 488.6625, ::, :FIRE:, :CA:, :ALAMEDA COUNTY:  
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SELDOM:, 482.6625, ::, :POLICE:, :CA:, :ALAMEDA COUNTY:  
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BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
:UPLAND:, :UPLAND FIRE:, :F7 FIREGROUND PORTABLES:, 153.8300, ::, :FIRE:, :CA:, :SAN  
BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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ALTERNATE:, 155.0850, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
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1:, 155.4900, ::, :POLICE:, :CA:, :SOLANO COUNTY:



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AID:, 154.2800, ::, :FIRE:, :CA:, :SOLANO COUNTY:  
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COUNTY:  
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SECONDARY:, 154.3400, ::, :FIRE:, :CA:, :SOLANO COUNTY:  
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PRIMARY:, 154.8600, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:VALLEJO:, :VALLEJO FIRE:, :FIRE MUTUAL AID:, 154.2800, ::, :FIRE:, :CA:, :SOLANO  
COUNTY:  
:VALLEJO:, :VALLEJO FIRE:, :F2 FIREGROUND:, 483.0625, ::, :FIRE:, :CA:, :SOLANO  
COUNTY:  
:VALLEJO:, :VALLEJO FIRE:, :F1 FIRE PRIMARY:, 482.9875, ::, :FIRE:, :CA:, :SOLANO  
COUNTY:  
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COUNTY:  
:VALLEJO:, :VALLEJO POLICE:, :F3 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:VALLEJO:, :VALLEJO POLICE:, :F1 POLICE  
PRIMARY:, 155.9100, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
:VALLEJO:, :VALLEJO POLICE:, :F2 POLICE  
TACTICAL:, 154.8300, ::, :POLICE:, :CA:, :SOLANO COUNTY:  
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COUNTY:  
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ANGELES COUNTY:  
:VERNON:, :VERNON FIRE:, :F3 FIREGROUND GREEN:, 154.2950, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
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ANGELES COUNTY:  
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ANGELES COUNTY:  
:VERNON:, :VERNON FIRE:, :F1 FIRE AREA E RED:, 154.2500, ::, :FIRE:, :CA:, :LOS  
ANGELES COUNTY:  
:VICTORVILLE:, :VICTORVILLE POLICE:, :F2 POLICE MUTUAL  
AID:, 154.9200, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
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BERNARDINO COUNTY:  
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CONTRACT:, 155.5650, ::, :POLICE:, :CA:, :SAN BERNARDINO COUNTY:  
:VILLA PARK:, :VILLA PARK POLICE:, :POLICE - SHERIFF BEAT 1  
YELLOW:, 460.4250, ::, :POLICE:, :CA:, :ORANGE COUNTY:  
:VISALIA:, :CALIFORNIA HIGHWAY PATROL:, :PINK MOBILE OFFICE #  
67:, 42.7600, :KA4993:, :POLICE:, :CA:, :  
:VISALIA:, :CALIFORNIA HIGHWAY PATROL:, :PINK BASE OFFICE #  
67:, 42.4400, :KMC984:, :POLICE:, :CA:, :  
:VISTA:, :VISTA FIRE:, :FIRE & MEDICS:, 154.2350, ::, :FIRE:, :CA:, :SAN DIEGO  
COUNTY:  
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CONTRACT:, 453.9250, ::, :POLICE:, :CA:, :SAN DIEGO COUNTY:  
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COUNTY:  
:WALNUT:, :WALNUT POLICE:, :F6 POLICE - LACOSD  
CONTRACT:, 483.6875, ::, :POLICE:, :CA:, :LOS ANGELES COUNTY:  
:WALNUT CREEK:, :WALNUT CREEK POLICE:, :POLICE TACTICAL  
A:, 155.3100, ::, :POLICE:, :CA:, :CONTRA COSTA COUNTY:  
:WALNUT CREEK:, :WALNUT CREEK POLICE:, :F5 POLICE

SECONDARY:,460.3250,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,WALNUT CREEK POLICE:,F6 POLICE  
COMMON:,460.1000,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:CONTRA COSTA COUNTY:,CONTRA COSTA COUNTY COMMUNITY COLLEGE DISTRICT:,DIABLO  
VALLEY COLLEGE DISPATCH:,464.9250,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,WALNUT CREEK FIRE:,FIRE - CONSOLIDATED  
FPD:,46.3200,::,FIRE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,WALNUT CREEK POLICE:,POLICE MUTUAL AID  
C:,154.9350,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,JOHN MUIR MEDICAL  
CENTER:,DISPATCH:,464.3250,::,MEDICAL:,CA:,CONTRA COSTA COUNTY:  
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CENTRAL:,460.0250,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,WALNUT CREEK POLICE:,POLICE TACTICAL  
D:,155.4750,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,KAISER FOUNDATION  
HOSPITAL:,DISPATCH:,464.5250,::,MEDICAL:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,WALNUT CREEK POLICE:,POLICE MUTUAL AID  
B:,154.9200,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WALNUT CREEK:,WALNUT CREEK POLICE:,F1 POLICE  
PRIMARY:,460.4250,::,POLICE:,CA:,CONTRA COSTA COUNTY:  
:WASCO:,WASCO FIRE:,FIRE - KERN COUNTY FD STATION  
31:,453.3000,::,FIRE:,CA:,KERN COUNTY:  
:WASCO:,WASCO POLICE:,POLICE - SHERIFF  
(WASCO):,453.0500,::,POLICE:,CA:,KERN COUNTY:  
:WATERFORD:,WATERFORD POLICE:,POLICE -  
SHERIFF:,158.7300,::,POLICE:,CA:,STANISLAUS COUNTY:  
:WATERFORD:,WATERFORD FIRE:,FIRE  
PRIMARY:,153.7700,::,FIRE:,CA:,STANISLAUS COUNTY:  
:WATSONVILLE:,WATSONVILLE FIRE:,F4 FIRE MUTUAL AID  
WHITE:,154.2800,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
:WATSONVILLE:,WATSONVILLE FIRE:,F3 FIRE COUNTY FIRE  
RED:,154.3250,::,FIRE:,CA:,SANTA CRUZ COUNTY:  
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REPEATER:,155.0100,::,POLICE:,CA:,SISKIYOU COUNTY:  
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CITIES:,154.3700,::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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VALLEY:,154.3400,::, :FIRE:, :CA:, :LOS ANGELES COUNTY:  
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COUNTY:  
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SERVICES:,:DISPATCH:,:155.0555,:,:OTHER:,:CA:,:MENDOCINO COUNTY:  
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COUNTY:  
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93:,:42.5000,:KMD997:,:POLICE:,:CA:,::  
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GREEN:,:460.1000,:,:POLICE:,:CA:,:ORANGE COUNTY:  
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NORTH:,:460.4000,:,:POLICE:,:CA:,:ORANGE COUNTY:  
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41:,:42.1600,:KA4993:,:POLICE:,:CA:,::  
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41:,:42.4000,:KME263:,:POLICE:,:CA:,::  
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COUNTY:

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REPEATER:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
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DIRECT:, 155.3100, ::, :POLICE:, :CA:, :SISKIYOU COUNTY:  
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COUNTY:  
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43:, 42.0000, :KME355:, :POLICE:, :CA:, ::  
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43:, 42.8200, :KA4993:, :POLICE:, :CA:, ::  
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BUTTES:, 463.1000, ::, :MEDICAL:, :CA:, :TEHAMA COUNTY:  
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NIGHT:, 154.7400, ::, :POLICE:, :CA:, :TEHAMA COUNTY:  
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COUNTY:, 154.4000, ::, :FIRE:, :CA:, :TEHAMA COUNTY:  
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COUNTY:  
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common:,:154.4300,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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VFD:,:154.4450,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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PUD:,:154.4300,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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CSD:,:154.0700,::,:FIRE:,:CA:,:TRINITY COUNTY:  
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Mountain:,:463.1250,::,:MEDICAL:,:CA:,:TRINITY COUNTY:  
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Peak:,:462.9500,::,:MEDICAL:,:CA:,:TRINITY COUNTY:  
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Hospital:,:151.8650,::,:MEDICAL:,:CA:,:TRINITY COUNTY:  
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LOCAL:,453.8250,::,POLICE:,CA:,TULARE COUNTY:  
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PD:,453.2000,::,POLICE:,CA:,TULARE COUNTY:  
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C:,155.1600,::,POLICE:,CA:,TULARE COUNTY:  
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DIRECT:,153.9050,::,FIRE:,CA:,TULARE COUNTY:  
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DEPARTMENT:,153.7550,::,FIRE:,CA:,TULARE COUNTY:  
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RIDGE:,463.0250,::,MEDICAL:,CA:,TULARE COUNTY:  
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DIRECT:, 153.8000, ::, :POLICE:, :CA:, :TUOLUMNE COUNTY:  
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PD:, 158.8350, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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PD:, 158.8050, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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VALLEY:, 156.1500, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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PD:, 155.6500, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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OPERATIONS 3:, 155.1450, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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RESCUE:, 155.1600, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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PRIMARY:,155.6550,:::,POLICE:,CA:,VENTURA COUNTY:  
:OXNARD:,OXNARD POLICE:,F2 POLICE SECONDARY  
RECORDS:,155.7450,:::,POLICE:,CA:,VENTURA COUNTY:  
:OXNARD:,OXNARD POLICE:,F3 POLICE VENTURA PD  
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AID:,154.9200,:::,POLICE:,CA:,VENTURA COUNTY:  
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GREEN:,154.1450,:::,FIRE:,CA:,VENTURA COUNTY:  
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RED:,154.3700,:::,FIRE:,CA:,VENTURA COUNTY:  
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GREEN:,154.1450,:::,FIRE:,CA:,VENTURA COUNTY:  
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YELLOW:,154.0100,:::,FIRE:,CA:,VENTURA COUNTY:  
:SAN BUENAVENTURA:,SAN BUENAVENTURA FIRE:,F4 FIRE MUTUAL AID WHITE  
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:SAN BUENAVENTURA:,SAN BUENAVENTURA FIRE:,F5 FIRE MUTUAL AID WHITE  
3:,154.2950,:::,FIRE:,CA:,VENTURA COUNTY:  
:SAN BUENAVENTURA:,SAN BUENAVENTURA FIRE:,F6 COUNTY FIRE COMMAND 1  
BLUE:,154.3250,:::,FIRE:,CA:,VENTURA COUNTY:  
:SANTA PAULA:,SANTA PAULA POLICE:,POLICE  
PRIMARY:,158.8350,:::,POLICE:,CA:,VENTURA COUNTY:  
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FD:,154.3700,:::,FIRE:,CA:,VENTURA COUNTY:  
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SECONDARY:,154.4150,:::,FIRE:,CA:,VENTURA COUNTY:

:SIMI VALLEY:, :SIMI VALLEY POLICE:, :F1 POLICE  
PRIMARY:, 158.8050, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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PD:, 158.8350, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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AID:, 154.9200, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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FIRE:, 154.0100, ::, :FIRE:, :CA:, :VENTURA COUNTY:  
:THOUSAND OAKS:, :THOUSAND OAKS POLICE:, :POLICE -  
SHERIFF:, 156.1500, ::, :POLICE:, :CA:, :VENTURA COUNTY:  
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:YOLO COUNTY:, :YOLO COUNTY SHERIFF:, :F1 OPERATIONS PRIMARY  
YELLOW:, 154.8000, ::, :POLICE:, :CA:, :YOLO COUNTY:  
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DIRECT:, 154.8000, ::, :POLICE:, :CA:, :YOLO COUNTY:  
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RED:, 154.9200, ::, :POLICE:, :CA:, :YOLO COUNTY:  
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PD:, 155.0550, ::, :POLICE:, :CA:, :YOLO COUNTY:  
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PD:, 159.0900, ::, :POLICE:, :CA:, :YOLO COUNTY:  
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CENTER:, 158.8050, ::, :POLICE:, :CA:, :YOLO COUNTY:  
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VHF:, 154.4450, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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BLUE:, 154.3700, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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1:, 154.2800, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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COUNTY:  
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COUNTY:, 154.2500, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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COUNTY:, 154.1900, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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UHF:, 453.8000, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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INTERCOMM:, 453.8000, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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FPD:, 154.4450, ::, :FIRE:, :CA:, :YOLO COUNTY:  
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COUNTY:  
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MEDIC:,:154.3700,::,:FIRE:,:CA:,:YOLO COUNTY:  
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COUNTY:  
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MOUNTAIN:,:463.0000,::,:MEDICAL:,:CA:,:YOLO COUNTY:  
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VACA:,:463.0500,::,:MEDICAL:,:CA:,:YOLO COUNTY:  
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DISPATCH:,:462.9750,::,:MEDICAL:,:CA:,:YOLO COUNTY:  
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EMERGENCY:,:155.2350,::,:MEDICAL:,:CA:,:YOLO COUNTY:  
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AMBULANCE:,:155.2800,::,:MEDICAL:,:CA:,:YOLO COUNTY:  
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CENTER:,:155.1750,::,:MEDICAL:,:CA:,:YOLO COUNTY:  
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COUNTY:  
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COUNTY:  
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:YUBA COUNTY:,:YUBA COUNTY SHERIFF:,:F1 OPERATIONS  
PRIMARY:,460.1000,::,:POLICE:,:CA:,:YUBA COUNTY:  
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LIAISON:,460.2250,::,:POLICE:,:CA:,:YUBA COUNTY:  
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TACTICAL:,460.1750,::,:POLICE:,:CA:,:YUBA COUNTY:  
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SWAT:,460.3000,::,:POLICE:,:CA:,:YUBA COUNTY:  
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OPERATIONS:,154.7100,::,:POLICE:,:CA:,:YUBA COUNTY:  
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DEPARTMENT:,460.5250,::,:POLICE:,:CA:,:YUBA COUNTY:  
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CLERS:,155.0700,::,:POLICE:,:CA:,:YUBA COUNTY:  
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CDF:,151.3250,::,:FIRE:,:CA:,:YUBA COUNTY:  
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RED:,154.2500,::,:FIRE:,:CA:,:YUBA COUNTY:  
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ORANGE:,153.7700,::,:FIRE:,:CA:,:YUBA COUNTY:  
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BLUE:,154.2800,::,:FIRE:,:CA:,:YUBA COUNTY:  
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COUNTY:



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:YUBA COUNTY:,:YUBA COUNTY EMS:,:MED 7 WOLF MOUNTAIN:,:463.1500,::,:MEDICAL:,:CA:,:YUBA COUNTY:  
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:MARYSVILLE:,:MARYSVILLE POLICE:,:F1 POLICE PRIMARY:,:460.1000,::,:POLICE:,:CA:,:YUBA COUNTY:  
:MARYSVILLE:,:MARYSVILLE POLICE:,:F2 SUTTER COUNTY SHERIFF LIAISON:,:460.2250,::,:POLICE:,:CA:,:YUBA COUNTY:  
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:MARYSVILLE:,:MARYSVILLE FIRE:,:F2 FIRE SECONDARY ORANGE:,:153.7700,::,:FIRE:,:CA:,:YUBA COUNTY:  
:MARYSVILLE:,:MARYSVILLE FIRE:,:F3 FIRE MUTUAL AID BLUE:,:154.2800,::,:FIRE:,:CA:,:YUBA COUNTY:  
:MARYSVILLE:,:MARYSVILLE FIRE:,:F4 FIRE TACTICAL:,:154.3100,::,:FIRE:,:CA:,:YUBA COUNTY:  
:MARYSVILLE:,:MARYSVILLE FIRE:,:F5 FIREGROUND:,:154.2050,::,:FIRE:,:CA:,:YUBA COUNTY:  
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COUNTY:  
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COUNTY:



Subject: Indoor Under-Carpet Loop Antenna

From: moisan@silver.lcs.mit.edu (David Moisan)

THE CARPET LOOP II -- A High Performance Indoor Antenna  
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Designed by David Moisan, N1KGH

Introduction:  
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There are many shortwave listeners who can't, because of location, infirmity or a unyielding landlord, put up an outside antenna. Such people are given two choices--random wire or active antenna. Yet, for the serious listener, neither choice is completely adequate.

Active antennas are expensive, apt to generate as much noise as signal, and are prone to overload. Random wires are cheap (cheapest, in fact) and easy to put up, but are unpredictable performers. Both subject the receiver to intermod, spurious signals and other trash.

The Carpet Loop II is an ideal step upward for the listener who wants something better than a random wire but doesn't want the expensive dice roll of an active antenna.

The Carpet Loop is made up of two components: A tuner, and the antenna cable itself; the cable can be either 5-conductor rotator cable or 4-conductor flat phone cable, both readily available from Radio Shack and elsewhere. The tuner couples the antenna to the radio, forming a (giant!) L-network. To tune the antenna, you turn a switch for best reception.

While NO antenna can give a cheap receiver the sensitivity, selectivity, or dynamic range it never had, the Carpet Loop will help you get the last ounce of performance out of your radio.

Two years ago, I was using a random wire. I had severe problems with a local AM station (2 miles away) on 1230 Khz. I was hearing intermod from it all over the 9 to 12 Mhz range.

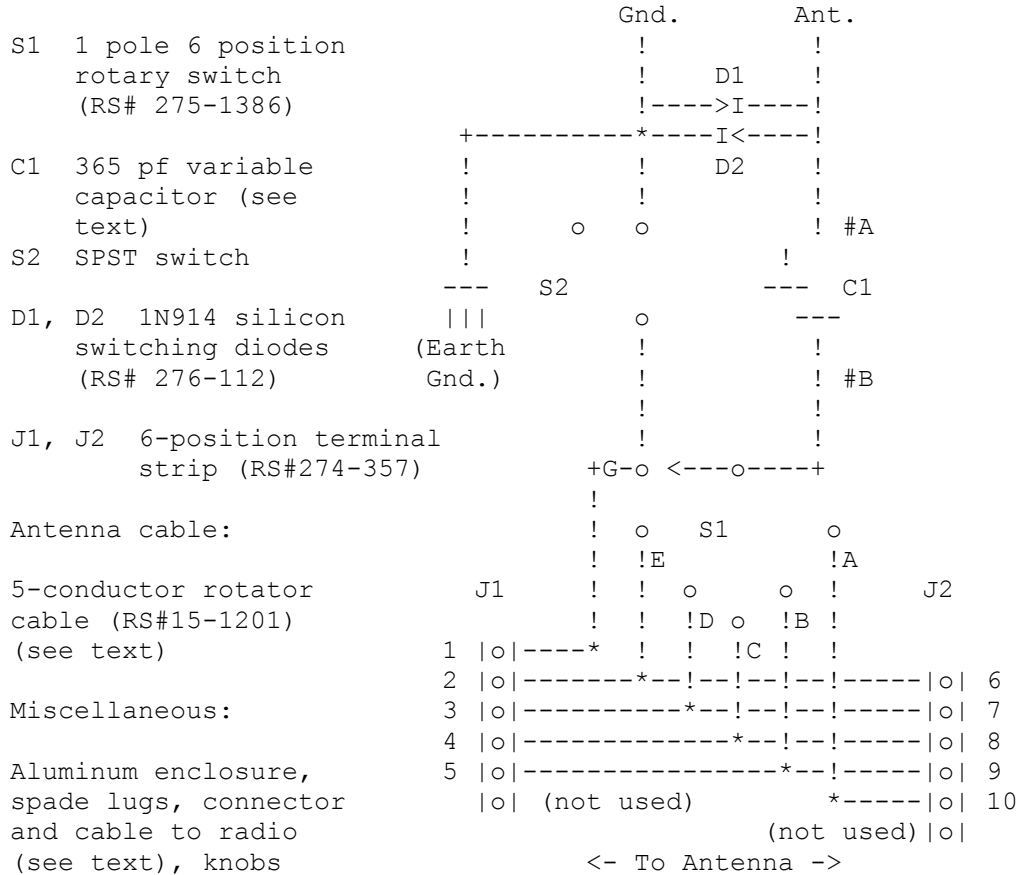
With the Carpet Loop (which was then just the cable), the interference was almost completely gone. Also, the signals I was receiving seemed to be just a little bit stronger. A year later, I built the tuner, with much better results. I'm convinced I have the best possible antenna for my location.

If you're stuck in an apartment, if you have a portable like the Sony 2010, the Sangean 803A or the Radio Shack DX400 or 440, if you have a tabletop receiver, the Carpet Loop may be for you. It's cheap--around \$25 in parts from Radio Shack, \*much\* less if you shop around, and an excellent first project for the technically minded.

CARPET LOOP II

From Radio

SCHEMATIC AND PARTS LIST



Note on Schematic symbols:

- !
  - \*- means: Intersecting wires are connected
  - !
- !
  - !- means: Intersecting wires NOT connected
  - !

HOW IT WORKS

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S1, C1, and the antenna cable connected to J1 and J2 form an L-network; when S1 is switched between positions A through F, and C1's capacitance is varied, the impedance of the antenna system changes. When S1 and C1 are adjusted for best signal, the impedance between antenna and receiver is matched. D1 and D2 provide protection against static discharges. The G position of S1 grounds the antenna when not in use. S2 disconnects the ground from the antenna, making the antenna into a random wire.

TUNER CONSTRUCTION

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PARTS AVAILABILITY:

With the exception of C1, all parts for the tuner are readily available from Radio Shack. C1, the 365 pf variable capacitor, can be gotten out of an old radio.

SUBSTITUTIONS:

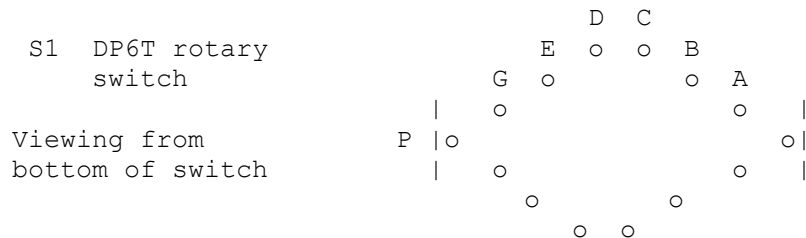
There are no critical parts in the tuner; as long as S1 has at least six positions, it will do. D1 and D2 can be any silicon diode. Use any enclosure that's big enough to comfortably install components in.

The choice for J3, the jack to the receiver, depends on what connector your radio uses for an external antenna. I used an SO-239 (RS #278-201); you could also use a TV antenna terminal strip (RS#274-663).

STEP-BY-STEP INSTRUCTIONS:

1) Mount the components on the enclosure you'll be using--all wiring is point to point. I suggest mounting J1 and J2 on opposite sides, S1 and C1 on top, and J3 on the other end of the enclosure.

2) Wire S1 to J1 and J2. If you use the Radio Shack DP6T rotary switch, you'll be using just one of the poles. The diagram of the switch is below:



Wire as follows:

(Note: If you're using the Radio Shack terminal strip, you will need to drill a hole in the cabinet to pass the wires through from inside. Use a rubber grommet to keep the wires from fraying)

S1 Term.	--to-->	J1 term.	J1 term.	--to-->	J2 term.
A		#1	#2		#6
B		#2	#3		#7
C		#3	#4		#8
D		#4	#5		#9
E		#5			

Connect a wire from J2 terminal #10 to the G terminal on S1, and this step is done.

3) Install and wire C1. Connect one terminal of C1 to the P terminal on S1. Connect the other end to J3. If using the SO239 or

phono jack, connect to the center conductor. If using screw terminals, connect to terminal #1 on J3. Skip ahead to step 5.

4) Connect the P terminal of S1 to J3. If you're using the SO239 or phono jack, connect to the center conductor. If you're using screw terminals, connect to terminal #1 on J3.

5) Connect the G terminal on S1 to J3. Connect it to the ground shield if it's an SO239 or phono jack, or to terminal #2 if it's screw terminals.

6) Connect D1 and D2 across J3's terminals; remember that D2 is connected opposite of D1.

That completes construction of the tuner.

#### ANTENNA CONSTRUCTION

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#### CHOOSING CABLE:

The kind of cable you use depends on where you're putting it and how much you want to pay for the cable.

If you plan on running it under carpet, then use the 5-conductor rotator cable mentioned in the parts list. This cable can easily withstand being stepped on; more importantly, there are no exposed wires to trip over. It's also easier to wire than phone cable.

If you're not running it underfoot, or if you're cheap, you can use 4-conductor flat phone cable, available nearly everywhere. It's a good choice for running around baseboards, around windows or in attics.

When running the cable around, start at your receiver and go around the room--or the house--and back to the radio. If you're using the rotator cable, you can make corners by folding the cable at a 45 degree angle, like folding paper.

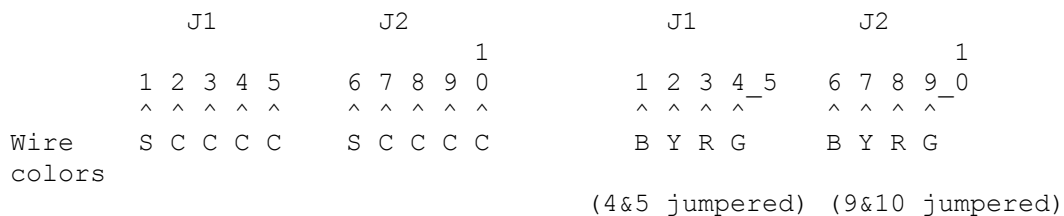
#### WIRING THE CABLE TO THE TUNER:

You should have two ends of the cable next to the tuner. Strip the ends and put spade lugs on all the wires. With the rotator cable, mark the \*silver\* conductor.

Next, connect the wire to the tuner using the following diagrams:

FOR 5-CONDUCTOR ROTATOR CABLE

FOR 4-CONDUCTOR PHONE CABLE



((S)ilver, (C)opper, (B)lack, (Y)ellow, (R)ed, (G)reen)

GROUNDING:

Run a wire--preferably a large one--from the ground terminal on the tuner (or a mounting screw on the SO239 connector if you're using one) to a suitable ground such as a cold water pipe; I grounded my tuner with a short length of RG58 coax connected to a baseboard heater via an alligator clip.

Connect the tuner to your receiver; you are now ready to use it.

USING THE CARPET LOOP

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It's easier to use than to talk about: Tune your receiver to the desired frequency. Adjust S1 and C1 (or the antenna trimmer on the radio) for strongest signal. For most situations, S2 (Loop/Longwire) can be left closed in the Loop position; you may find that setting S2 to Longwire may work better for mediumwave listening.

CONCLUSION

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The Carpet Loop II is an inexpensive, easily built, high performance antenna that can work in almost all apartments.

CONTACTING THE AUTHOR

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I can be reached at the following addresses:

Mail: David Moisan  
86 Essex St. Apt. #204  
Salem, MA 01970-5225

Fidonet: David Moisan, 1:101/165  
Internet: dmoisan@pro-angmar.alfalfa.com  
or moisan@silver.lcs.mit.edu

Your comments and suggestions are welcome.





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Subject: COMB6 - USER MANUAL  
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When you run the program, you'll be asked for link parameters; in particular, COMB6 will ask:

TRANSMITTER NAME: <The name of the Transmitter Site, only for your information>

RECEIVER NAME: < " " " Receiving Site " " " ">  
>

ENTER TX LATITUDE, IN DEGREES.MINUTES (N +, S -)

<You must enter the geographical latitude of the TRANSMITTER; for the northern emisphere, the sign is positive; for the southern emisphere, the sign is negative>

ENTER TX LONGITUDE, IN DEGREES.MINUTES (W +, E -)

<You must enter the geographical longitude of the TRANSMITTER; longitudes west of Greenwich (UK) have a positive sign (e.g. Usa); east of Greenwich the sign if negative (e.g. USSR)>

ENTER RX LATITUDE, IN DEGREES.MINUTES (N +, S -)

<You must enter the geographical latitude of the RECEIVER; for the northern emisphere, the sign is positive; for the southern emisphere, the sign is negative>

ENTER RX LONGITUDE, IN DEGREES.MINUTES (W +, E -)

<You must enter the geographical longitude of the RECEIVER; longitudes west of Greenwich (UK) have a positive sign (e.g. Usa); east of Greenwich the sign if negative (e.g. USSR)>

After this, COMB6 will calculate and display on the screen the DISTANCE between transmitter and receiver and the BEARING (angle from the North) with respect to the TRANSMITTER.

Afterwards you'll be asked for:

ENTER MONTH (1-12): <This is the month you want the predictions for>

ENTER SUNSPOT NUMBER: <The mean montly sunspot number, CRITIC for predictions>

COMB6 will evaluate the lowest order F-Layer mode (the minimum number of "jumps" on the F-Layer requested to connect the two sites) and the angle of elevation (from the horizont) for the transmitting and receiving antennas. After, it will ask:

TRANSMITTER POWER IN KW : <The power of the transmitter, in Kw >

The unabsorbed field strenght at the receiving site will then be displayed;

this is the theoretical maximum signal you'll experience at your site, in the hypothesis there is no attenuation from the E and D layers.

To go on with calculations, you'll have to type C (& Return) and then you can choose if you want to:

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ENTER UNIVERSAL TIME IN HOURS    <Prediction for a sigle hour of day>
FOR EVERY EVEN HOUR TYPE  25     <Predictions for all even hours: 0, 2, 4,
etc.)
FOR EVERY ODD  HOUR TYPE  26     <Predictions for all odd  hours  1, 3, 5,
etc.)
To EXIT TYPE 27                 <Quit COMB6 and return to BASIC>
```

Please note: you'll NOT be asked for frequency, since COMB6 makes predictions for ALL broadcasting bands, from 75 up to 11 Meters Band. You can easily modify this, anyway.

----- END OF HANDBOOK ----

Note: COMB6.EXE uses NO graphics, so no matter what kind of display you have. You MUST HAVE A PRINTER, since the propagation predictions are routed to it.

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Michele D'Amico ("StarFighter")           E-Mail: DAMICO@IPMEL1.POLIMI.IT
Viale C. Colombo, 107
Foggia 71100 ITALY                         "May the cube be with you"
Tel. (+39) 2-26823352 (Home)
Tel. (+39) 2-23993596 (Office - Politecnico di Milano - Electronic Depart.)
FAX  (+39) 2-23993413 ( " " " " )
=====
=
```



Subject: Ham Related Files from buffalo.edu

1750m.txt Yes there is a 1750 Meter band

amprcord.txt AMPRNet IP address coordinators as of 15 December 1992

antenna.txt QST Bibliography of Antenna Articles

arrl fo.txt ARRL Appointment Descriptions

arrlinfo.txt ARRL Information Service (info@arrl.org)

ca pd fr.txt California Police Radio Frequencies

carpet2.txt Indoor Under-Carpet Loop Antenna

comb6.txt COMB6 - USER MANUAL

dxccck2di.txt DXCC List from K2DI

elements.txt Acceptable evidence of Element Credit for w/HF privileges

elmers.txt Elmers on Internet

elmers 1.txt Elmers on Internet List

exam ops.txt AMATEUR RADIO EXAMINATION OPPORTUNITIES

faq ham1.txt Ham Radio Frequently Asked Questions (FAQ) (1 of 3)

faq ham2.txt for FTP - Ham Radio FAQ (2 of 3)

faq ham3.txt for FTP - Ham Radio FAQ (3 of 3)

faq pkt.txt Frequently Asked Questions

faqshort.txt Shortwave Listening FAQ

fcc9136.txt Text of FCC PR Docket 91-36 (FCC Scanner regs)

florida.txt Florida State Antenna Law

guidnwsgr.txt Guide to Ham Radio Newsgroups on Internet

ham sat.txt Summary - Getting onto the Hamsats

hams net.txt Hams on Internet - List

hamstak.txt Mac HamStacks for Exams

handicap.txt Handicapped/disabled exemptions

hf rigs.txt Summary of Data from QST Reviews of Amateur HF Transceivers

ht info.txt HT Comparisons

introscn.txt Intro to scanning

j poles.txt TV Twin-lead J-pole design

leadbatt.txt Re: Safety of auto battery for power?

mailshop.txt List of Mail Order Electronics Companies

manuals.txt Mototola & GE Manuals

mfgrs.txt Ham gear manufacturers addresses and phone numbers

nasa tv.txt NASA SELECT rebroadcast frequencies

newbies.txt NEWCOMER'S GUIDE TO AMATEUR RADIO EQUIPMENT

newpkt.txt Packet Note Usage Guidelines

phonebbs.txt List of Ham Radio Related BBS's

pio info.txt ARRL Public Information Officer's Handbook

pktgate.txt Packet-to-Internet Gateways

pktmisc.txt Misc Packet Info 92-Aug-15

pktsoft.txt Packet Software Versions 92-Aug-15

plates.txt Amateur Radio Callsign License Plates

qslburo1.txt THE ARRL INCOMING QSL BUREAU SYSTEM

qslburo2.txt Re: Do QSL bureaus actually work?

qst prod.txt List of QST Product Reviews

rftips.txt Re: Ham Radio Interference from Neighbor

rprrmaps.txt The Electronic Repeater Mapping Project

solterat.txt GLOSSARY OF SOLAR-TERRESTRIAL TERMS

sstv fax.txt SSTV Modes and Info

test a.txt Advanced License Exam Questions

test e.txt Extra License Exam Questions

test g.txt General License Exam Questions

test n.txt Novice License Exam Questions

test t.txt Technician License Exam Questions



Date: Mon, 1 Mar 93 13:02 EST  
From: wmb@joplin.att.com  
To: bowen@cs.Buffalo.EDU  
Subject: DXCC List from K2DI

The current ARRL DXCC country list follows. Changes from the previous posting (10/91) include re-ordering ("numeric" prefixes first); the addition of Croatia (9A), Slovenia (S5) and Bosnia-Herzegovina (4N4); the inclusion of "likely" new countries (Macedonia 4N5, Czech Republic OK, Slovenia OM); and other minor modifications.

This list is available via

- occasional Usenet posting.
- ftp from ftp.cs.buffalo.edu (as pub/ham-radio/dxcc-k2di).
- email from the ARRL Information Service -- send a message containing the line "send dxcc-k2di" to info@arrl.org.

Much of the information was provided by Ron McConnell, W2IOL. His detailed geographical listing will also be available via ftp from ftp.cs.buffalo.edu, and from info@arrl.org ("send dxcc-w2iol-inst", "send dxcc-w2iol-a-p", "send dxcc-w2iol-q-z").

Thanks also to Hugh, G0CNR, and Fran, PT2TD, for their input.

The colon-separated fields are:

1. primary amateur prefix
  - "\*" suffix for deleted countries
  - "@" suffix for likely new countries
2. country name
3. continent(s)
4. ITU zone(s)
5. CQ zone(s)
6. time zone (hours from UTC)
7. latitude
8. longitude
9. ITU prefix allocation(s) ("~" suffix for unofficial)
10. other amateur prefixes

Please mail corrections and suggestions to me.

Bill Brelsford, K2DI  
AT&T, Basking Ridge NJ  
wmb@joplin.att.com  
03/01/93

-----  
:(ICAO)::::::::::4Y:  
:(WMO)::::::::::C7:  
1A0:SMO Malta:Eu:28:15:+1:42N:13E:1A~:  
1M\*:Minerva Reef:Oc:62:32:-12:24S:179W::  
1S:Spratly Is:As:50:26:+7:9N:112E:1S~:  
3A:Monaco:Eu:27:14:+1:44N:8E:3A:  
3B6:Agalega & St Brandon:Af:53:39:+4:10S:57E::3B7  
3B8:Mauritius:Af:53:39:+4:20S:58E:3B:  
3B9:Rodriguez Is:Af:53:39:+4:20S:63E::  
3C:Equatorial Guinea:Af:47:36:-1:4N:9E:3C:  
3C0:Pagalu:Af:52:36:-1:1S:6E::



3D2:Conway Reef:Oc:56:32:+12:22S:175E::  
3D2:Fiji:Oc:56:32:+12:18S:178E:3DN-3DZ:  
3D2:Rotuma:Oc:56:32:+12:13S:177E::  
3DA:Swaziland:Af:57:38:+2:26S:31E:3DA-3DM:3D6  
3V:Tunisia:Af:37:33:+1:37N:10E:3V, TS:  
3W:Vietnam:As:49:26:+7:11N:107E:3W, XV:  
3X:Guinea:Af:46:35:+0:10N:14W:3X:  
3Y:Bouvet:Af:67:38:+0:54S:3E::  
3Y:Peter I:An:72:12:-6:69S:91W::  
4J1:Malyj Vysotskij Is:Eu:29:16:+3:61N:29E::  
4K2:Franz Josef Land:Eu:75:40:+3:81N:48E::UA1  
4N4:Bosnia-Hercegovina:Eu:28:15:+1:44N:18E::  
4N5@:Macedonia:Eu:28:15:+1:42N:21E::  
4S:Sri Lanka:As:41:22:+5.5:7N:80E:4P-4S:  
4U:ITU Geneva:Eu:28:14:+1:46N:6E::  
4U:UN HQ:NA:08:05:-5:41N:74W:4U:  
4W\*:Yemen Arab Rep:As:39:21:+3:15N:44E::  
4X:Israel:As:39:20:+2:32N:35E:4X, 4Z:  
5A:Libya:Af:38:34:+2:33N:13E:5A:  
5B:Cyprus:As:39:20:+3:35N:33E:5B, C4, H2, P3:  
5H:Tanzania:Af:53:37:+3:7S:39E:5H-5I:  
5N:Nigeria:Af:46:35:+1:6N:3E:5N-5O:  
5R:Madagascar:Af:53:39:+3:19S:48E:5R-5S, 6X:  
5T:Mauritania:Af:46:35:-1:18N:16W:5T:  
5U:Niger:Af:46:35:+1:14N:2W:5U:  
5V:Togo:Af:46:35:+0:6N:1E:5V:  
5W:Western Samoa:Oc:62:32:-11:14S:172W:5W:  
5X:Uganda:Af:48:37:+3:0N:33E:5X:  
5Z:Kenya:Af:48:37:+3:2S:37E:5Y-5Z:  
6W:Senegal:Af:46:35:+0:15N:18W:6V-6W:  
6Y:Jamaica:NA:11:08:-5:18N:77W:6Y:  
7O:Yemen:As:39:21:+3:13N:45E:7O:  
7O\*:PDR Yemen:As:39:21:+3:13N:45E::  
7P:Lesotho:Af:57:38:+2:29S:27E:7P:  
7Q:Malawi:Af:53:37:+2:14S:34E:7Q:  
7X:Algeria:Af:37:33:+0:37N:3E:7R, 7T-7Y:  
8P:Barbados:NA:11:08:-4:13N:60W:8P:  
8Q:Maldives:As, Af:41:22:+5:4N:73E:8Q:  
8R:Guyana:SA:12:09:-3.75:6N:58W:8R:  
8Z4\*:S Arabia/Iraq NZ:As:39:21:+3:29N:46E::  
8Z5\*:Kuwait/S Arabia NZ:As:39:21:+3:29N:48E::9K3  
9A:Croatia:Eu:28:15:+1:45N:16E:9A:  
9G:Ghana:Af:46:35:+0:5N:0W:9G:  
9H:Malta:Eu:28:15:+1:36N:15E:9H:  
9J:Zambia:Af:53:36:+2:15S:28E:9I-9J:  
9K:Kuwait:As:39:21:+3:29N:48E:9K:  
9L:Sierra Leone:Af:46:35:+0:9N:13W:9L:  
9M2:Malaysia:As:54:28:+7.5:3N:102E:9M, 9W:9M4  
9M6:East Malaysia:Oc:54:28:+8:2N:110E::9M8  
9N:Nepal:As:42:22:+5.5:28N:85E:9N:  
9Q:Zaire:Af:52:36:+1:4S:15E:9O-9T:  
9S4\*:Saar:Eu:28:14:+1:49N:7E::  
9U:Burundi:Af:52:36:+3:3S:29E:9U:  
9U5\*:Ruanda-Urundi:Af:52:36:+3:3S:30E::  
9V:Singapore:As:54:28:+7.5:1N:104E:9V, S6:  
9X:Rwanda:Af:52:36:+3:2S:30E:9X:  
9Y:Trinidad & Tobago:SA:11:09:-4:11N:62W:9Y-9Z:

A1:Abu Ail, Jabal at Tair:As:39:21:+2:14N:43E:A1~:J2/A  
A2:Botswana:Af:57:38:+2:25S:26E:80,A2:  
A3:Tonga:Oc:62:32:+13:21S:175W:A3:  
A4:Oman:As:39:21:+4:24N:59E:A4:  
A5:Bhutan:As:41:22:+5.5:27N:90E:A5:  
A6:United Arab Emirates:As:39:21:+4:24N:54E:A6:  
A7:Qatar:As:39:21:+4:25N:52E:A7:  
A9:Bahrain:As:39:21:+4:26N:51E:A9:  
AC3\*:Sikkim:As:41:22:+5.5:27N:89E::  
AC4\*:Tibet:As:41:23:+6:30N:92E::  
AP:Pakistan:As:41:21:+5:34N:73E:6P-6S,AP-AS:  
BV:Taiwan:As:44:24:+8:25N:122E::  
BY:China:As:33,42,43,44:23,24:+8:40N:116E:3H-3U,BA-BZ,XS:  
C2:Nauru:Oc:65:31:+11.5:0S:167E:C2:  
C3:Andorra:Eu:27:14:+1:43N:2E:C3:  
C5:Gambia:Af:46:35:+0:13N:17W:C5:  
C6:Bahamas:NA:11:08:-5:25N:77W:C6:  
C9:Mozambique:Af:53:37:+2:26S:33E:C8-C9:  
C9\*:Manchuria:As:33:24:+8.5:46N:127E::  
CE:Chile:SA:14,16:12:-4:33S:71W:3G,CA-CE,XQ-XR:  
CE0X:San Felix:SA:14:12:-5:26S:80W::  
CE0Y:Easter Is:SA:63:12:-7:27S:109W::  
CE0Z:Juan Fernandez:SA:14:12:-4:34S:79W::  
CE9:Antarctica:An:67,69,70,71,72,73,74:12,13,29,30,32,38,39:+0:90S:0W::3Y,4K1,  
8J1,AT0,DP0,FT\_Y,KC4,LU\_Z,OR4,VK0,VP8,Y8,ZL5,ZS7,ZX0  
CN:Morocco:Af:37:33:+0:34N:7W:5C-5G,CN:  
CN2\*:Tangier:Af:37:33:+0:36N:8W::  
CO:Cuba:NA:11:08:-5:23N:82W:CL-CM,CO,T4:  
CP:Bolivia:SA:12,14:10:-4:17S:68W:CP:  
CR8\*:Damao, Diu:As:41:22:+5.5:21N:71E::  
CR8\*:Goa:As:41:22:+5.5:16N:74E::  
CR8\*:Portuguese Timor:Oc:54:28:+8:9S:126E::  
CT:Portugal:Eu:37:14:+1:39N:9W:CQ-CU,XX:  
CT3:Madeira Is:Af:36:33:-1:33N:17W::  
CU:Azores:Eu:36:14:-1:38N:26W::CT2  
CX:Uruguay:SA:14:13:-3:35S:56W:CV-CX:  
CY0:Sable Is:NA:09:05:-5:44N:60W::  
CY9:St Paul Is:NA:09:05:-5:47N:60W::  
D2:Angola:Af:52:36:+1:9S:13E:D2-D3:  
D4:Cape Verde:Af:46:35:-2:15N:23W:D4:  
D6:Comoros:Af:53:39:+3:12S:43E:D6:  
DL:Germany:Eu:28:14:+1:52N:7E:DA-DR,Y2-Y9:  
DL\*:Germany:Eu:28:14:+1:52N:7E::  
DU:Philippines:Oc:50:27:+8:15N:121E:4D-4I,DU-DZ:  
EA:Spain:Eu:37:14:+1:40N:4W:AM-AO,EA-EH:  
EA6:Balearic Is:Eu:37:14:+1:38N:3E::  
EA8:Canary Is:Af:36:33:+0:28N:15W::  
EA9:Ceuta & Melilla:Af:37:33:+1:36N:5W::  
EA9\*:Ifni:Af:37:33:+0:29N:10W::  
EI:Ireland:Eu:27:14:+0:53N:6W:EI-EJ:  
EL:Liberia:Af:46:35:-0.75:6N:11W:5L-5M,6Z,A8,D5,EL:  
EP:Iran:As:40:21:+3.5:36N:51E:9B-9D,EP-EQ:  
ES:Estonia:Eu:29:15:+2:59N:25E:ES:UR  
ET:Ethiopia:Af:48:37:+3:9N:39E:9E-9F,ET:  
ET2\*:Eritrea:Af:48:37:+3:15N:39E::  
F:France:Eu:27:14:+1:49N:2E:FA-FZ,HW-HY,TH,TK,TM,TO-TQ,TV-TX:  
FF\*:French W Africa:Af:46:35:+0:15N:18W::

FG:Guadeloupe:NA:11:08:-4:16N:62W::  
FH:Mayotte:Af:53:39:+3:13S:45E::  
FH\*:Comoros:Af:53:39:+3:12S:43E::FB8  
FI8\*:Fr Indo China:As:49:26:+7:11N:107E::  
FK:New Caledonia:Oc:56:32:+11:22S:167E::  
FM:Martinique:NA:11:08:-4:15N:61W::  
FN8\*:French India:As:41:22:+5.5:12N:80E::  
FO:Clipperton Is:NA:10:07:-7:10N:109W::  
FO:French Polynesia:Oc:63:32:-10:18S:150W::  
FP:St Pierre & Miquelon:NA:09:05:-4:47N:56W::  
FQ8\*:Fr Equatorial Africa:Af:47,52:36:+1:5N:18E::  
FR:Glorioso Is:Af:53:39:+3:12S:47E::  
FR:Juan de Nova, Europa:Af:53:39:+3:17N:43E::  
FR:Reunion:Af:53:39:+4:21S:55E::  
FR:Tromelin:Af:53:39:+4:16S:54E::  
FS:St Martin:NA:11:08:-4:18N:63W::FJ  
FT\_W:Crozet:Af:68:39:+3:46S:52E::  
FT\_X:Kerguelen Is:Af:68:39:+5:50S:70E::  
FT\_Z:Amsterdam & St Paul Is:Af:68:39:+5:38S:78E::  
FW:Wallis & Futuna Is:Oc:62:32:-10.5:14S:172W::  
FY:French Guiana:SA:12:09:-4:5N:52W::  
G:England:Eu:27:14:+0:52N:0W:2A-2Z, GA-GZ, MA-MZ, VP-VS, ZB-ZJ, ZN-ZO, ZQ:2E  
GD:Isle of Man:Eu:27:14:+0:54N:4W::2D  
GI:No Ireland:Eu:27:14:+0:55N:6W::2I  
GJ:Jersey:Eu:27:14:+0:49N:2W::2J  
GM:Scotland:Eu:27:14:+0:57N:2W::2M  
GU:Guernsey:Eu:27:14:+0:49N:3W::2U  
GW:Wales:Eu:27:14:+0:52N:3W::2W  
H4:Solomon Is:Oc:51:28:+11:9S:160E:H4:  
HA:Hungary:Eu:28:15:+1:48N:19E:HA, HG:  
HB:Switzerland:Eu:28:14:+1:47N:7E:HB, HE:  
HB0:Liechtenstein:Eu:28:14:+1:47N:10E::  
HC:Ecuador:SA:12:10:-5:0N:79W:HC-HD:  
HC8:Galapagos Is:SA:12:10:-5:1S:90W::  
HH:Haiti:NA:11:08:-5:19N:72W:4V, HH:  
HI:Dominican Rep:NA:11:08:-5:18N:70W:HI:  
HK:Colombia:SA:12:09:-5:5N:74W:5J-5K, HJ-HK:  
HK0:Malpelo Is:SA:12:09:-5:4N:82W::  
HK0:San Andres & Providencia:NA:11:07:-6:13N:82W::  
HK0\*:Bajo Nuevo:NA:11:08:-5:16N:79W::  
HK0\*:Serrana Bnk, Roncador Cay:NA:11:07:-5:14N:80W::KP3, KS4  
HL:So Korea:As:44:25:+9:38N:127E:6K-6N, DS-DT, D7-D9, HL:  
HP:Panama:NA:11:07:-5:9N:80W:3E-3F, HO-HP, H3, H8-H9:  
HR:Honduras:NA:11:07:-6:14N:87W:HQ-HR:  
HS:Thailand:As:49:26:+6:14N:101E:E2, HS:  
HV:Vatican:Eu:28:15:+1:42N:13E:HV:  
HZ:Saudi Arabia:As:39:21:+3:25N:47E:8Z, HZ, 7Z:  
I:Italy:Eu:28:15:+1:42N:12E:IA-IZ:  
I1\*:Trieste:Eu:28:15:+1:46N:14E::  
I5\*:Ital Somaliland:Af:48:37:+3:2N:46E::  
IS:Sardinia:Eu:28:15:+1:39N:9E::  
J2:Djibouti:Af:48:37:+3:12N:43E:J2:  
J3:Grenada:NA:11:08:-4:12N:62W:J3:  
J5:Guinea-Bissau:Af:46:35:-1:12N:16W:J5:  
J6:St Lucia:NA:11:08:-4:14N:61W:J6:  
J7:Dominica:NA:11:08:-4:15N:61W:J7:  
J8:St Vincent:NA:11:08:-4:13N:61W:J8:

JA:Japan:As:45:25:+9:36N:140E:7J-7N,8J-8N,JA-JS:  
JD:Minami Torishima:Oc:45/90:27:+10:24N:154E::  
JD:Ogasawara:As:45:27:+10:28N:142E::  
JD1\*:Okino Tori-shima:As:45:27:+10:30N:140E::7J1  
JT:Mongolia:As:32,33:23:+7.5:48N:107E:JT-JV:  
JW:Svalbard:Eu:18:40:+1:78N:16E::  
JX:Jan Mayen:Eu:18:40:-1:71N:9W::  
JY:Jordan:As:39:20:+2:32N:36E:JY:  
JZ0\*:Neth New Guinea:Oc:51:28:+10:10S:147E::  
K:United States:NA:06,07,08:03,04,05:-5:39N:77W:AA-AL,KA-KZ,NA-NZ,WA-WZ:  
KC6:Belau:Oc:64:27:+10:7N:134E::  
KG4:Guantanamo Bay:NA:11:08:-5:20N:75W::  
KH0:Mariana Is:Oc:64:27:+10:15N:146E::  
KH1:Baker & Howland Is:Oc:61:31:-12:0N:176W::  
KH2:Guam:Oc:64:27:+10:13N:145E::  
KH3:Johnston Is:Oc:61:31:-11:17N:170W::  
KH4:Midway Is:Oc:61:31:-11:28N:177W::  
KH5:Palmyra, Jarvis Is:Oc:61,62:31:-11:6N:162W::  
KH5K:Kingman Reef:Oc:61:31:-11:6N:162W::  
KH6:Hawaii:Oc:61:31:-10:21N:158W::  
KH7:Kure Is:Oc:61:31:-11:29N:178W::  
KH8:Am Samoa:Oc:62:32:-11:14S:171W::  
KH9:Wake Is:Oc:65:31:+12:19N:167E::  
KL7:Alaska:NA:01,02:01:-8:58N:134W::  
KP1:Navassa Is:NA:11:08:-5:18N:75W::  
KP2:Virgin Is:NA:11:08:-4:18N:65W::  
KP4:Puerto Rico:NA:11:08:-4:18N:66W::  
KP5:Desecheo Is:NA:11:08:-4:18N:68W::  
KR6\*:Okinawa (Ryukyu):As:45:25:+8:26N:128E::KR8, JR6, KA6  
KS4\*:Swan Is:NA:11:07:-6:17N:84W::  
KZ5\*:Canal Zone:NA:11:07:-5:9N:80W::  
LA:Norway:Eu:18:14:+1:60N:11E:3Y, JW-JX, LA-LN:  
LU:Argentina:SA:14,16:13:-3:35S:58W:AY-AZ, LO-LW, L2-L9:  
LX:Luxembourg:Eu:27:14:+1:50N:6E:LX:  
LY:Lithuania:Eu:29:15:+2:55N:25E:LY:UP  
LZ:Bulgaria:Eu:28:20:+2:43N:23E:LZ:  
OA:Peru:SA:12:10:-5:12S:78W:4T,OA-OC:  
OD:Lebanon:As:39:20:+2:34N:36E:OD:  
OE:Austria:Eu:28:15:+1:48N:16E:OE:  
OH:Finland:Eu:18:15:+2:60N:25E:OF-OJ:  
OH0:Aland Is:Eu:18:15:+2:60N:20E::  
OJ0:Market Reef:Eu:18:15:+2:60N:19E::  
OK:Czechoslovakia:Eu:28:15:+1:50N:15E::  
OK@:Czech Republic:Eu:28:15:+1:50N:16E:OK-OL:  
OM@:Slovakia:Eu:28:15:+1:49N:20E:OM:  
ON:Belgium:Eu:27:14:+1:51N:4E:ON-OT:  
OX:Greenland:NA:05,75:40:-3:64N:52W::XP  
OY:Faroe Is:Eu:18:14:+0:62N:7W::  
OZ:Denmark:Eu:18:14:+1:56N:13E:5P-5Q,OU-OZ,XP:  
P2: Papua New Guinea:Oc:51:28:+10:10S:147E:P2:  
P2\*: Papua Terr:Oc:51:28:+10:10S:147E::VK9  
P2\*: Terr New Guinea:Oc:51:28:+10:10S:147E::VK9  
P4:Aruba:SA:11:09:-4:13N:70W:P4:  
P5:No Korea:As:44:25:+9:39N:126E:HM,P5-P9:  
PA:Netherlands:Eu:27:14:+1:52N:5E:PA-PI:  
PJ2:Neth Antilles:SA:11:09:-4:12N:69W:PJ:PJ4,PJ9  
PJ5:St Maarten, Saba, St Eus:NA:11:08:-4:18N:63W::PJ6-8

PK1\*:Java:Oc:54:28:+7.5:6S:107E::PK2-3  
PK4\*:Sumatra:Oc:54:28:+7:1S:100E::  
PK5\*:Netherlands Borneo:Oc:54:28:+8:3S:115E::  
PK6\*:Celebe & Molucca Is:Oc:54:28:+8:5S:119E::  
PY:Brazil:SA:12,13,15:11:-3:16S:48W:PP-PY,ZV-ZZ:  
PY0F:Fernando de Noronha:SA:13:11:-2:4S:32W::  
PY0P:St Peter & St Paul Rocks:SA:13:11:-2:0N:29W::  
PY0T:Trindade & Martin Vaz Is:SA:15:11:-2:21S:29W::  
PZ:Surinam:SA:12:09:-3.5:6N:55W:PZ:  
S0:Western Sahara:Af:37:33:+0:27N:13W:S0~:  
S2:Bangladesh:As:41:22:+6:24N:90E:S2-S3:  
S5:Slovenia:Eu:28:15:+1:46N:14E:S5:  
S7:Seychelles:Af:53:39:+4:5S:55E:S7:  
S9:Sao Tome & Principe:Af:47:36:+0:0N:7E:S9:  
SM:Sweden:Eu:18:14:+1:59N:18E:7S,8S,SA-SM:  
SP:Poland:Eu:28:15:+1:52N:21E:3Z,HF,SN-SR:  
ST:Sudan:Af:48:34:+2:16N:33E:6T-6U,SSN-SSZ,ST:  
ST0:Southern Sudan:Af:48:34:+2:5N:32E::  
SU:Egypt:Af,As:38:34:+2:31N:31E:6A-6B,SSA-SSM,SU:  
SV:Greece:Eu:28:20:+2:38N:24E:J4,SV-SZ:  
SV5:Dodecanese:Eu:28:20:+2:36N:28E::  
SV9:Crete:Eu:28:20:+2:36N:24E::  
SY:Mt Athos:Eu:28:20:+2:40N:24E::SV1/A  
T2:Tuvalu:Oc:65:31:+12:9S:179E:T2:  
T30:West Kiribati:Oc:65:31:+12:1S:173E::  
T31:Central Kiribati:Oc:62:31:+12:4S:171W:T3:  
T32:East Kiribati:Oc:61,63:31:+12:2N:158W::  
T33:Banaba:Oc:65:31:+11.5:1S:170E::  
T5:Somalia:Af:48:37:+3:2N:46E:6O,T5:  
T7:San Marino:Eu:28:15:+1:44N:12E:T7:  
TA:Turkey:As, Eu:39:20:+2:40N:33E:TA-TC,YM:  
TF:Iceland:Eu:17:40:0:64N:22W:TF:  
TG:Guatemala:NA:11:07:-6:16N:92W:TD,TG:  
TI:Costa Rica:NA:11:07:-6:10N:84W:TE,TI:  
TI9:Cocos Is:NA:11:07:-6:6N:87W::  
TJ:Cameroon:Af:47:36:+1:4N:12E:TJ:  
TK:Corsica:Eu:28:15:+1:42N:9E::  
TL:Central African Rep:Af:47:36:+1:5N:19E:TL:  
TN:Congo:Af:52:36:+1:4S:15E:TN:  
TR:Gabon:Af:52:36:+1:1N:10E:TR:  
TT:Chad:Af:47:36:+1:12N:15E:TT:  
TU:Ivory Coast:Af:46:35:+0:5N:4W:TU:  
TY:Benin:Af:46:35:+0:6N:3E:TY:  
TZ:Mali:Af:46:35:+0:13N:8W:TZ:  
UA:Russia:Eu:19,20,29,30:16:+3:56N:37E:4J-4L,EK,EM-EO,ER,EX-EZ,RA-RZ,UA-UQ,UU-  
UZ:  
UA2:Kaliningrad:Eu:29:15:+2:55N:21E::  
UA9:Russia  
(Asiatic):As:20,21,22,23,24,25,26,30,31,32,33,34,35,75:16,17,18,19,23:+7:52N:1  
04E::UA0  
UB:Ukraine:Eu:29:16:+2:50N:30E:UR-UT:  
UC:Belarus:Eu:29:16:+2:54N:28E:EU-EW:  
UD:Azerbaijan:As:29:21:+4:40N:50E::  
UF:Georgia:As:29:21:+4:42N:45E::  
UG:Armenia:As:29:21:+4:40N:45E::  
UH:Turkmenistan:As:30:17:+5:38N:58E::  
UI:Uzbekistan:As:30:17:+6:41N:69E::

UJ:Tajikistan:As:30:17:+6:39N:69E::  
UL:Kazakhstan:As:29,30,31:17:+5.5:43N:77E::  
UM:Kyrgyzstan:As:30,31:17:+6:43N:75E::  
UN1\*:Karelo-Finnish Rep:Eu:19:16:+3:64N:32E::  
UO:Moldova:Eu:29:16:+3:47N:29E::  
V2:Antigua, Barbuda:NA:11:08:-4:17N:62W:V2:  
V3:Belize:NA:11:07:-5.5:17N:89W:V3:  
V4:St Kitts, Nevis:NA:11:08:-4:17N:63W:V4:  
V5:Namibia:Af:57:38:+2:22S:17E:V5:  
V6:Micronesia:Oc:65:27:+11:7N:158E:V6:KC6  
V7:Marshall Is:Oc:65:31:+12:7N:171E:V7:KX6  
V8:Brunei:Oc:54:28:+8:5N:115E:V8:  
VE:Canada:NA:02,03,04,09,75:01,02,03,04,05:-5:45N:76W:CF-CK,CY-CZ,VA-VG,VO,VX-  
VY,XJ-XO:  
VK:Australia:Oc:55,58,59:29,30:+10:35S:149E:AX,VH-VN,VZ:  
VK0:Heard Is:Af:68:39:+5:53S:73E::  
VK0:Macquarie Is:Oc:60:30:+11:54S:159E::  
VK9C:Cocos-Keeling Is:Oc:54:29:+6.5:12S:97E::VK9Y  
VK9L:Lord Howe Is:Oc:60:30:+10:31S:159E::  
VK9M:Mellish Reef:Oc:56:30:+10:17S:156E::VK9Z  
VK9N:Norfolk Is:Oc:60:32:+11.5:29S:168E::  
VK9W:Willis Is:Oc:55:30:+10:16S:150E::VK9Z  
VK9X:Christmas Is:Oc:54:29:+7:10S:106E::  
VO\*:Newfoundland, Labrador:NA:09:02,05:-3.5:48N:53W::  
VP2E:Anguilla:NA:11:08:-4:18N:63W::  
VP2M:Montserrat:NA:11:08:-4:17N:62W::  
VP2V:Br Virgin Is:NA:11:08:-4:18N:65W::  
VP5:Turks & Caicos Is:NA:11:08:-5:22N:72W::  
VP8:Falkland Is:SA:16:13:-4:52S:58W::  
VP8:So Georgia Is:SA:73:13:-1.5:54S:37W::LU\_Z  
VP8:So Orkney Is:SA:73:13:-3:61S:45W::LU\_Z  
VP8:So Sandwich Is:SA:73:13:-3:59S:27W::LU\_Z  
VP8:So Shetland Is:SA:73:13:-4:62S:59W::LU\_Z,CE9,HF0,4K1  
VP9:Bermuda:NA:11:05:-4:32N:65W::  
VQ1\*:Zanzibar:Af:53:37:+3:7S:39E::5H1  
VQ6\*:British Somaliland:Af:48:37:+3:2N:46E::  
VQ9:Chagos:Af:41:39:+5:7S:72E::  
VQ9\*:Aldabra:Af:53:39:+4:9S:46E::  
VQ9\*:Desroches:Af:53:39:+4:6S:55E::  
VQ9\*:Farquhar:Af:53:39:+4:10S:51E::  
VR2:Hong Kong:As:44:24:+8:22N:114E::VS6  
VR6:Pitcairn Is:Oc:63:32:-8.5:25S:130W::  
VS2\*:Malaya:As:54:28:+7.5:3N:102E::9M2  
VS4\*:Sarawak:Oc:54:28:+8:2N:110E::  
VS9H\*:Kuria Muria Is:As:39:21:+4:18N:56E::  
VS9K\*:Kamoran Is:As:39:21:+3:15N:43E::7O  
VU:India:As:41:22:+5.5:29N:77E:8T-8Y,AT-AW,VT-VW:  
VU7:Andaman & Nicobar Is:As:49:26:+5.5:12N:93E::  
VU7:Laccadive Is:As:41:22:+5.5:11N:73E::  
XE:Mexico:NA:10:06:-6:20N:99W:4A-4C,6D-6J,XA-XI:  
XF4:Revilla Gigedo:NA:10:06:-7:18N:113W::  
XT:Burkina Faso:Af:46:35:+0:12N:2W:XT:  
XU:Cambodia:As:49:26:+8:12N:105E:XU:  
XW:Laos:As:49:26:+7:20N:102E:XW:  
XX9:Macao:As:44:24:+8:22N:114E::  
XZ:Myanmar (Burma):As:49:26:+6.5:17N:96E:XY-XZ:  
Y2\*:East Germany:Eu:28:14:+1:53N:13E::Y3-Y9

YA:Afghanistan:As:40:21:+4.5:35N:69E:T6, YA:  
YB:Indonesia:Oc:51, 54:28:+7.5:6S:107E:7A-7I, 8A-8I, JZ, PK-PO, YB-YH:  
YI:Iraq:As:39:21:+3:32N:45E:HN, YI:  
YJ:Vanuatu:Oc:56:32:+11:18S:168E:YJ:  
YK:Syria:As:39:20:+2:34N:36E:6C, YK:  
YL:Latvia:Eu:29:15:+2:57N:24E:YL:UQ  
YN:Nicaragua:NA:11:07:-6:12N:87W:HT, H6-H7, YN:  
YO:Romania:Eu:28:20:+2:45N:26E:YO-YR:  
YS:El Salvador:NA:11:07:-6:14N:89W:HU, YS:  
YU:Yugoslavia:Eu:28:15:+1:45N:20E:4N-4O, YT-YU, YZ:  
YV:Venezuela:SA:12:09:-4:10N:67W:4M, YV-YY:  
YV0:Aves Is:NA:11:08:-4:16N:64W::  
Z2:Zimbabwe:Af:53:38:+2:18S:31E:Z2:  
ZA:Albania:Eu:28:15:+1:41N:20E:ZA:  
ZB:Gibraltar:Eu:37:14:+1:37N:5W::  
ZC:Cyprus SBA:As:39:20:+2:36N:33E::  
ZC5\*:Br No Borneo:Oc:54:28:+8:6N:116E::  
ZC6\*:Palestine:As:39:20:+2:32N:35E::4X1  
ZD4\*:Gold Coast, Togoland:Af:46:35:+0:5N:0W::  
ZD7:St Helena:Af:66:36:+0:16S:6W::  
ZD8:Ascension Is:Af:66:36:0:8S:14W::  
ZD9:Tristan da Cunha & Gough Is:Af:66:38:0:37S:12W::  
ZF:Cayman Is:NA:11:08:-5:19N:81W::  
ZK1:No Cook Is:Oc:62, 63:32:-10.5:10S:161W::  
ZK1:So Cook Is:Oc:63:32:-10.5:22S:158W::  
ZK2:Niue:Oc:62:32:-11:19S:170W::  
ZK3:Tokelau Is:Oc:62:31:-11:9S:171W::  
ZL:New Zealand:Oc:60:32:+12:41S:175E:ZK-ZM:  
ZL7:Chatham Is:Oc:60:32:+12.75:44S:177W::  
ZL8:Kermadec Is:Oc:60:32:+12:29S:178W::  
ZL9:Auckland, Campbell Is:Oc:60:32:+12:51S:166E::  
ZP:Paraguay:SA:14:11:-4:26S:57W:ZP:  
ZS:So Africa:Af:57:38:+2:26S:28E:H5~, S4~, S8~, V9~, ZR-ZU:  
ZS0:Penguin Is:Af:57:38:+2:27S:15E::  
ZS8:Pr Edward & Marion Is:Af:57:38:+3:47S:38E::  
ZS9:Walvis Bay:Af:57:38:+2:23S:15E::  
~~\*:Blenheim Reef:Af:41:39:+5:7S:72E::  
~~\*:Geyser Reef:Af:53:39:+3:12S:46E::

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From: bjahnke%arrlhq.UUCP@uhasun.hartford.edu (Bart Jahnke)  
Newsgroups: rec.radio.amateur.policy  
Subject: Acceptable evidence of Element Credit for w/HF privileges  
Date: 3 Dec 91 12:17:43 GMT  
Article-I.D.: arrlhq.332  
Organization: American Radio Relay League  
Lines: 139

Many of you have shared your concerns in this newsgroup regarding what is considered acceptable evidence of Element Credit held/possessed toward any upgrade(s) you are seeking; and how will/does the FCC know the difference between the two types of Technician licensees.

Since we work closely with the FCC, here's what the FCC requires of us--the ARRL/VEC.

#### ELEMENT CREDIT

As provided in Section 97.505 of the FCC Rules, VEs must give credit to an examinee holding any of the following documents:

1. An unexpired (or expired but within the grace period [there is a 5 year grace period for 5-year licenses and a 2 year grace period for 10-year licenses]) FCC-issued amateur operator license: The least elements required for the license held. For a Technician class operator license issued BEFORE March 21, 1987, credit must also be given for Element 3(B) [the 25 question General class written examination].
2. A CSCE: Each element the CSCE indicates the examinee passed within the previous 365 days.
3. A photocopy of an FCC Form 610 which was submitted to the FCC indicating that the examinee qualified for a Novice class operator license within the previous 365 days: Elements 1A and 2.
4. An unexpired (or expired less than 5 years) FCC-issued commercial RadioteleGRAPH operator license or permit: Element 1(C).
5. A current, or expired but within the grace period for renewal, Novice, Technician plus a CSCE indicating that the person passed Element 1(A) or 1(B). Technician issued before February 14, 1991. General, or Advanced Class operator license, and a Form 610 containing:
  - (i) A physician's certification stating that because the person is an individual with a severe handicap, the duration of which extends for more than 365 days beyond the date of certification, the person is unable to pass a 13 or 20 words per minute telegraphy examination; and
  - (ii) A release signed by the person permitting disclosure to the FCC of medical information pertaining to the person's handicap: Element 1(C).

Also, per instruction 5 on the Instructions To Form 610 for Technician, General, Advanced and Amateur Extra class to examiners: Element 1A or 2 credit is acceptable for 365 days as documented on an ORIGINAL Form 610

for an unsuccessful Novice operator examination indicating either Element 1A or Element 2 was passed (see also November 1991 QST--Exam Info).

#### DOCUMENTATION

##### Lost Licenses

The FCC currently will not allow VECs to submit upgrade applications to them without attaching a copy of the applicant's current FCC-issued license held.

For those who have lost their original license, and have no copy, a replacement license or FCC Form 1010-B license verification letter must be obtained by the applicant and presented to the VE Team at the test session (or to the VEC after the session) in order for the upgrade application to be forwarded to the FCC. The Form 1010-B verification letter serves as a valid FCC license for operating or upgrading purposes-- and will arrive in about two weeks. The replacement license will take closer to four weeks for receipt. The Form 1010-B verification of license letter can be requested by calling the FCC at (717) 337-1212.

##### Licenses Which Convey Element Credit

As described in Item 1 (Element Credit) above, Technician licensees who have passed the old Element 3 Technician/General examination prior to March 21, 1987, must present the original or a copy of the Technician license carrying the pre-3/21/87 begin date to the VE Team in order to receive credit for the current Element 3(B) General class written examination.

If the original (or copy of) a pre-3/21/87 license has been lost or thrown away, then a suitable verification must be obtained from the FCC. In order to receive the necessary verification document from the FCC, write them at 1270 Fairfield Rd, Gettysburg, PA 17325-7245, and request a letter of VERIFICATION OF TECHNICIAN CLASS LICENSE HELD PRIOR TO 3/21/87. That letter may be a special letter carrying the signature of an FCC Staff member, or it can be a Form 1010-B Verification Letter.

Although some VECs, including the ARRL/VEC, do have access to a copy of the FCC's data base which includes licensing data prior to 3/21/87, as we have gotten farther away from that date, verifications have become nearly impossible for us to accomplish. The FCC, on the other hand, will make their verifications from their permanent archives--and not from their current (active) data base.

##### TECHNICIANS WHO HAVE HF PRIVILEGES

Although the FCC has chosen not to identify or distinguish codeless Technicians differently from Technicians who have HF privileges, the FCC does know who is who.

A data base of Technician class licensees who have earned HF privileges is being maintained by the National Conference of VECs, and information on each Technician licensee with HF privileges is being made

available to the FCC.

Of course, any Technician class licensee who was licensed prior to February 14, 1991, does have HF privileges--and the VEC Conference data base reflects this. New Technicians licensed after that date who subsequently pass a Morse code examination at a VEC-coordinated examination--as documented on a VE Team-issued Certificate of Successful Completion of Examination (CSCE); or a Novice licensee who have upgraded to Technician; have also been added to the Technician w/HF privileges data base.

Although perhaps not immediately, the FCC does have access to Technician w/HF privileges licensee information and is able to determine which Technicians do, or do not, have HF privileges--and are able to conduct enforcement where necessary.

Should you have any further questions regarding examination or upgrade requirements, please feel free to contact me at the ARRL/VEC at:

bjahnke%arrlhq.UUCP@uhasun.hartford.edu

Or at:

ARRL/VEC, 225 Main Street, Newington, CT 06111

Tel: (203) 666-1541

73,

Bart J. Jahnke, KB9NM  
Manager  
ARRL/VEC



From pschleck@cwis.unomaha.edu Sun Jan 31 16:00:54 1993  
Subject: Elmers on Internet  
To: bowen@cs.Buffalo.EDU

This administrivia file and the companion Amateur Radio Elmers Resource Directory are intended for non-commercial distribution via Usenet. Any other uses, please E-mail for permission.

A Brief Historical Overview:  
+++++

If there is any one constant in the changing state of the communications art, it is that "Hams" (Amateur Radio Operators) have always been on the forefront of it. Rumors abound where the term "Ham" came from. Some of the more amusing are described at the end of this article.

Regardless of origin of the name, a "Ham" is universally recognizable as one who experiments in radio and communications.

Whether it be constructing a low-power CW radio with vacuum tubes, or designing TCP/IP packet networks, such experimentation has historically spilled over into the mainstream such as was the case with Edwin Armstrong, who developed the regenerative oscillator and FM radio, or General Curtis LeMay (W6EZV) who was instrumental in making Single-Sideband the communications standard for the Strategic Air Command (1947-1992, now reorganized into a joint command called StratComm) and eventually the U.S. Air Force. Although packet-switching techniques originated from DARPA (Defense Advanced Research Projects Agency) and the ARPANet, no one can deny the tremendous influence that amateurs have had in demonstrating the viability of TCP/IP and AX.25 communications via radio links. The efforts of AMSAT (the Amateur Satellite Corporation), including the development of many ham satellites and the low-orbiting Microsats (communications satellites no bigger than a breadbox that use store-and forward packet techniques), have certainly advanced the state-of-the-art in communications, one of the defined purposes of the Amateur Radio Service, as recognized by international treaty.

Since in many cases hams are writing "the book", there is often no "book" or other established reference for a beginner to refer to. Traditionally, information has been passed on from ham to ham via word-of-mouth. Like many of the traditional crafts, a variation of the Master-Apprentice system has emerged, the Elmer-Novice relationship. Called "Elmers" because they are usually older and wiser, having the benefit of many years in the hobby, including several failed projects, and an electric shock or two, they have traditionally been the mainstay of amateur radio, and the source of many new hams, particularly those interested in working on emerging technologies.

Even more importantly, Elmers provided an outlet for the impatient newcomer who wanted "to know everything, and right away." Faced with such a request, a good Elmer will smile and proceed to lead the novice through some project or operating experience. Several hours, days, or weeks later, the novice would have his answers, but would have earned them. Even better, the sense of accomplishment would boost the novice's confidence and nudge him or her down the road to being a model,

experienced ham operator.

Many present hams feel that such an experience is missing today. In today's hustle-bustle world, the response to such natural curiosity and desire to learn is, more often than not, "I'm too busy" or "RTFM." As a result, the quality of new hams declines and the knowledge and operating habits they develop in their first formative months and years leave much to be desired. And the very same hams who claim that they "can't understand the new generation" also, in almost the same breath, lament about the "decline of amateur radio."

What is an Elmer today?

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An Elmer today is of any age, male or female, who has some expertise and is willing to share it with beginners. Elmers don't even need to be licensed amateurs, just people with knowledge in some area of electronics or communications technology.

What is a Usenet Elmer?

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With the ever-widening scope of the Internet, and the amateur radio newsgroups on Usenet, the potential for Elmers to share their knowledge to a wide audience has never been greater. To that end, I have started to maintain a list of such Elmers. Volunteers need only send me their name, E-mail address, and area of expertise. I have set up an administrivia mailbox for this purpose (elmers-request@unomaha.edu, the default Reply-To: of this message).

Those desiring a more extensive list, or who need more specific assistance, are encouraged to contact Rosalie White, WA1STO, Educational Services Manager at the American Radio Relay League, 225 Main St., Newington, CT 06111 or via electronic mail addressed to rwhite@arrl.org.

How may I obtain the latest copy of the Elmers List?

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There are currently 4 ways of obtaining the Elmers List. Any site at least reachable by Internet E-mail can use options 3 or 4:

1. Usenet News: The latest copy of the list can be found in the companion posting to this message, "Amateur Radio Elmers Resource Directory." Since the list is cross-posted to rec.radio.amateur.misc, rec.radio.info, rec.answers, and news.answers on the 1st of each month, with an expiration date 6 weeks into the future, there should always be a copy available at most news sites. Check your newsreader documentation for information about reading previously-read articles.

2. Anonymous FTP: If your site is directly connected to the Internet, you may retrieve the latest copy via File Transfer Protocol (FTP) from the following sites:

ftp.cs.buffalo.edu /pub/ham-radio/elmers\*  
pit-manager.mit.edu /pub/usenet/news.answers/radio/ham-radio/elmers/\*

3. Mailing-List: Since the list is cross-posted to rec.radio.info, the latest copy may be obtained from the mailing-list gateway for that newsgroup (along with many other informational articles about radio) when it is published each month. To subscribe, send E-mail to:

listserv@ucsd.edu

and in the BODY (not the Subject) of the message, write:

subscribe radio-info

The server may not be able to determine your return address. In that case write:

subscribe radio-info (your E-mail address)

You should get an acknowledgement very shortly.

4. Mail-Server: If you don't want to read through the entire gateway of rec.radio.info, or want a copy of the list right away, send E-mail to:

mail-server@pit-manager.mit.edu

and in the BODY (not the Subject) of the message, write:

send usenet/news.answers/radio/ham-radio/elmers/admin  
send usenet/news.answers/radio/ham-radio/elmers/list  
send usenet/news.answers/radio/ham-radio/elmers/diff

and the latest copy of the list should be sent to you E-mail within 24 hours (the mail-server uses batch priority to reduce system demand).

How may I contribute to the Elmers List?  
+++++

By using this resource, you are benefitting the net by obtaining assistance in the fastest and most efficient way possible. By volunteering to appear on this list, you are contributing to the good reputation of the radio-related newsgroups.

Thanks to all the volunteer Elmers, as well as courteous list users, for making this service a success.

--  
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu (personal mail)  
elmers-request@unomaha.edu (Elmers List administrivia)

\* Possible origins of the word HAM:

The acronym "Home Amateur Mechanic" or...

from the Cockney pronunciation of "L'amateur" or...

the initials of the founder of the American Radio Relay League, Hiram

Maxim, W1AW (his actual middle name being Percy apparently notwithstanding) or...

from the call letters of one of the first amateur stations at Harvard, H.A.M. (please, no flames from W1XM at MIT)

Dale Mosby, N7PEX, offers the explanation that HAM must stand for "Hardly Any Money," considering the investment one could make in the hobby.

Knowledgeable individuals from the American Radio Relay League (ARRL), and other radio historians, seem to agree that the terms "Ham" and "Lid" (an inept operator) both originated with landline telegraphy. A "Ham" was a show-off and a "Lid" was a telegraph operator so inexperienced, he had to use a pot or can lid to rest his telegraph sounder on to properly copy the code.

As an interesting historical footnote, early telegraph operators may have been the first to experience the infamous curse of our communications age, Repetitive Stress (or "Carpal Tunnel") Syndrome (called "Glass Arm" in those days, which encouraged the invention of the semi-automatic or "bug" key).

(Larry E. McDonald, N6ZMB, wrote to point out another plausible origin, which doesn't necessarily contradict the ARRL version. The term "ham" may have been derived from "ham-fisted" or "ham-handed" to describe poor telegraph operators who were hired from the ranks of radio operators. Or maybe "ham-fisted" and "ham-handed" are derived from "ham." Who knows?)





From pschleck@cwis.unomaha.edu Mon Feb 1 07:01:00 1993  
To: bowen@cs.Buffalo.EDU, sjl@glenbrook.com  
Subject: Elmers on Internet List

More information about this list can be found in the companion posting to this file, "Amateur Radio Elmers List Info and Administrivia."

73, Paul, KD3FU

Quick Search Index by Subject:

(Note: This index is not necessarily all-inclusive and some Elmers are listed more than once.)

AMATEUR RADIO EMERGENCY SERVICE  
(ARES)/RADIO AMATEUR CIVIL  
EMERGENCY SERVICE (RACES)

Chilton (EMA Radio Officer)  
Humphries  
Magid  
Stader (EMAS DEC)  
Wilson

AMATEUR TELEPRINTER OVER RADIO  
(AMTOR)/RADIO TELETYPE (RTTY)

Appell  
Doane  
Graham  
Sayer (also decoding CHU's  
ASCII time code)

AMERICA ON-LINE

Stader (Host,  
Ham Radio Club forum)

AMERICAN RADIO RELAY LEAGUE  
(ARRL)

Bloom (ARRL HQ Postmaster,  
QEX Editor)  
Doane (CT SM)  
Elmore (CO TC)  
Hare (Laboratory Manager)  
Jahnke (VEC Manager)  
Lau (Technical Editor)  
Redding (Educational Advisor)  
Schleck (NE TS)  
Stader (EMAS DEC)  
Turner (Volunteer Counsel)  
Wilson (SCV SM)

ANTENNAS

INTERNET SERVICES

Schleck

MARS

Doane (Navy)  
Miller (Air Force)  
Taylor (Air Force)

MICROWAVE

Graham (1.2 Ghz repeaters)  
Jahnke (SSB/CW SHF Contesting)  
Lau (Transverters up to  
24 Ghz)

MOBILE

Carruth (FM and HT's)  
Hare (RFI issues)  
Humphries  
Keller (HF)  
Salmon (Maritime)  
Salyzyn (HF CW)

NATIONAL TRAFFIC SYSTEM (NTS)

Doane  
Elmore  
Salyzyn

NOVICE/TECH INSTRUCTION

Billson  
Bono (AutoExam/AutoCW)  
Carlson (Macintosh Hamstacks)  
Chilton  
Larson  
Magid  
Maia  
Myers (including basic

Brewer (wire HF)	electronics and communications
Billson (HF)	theory)
Brubaker (HF)	Redding
Elmore	Reeves
Halbert (simple designs)	Salmon
Myers (and transmission lines)	Stader
Ornitz (including computer modelling)	PACKET
Potter	Angus (TCP/IP, NOS, UUPC, Tnet, and SNEWS, IP Coordinator for CA - LA and SF Valley subnet)
Salnick	Bloom (IP Coordinator for Connecticut subnet)
Salyzyn	Braun (TCP/IP and Macintosh)
Sefranek	Cole (TCP/IP and NOS)
Stockton	Elmore (including TCP/IP)
Taylor	Graham (VHF)
	Salyzyn (Canadian)
ANTIQUA AND OLDER EQUIPMENT	Sayer (VHF)
Keys (including HF and CW)	Schallehn (Kantronics)
Moore (VHF)	Stader (TCP/IP and Macintosh)
Turner (including Kenwood and Ten-Tec)	
	PART-15 BROADCASTING
APPLE MACINTOSH COMPUTER	Ornitz
Braun	POWER SUPPLIES
Carlson (Macintosh Hamstacks)	Myers
Stader	Sefranek
BATTERIES	Stuart
Meyers	CALLSIGN PROJECT/NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)
Stuart	PRODUCT INFO/FEEDBACK
	Appell
CALLSIGN PROJECT/NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)	Shirley (Advanced Computer Controls - ACC)
Carruth (et al)	PUBLICATION/WRITING
CIVIL AIR PATROL (CAP)	Bloom (QEX)
Carlson	Lau (QST/QEX)
COLLEGE CLUBS	QRP (LOW POWER)
Edwards	Billson
Schallehn	Halbert (HF)
Schleck	Stockton
CW (MORSE CODE)	Turner (including Ten-Tec Argonaut)
Bono (AutoCW)	RADIO FREQUENCY INTERFERENCE (RFI)
Elmore	Elmore
Keys	Graham (including PC's)
Salyzyn	
Squicciarini	
Stockton	

Tescher (Computer Programs)	Hare (including Automotive)
DIGITAL SIGNAL PROCESSING (DSP)	Myers
	Stockton
	Witte
Bloom	
Edwards	RECIPROCAL LICENSING/FOREIGN OPERATION
EQUIPMENT TESTING/TROUBLESHOOTING	Flaherty (South Pacific)
	Salmon
Billson	Salyzyn (Canada)
Brewer (Tube Gear)	Stockton (UK)
Hare (ARRL Laboratory Manager)	
Myers	REPEATERS
Ornitz (Instrumentation)	De Armond
Salnick	Graham (including 1.2 Ghz)
Salyzyn	Keller (220 Mhz)
Stockton	Schallehn (VHF/UHF)
Taylor	Witte
Tescher	
Witte (Instrumentation)	SATELLITES
FREQUENTLY ASKED QUESTIONS (FAQ's)	Chilton (including SAREX)
	Flaherty (including OSCAR)
Bloom (ARRL E-mail and Info Server)	
Jahnke (VE Exams Scheduled)	SEMINARS/LECTURES
Kluft (General)	Humphries
Salyzyn (Hams on Usenet, rec.radio.info Moderator)	Redding
Watt (Packet, On-Line Repeater Directory)	Stuart (Batteries and Power Supplies)
HANDICAPPED OPERATING	
	TANDY COLOR COMPUTER AND OS-9
Billson	Billson
Doane	
HF/CONTESTING/DX	TELEVISION, FAST-SCAN (ATV)
	Chilton
Brubaker	TELEVISION, SLOW-SCAN (SSTV)
Chilton	Langner
Elmore	
Salmon (including DXpeditions)	UNIX
Salnick	
Squicciarini	Carruth (System Administration)
Tidd (DXCC Databases)	Cole (including Linux)
	Sayer (especially SunOS)
HOME BREWING/DO-IT-YOURSELF	Tescher
Billson (6809 uP)	VHF/UHF
Bloom (including DSP)	Carpenter (6 meters)
Carruth (Digital Design, Software)	Flaherty (including Amplifiers)
Chilton	Graham (Commercial Rig Conversions)
De Armond	
Edwards (including DSP)	
Halbert (QRP)	
Keys (Junk Box projects)	

Kohnen (Tubes)  
Lau (Transverters, VHF/UHF,  
Filters, repeatable projects)  
Myers (Transmission Lines,  
Analog and Digital Design)  
Moore (Junk Box projects)  
Salyzyn  
Sefranek (Power Supples and  
Microcontrollers)  
Stockton (including QRP)  
Stuart (Batteries and Power  
Supplies)  
Taylor (Tubes and Amplifiers)  
Tescher

IBM PERSONAL COMPUTER (PC)

Angus  
Bono (AutoExam, et al)  
Braun  
Cole  
Keller  
Tescher

Humphries  
Jahnke (CW/SSB Contesting and  
Weak Signal)  
Lau (CW/SSB to 222 Mhz)  
Moore  
Witte (including Portable  
and Mountaintopping)

VOLUNTEER EXAMINER (VE) PROGRAM

Billson  
Carlson (W5YI)  
Jahnke (ARRL VEC Manager)  
Kohnen (W5YI)  
Maia (W5YI VEC)  
Reeves  
Salmon (Sunnyvale)

Amateur Radio Elmers Resource Directory (as of 02/01/93)

+++++

Jeff Angus WA6FWI

jangus@skyld.sr.com

I run NOS as a tcp/ip <--> AX.25 mail bbs gateway. I also run a few nodes,  
soon to replace with Tnet-xlg on one and a PC NOS-switch on the other.  
And, I have successfully installed UUPC/extended 1.11k and SNEWS for those  
MS-DOS affectionados out there.

ampr.org IP Coordinator for California - Los Angeles and San Fernando  
Valley subnet (44.016.xxx.xxx)

"We're here to help, we don't loan tools" (Just kidding....put me on the  
list). Monday-Thursday 8 AM to 9 PM Pacific time, Friday 8 am to 5 pm.

--

xenon!skyld!jangus < This space left blank intentionally. >  
PO Box 4425, Carson CA 90749-4425 voice (310) 324-6080

+++++

Jay Appell --> KA1SNA

1976-1978 FCC Personal Users Radio Advisory Committee  
Task force for Rules Rewrite Citizens Radio Service  
Rules interpretation

Currently work for Stratus Computers/Technical Support Engineering

Address: Jay\_Appell@cac.stratus.com  
Telephone: 1-800-458-0042 X2548

I enjoy Amtor, RTTY, and SCA reception.

If you would like to leave me mail by modem, use the BBS 1 Hopedale Center at 508-478-6969. This is a new amateur BBS running from 7AM to 7PM EDST. The board usually runs beyond 9PM daily. Until I can get another server, online times will vary. We honor modems running 9600 baud/MNP 5.

Discussion groups have been setup for all ham radio vendors. Comments shared on this BBS will be conveyed to the ham radio company referenced in the forum. This platform will make companies aware of how the amateur radio community feels about their products. Please indicate otherwise if you don't want the comment forwarded.

+++++

Bob Billson, KC2WZ	Internet: bob@kc2wz.bubble.org
21 Bates Way	UUCP: ...!uunet!kc2wz!bob
Westfield, NJ 07090	
908-232-2603 (evenings)	

Advanced (since 1975)	Troubleshooting
Homebrewing	C and 6809 uP programming
Antennas (particularly HF)	Volunteer Examiner
Digital Communications	QRP

OS-9 operating system (UUCP is run on my Tandy Color Computer 3 :-)

10m is my favorite band even when it is "dead".

Member of Handi-Hams. Work as an Interpreter for the Deaf (I am hearing).

Interested in helping \*any\* would-be ham get their ticket. Ham Radio is a great(!) hobby and should not kept a secret!

+++++

Jon Bloom, KE3Z	jbbloom@arrl.org
American Radio Relay League	Justice is being allowed to do whatever
225 Main St.	I like. Injustice is whatever prevents
Newington, CT 06111	my doing so. -- Samuel Johnson

Postmaster, ARRL HQ (arrl.org)  
QEX Editor  
Digital Signal Processing (DSP)  
ampr.org IP Coordinator for Connecticut subnet (44.088.xxx.xxx)

Collecting information for the next annual ARRL Computer Networking Conference.

For information about the ARRL info server, send E-mail to info@arrl.org with the word "HELP" in the message body.

+++++

/\*  
\* Rich Bono IMRICH UUCP:rbono@necis.ma.nec.com \*  
\* (508) 635-6300 NM1D AMPR: nm1d@nm1d.nh.usa.noam \*  
\*/

Author of the following MS-DOS ham programs:

- AutoExam - Examination simulator and study aid
- AutoCW - Morse Code practice program
- DOSGATE - allows users to run programs on your PC remotely (AutoExam compatible)
- AutoCall - Allows use of the Buckmaster HAMCALL CD-ROM online callbook with DOSGATE
- AutoFax - Allows reception of weather fax using Kantronics TNC's
- SeeSats - Real time satellite tracking (text only), DOSGATE compatible

Most of these programs are available from wuarchive.wustl.edu under /mirrors/msdos/hamradio or write me at:

7 Red Field Circle  
Derry, NH 03038

and enclose:

A FORMATTED high density diskette (either 1.44 MB or 1.2 MB; 3.5" or 5.25").

A Self Addressed STAMPED return diskette mailer.

A note explaining that you want a copy of AutoExam and/or AutoCW (or one of the other programs).

I am always receptive to individuals interested in maintenance, enhancements, and non-commercial distribution for these shareware programs.

+++++

Curtis Braun (curtis@computronics.com) (N2HKD)  
Computronics, POBOX 1002 Fairport, NY 14450  
Guest@Digital Telstar, Network Operations Center Kodak

Apple Macintosh, IBM-PC, and Sun Computers

I have extensive knowledge on Appletalk protocol down to the bit level. I have also worked with various iterations of MacTCP applications. (Routers, hubs, gateways, Ethernet, Localtalk, etc)

I am also familiar with the look and feel of the Mac OS, (Ver. 6 & 7), and its associated troubleshooting. I have some application experience with numerous programs. (including ARAP Apple remote dial-in stuff).

Hope to experiment with NOS and Baycom modem on a Mac+ soon.

+++++

John Brewer WB50AU

brewer@anarky.enet.dec.com

Wire antennas, restoration and operation/repair of tube gear.

+++++

Alan Brubaker, K6XO  
alan@dtd.es.com

HF Antenna Systems  
Contest Operating  
General HF Operations  
Propagation

+++++

Diana L. (Syriac) Carlson  
Hudson, NH  
dls@genrad.com  
KC1SP

QSL Bureaus (how to use them)  
Volunteer Examiner Service (how to become one)  
Macintosh Hamstacks (available from uxc.cso.uiuc.edu  
under /pub/ham-radio)  
Civil Air Patrol

+++++

Robert (Bob) Carpenter W3OTC  
rc@cmr.ncsl.nist.gov

6 meter SSB DX  
Central States VHF Society

"2m FM isn't ham radio, but it's a good way to contact radio amateurs."

Disclaimer: Opinions expressed are those of the sender  
and do not reflect NIST policy or agreement.

+++++

73 de Rusty Carruth, N7IKQ P.O. Box 27001, Tempe, AZ 85285  
(602) 870-3330 !'s:[ames!ncar!noao!asuvax,mcdphx]!anasaz!rusty  
's: rusty@anasazi.com LastResort: rusty%anasaz.UUCP@asuvax.eas.asu.edu  
Join the Usenet Un-Net: 1700-1900Z Saturdays, 28.410 or 28.390 MHz  
EEK! The 1992 Summer Callsign Project lives! Details: Fred.Lloyd@West.Sun.COM

I'm willing to act as a reference for anyone wanting info on getting  
tapes (especially Callsign tapes) from the Department of Commerce  
National Technical Information Service (NTIS) or wanting other info on  
callsign-project related stuff.

One of these days I'll actually be around for the un-net! I promise, really!

My job is currently System Administrator for a large Unix site so I know a



little bit about day-to-day Unix operations and Unix installation :-)  
I also have much experience with constructing email paths that will work rather than bounce.

I also have a fair amount of experience in hardware/software interfacing and machine control.

+++++

Ken Chilton  
KALTIH, Advanced Class  
27-6 Royal Crest Dr.  
Marlborough, MA 01752  
chilton@emc.com  
(508) 481-0038  
Design Engineer

Amateur Qualifications:

Trustee of the Algonquin Amateur Radio Club Repeaters:  
446.675 -- 223.86 -- 53.47  
Assistant Radio Officer for the City of Marlborough  
Emergency Management Agency  
Trained in Electronics Engineering, Electrical Engineering,  
Computer Sciences, Computer Programming, and Management  
Knowledgeable in Rules, Regs, and interpretations

Areas I am also interested:

Homebrewing  
Repeater Hardware, Control, Operation  
Packet (AX.25)  
Net Control Operations  
Electromagnetics and EMP  
HF SSB and CW operating  
Satellite and Shuttle operation  
Amateur Television  
Elmering new HAMS

+++++

Derrick C. Cole KC4WEJ

cole@concert.net

Anything having to do with PC's, DOS, Unix, Linux, C, NOS, TCP/IP et al is fair game. I'm not much help in the electrical/circuit department (but I am learning/applying, though! :) If you feel such information could be useful, I would of course offer any/all help I could provide.

+++++

John De Armond WD4OQC

jgd@dixie.com

Marietta, GA

Construction techniques, telemetry, repeater design and maintenance,

most aspects of circuit design.

+++++

Betsey Doane, K1EIC

Doane@CCSUA.CTStateU.Edu

I am Section Manager for CT and would be happy to help folks on packet operation (AX.25), NTS procedures, Amtor, General Field Organization, ARRL and Navy MARS. My real loyalty is to NTS! I am also a blind amateur radio op having been on the air for 31 years and can probably give a hand with regards to equipment or referrals to somebody if needed.

+++++

Thomas Edwards N3HAU

tedwards@wam.umd.edu

Technopagan Priest  
Member, University of Maryland ARA - W3EAX

Digital Signal Processing (DSP)  
Electrical and Electronics Engineering

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Kim Elmore, N5OP  
1103 South Gay Drive  
Longmont, CO 80501

elmore@brightband.rap.ucar.edu  
n5op@n5op.ampr.org

I'm the Technical Coordinator for the Colorado Section.  
Areas of expertise:

- RFI/EMI
- Antennas
- DX'ing
- Contesting
- HF propagation
- CW

Areas where I have enough knowledge to be dangerous:

- Troubleshooting
- Traffic Handling
- Homebrewing and construction practices

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Reciprocal Licensing (South Pacific)  
VHF (Propagation, Power Amplifiers)  
Satellites (Project Oscar)

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--Paul Flaherty, N9FZX/5W1JX | "The enemy of the good is the better."  
->paulf@Stanford.EDU | -- William "Wild Bill" Donovan

+++++

KJ6NN  
Philip Graham  
723 Berkshire Place  
Milpitas, CA 95035

EMAIL: phil@ncd.com

My skills are listed below in no special order

- PC RFI reduction (Wrote a chapter for the new ARRL RFI BOOK)
- Repeaters (How to put one up)
- Repeaters (How to use one, without making others mad)
- 1.2 GHz (My repeater is on this band)
- VHF packet only (I hate HF packet)
- HF DX
- HF AMTOR, RTTY, ASCII
- Putting up a tower and/or HF beam

+++++

Dan Halbert, KB1RT  
halbert@crl.dec.com

QTH: West Newton, MA, near Boston.

Building homebrew QRP gear.  
Information about QRP-NE Club.  
Advice on simple antennas.

+++++

Ed Hare, KA1CV | ehare@arrl.org  
American Radio Relay League |  
225 Main St. |  
Newington, CT 06111 |  
(203) 666-1541 - voice  
(203) 665-7531 - FAX  
ARRL Laboratory Engineer

Radio Frequency Interference (RFI) matters  
Equipment Testing

I want stories about automotive EMI problems, dealings with dealers,  
and, if possible, solutions. I plan to forward these to my contact at  
the Society of Automotive Engineers (SAE).

If anyone knows the \*right\* people at any particular company, I want  
to know. I am also pursuing (via the SAE) more official channels.

EMI/RFI Resource List and RFI Tips package available. A business  
SASE with 98 cents postage is appreciated. Electronic versions  
available soon. Please specify the desired documents in your  
correspondence.

Many amateur radio informational documents (including EMI/RFI files) are also available from the ARRL info server. Send E-mail to info@arrl.org with the word "HELP" in the message body.

+++++

Ed Humphries Texas Instruments, Inc. 512-250-6894  
N5RCK Internet ed.humphries@hub.dsg.ti.com

President, Williamson County (TX) ARC  
(Newly Appointed) Assistant Emergency Coordinator for  
Williamson County ARES/RACES

Advice on 2-meter FM  
VHF Antennas  
Mobile Installations  
Organizing Amateur Radio Seminars and Programs

+++++

Bart J. Jahnke, KB9NM | USENET: bjahnke@arrl.org  
Manager, ARRL Volunteer |  
Examiner Program | BIX: ARRL  
ARRL VEC Dept. | PRODIGY: MGTS39A (c/o Luck Hurder)  
225 Main St | MCI ID: 215-5052  
Newington, CT 06111 | CompuServe: 70007,3373  
Voice (203) 666-1541 | America On-Line: ARRL HQ  
FAX (203) 665-7531 |

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- \* Listings of Examination Opportunities -- bi-weekly postings
- \* Volunteer Examining procedures - ARRL VE Manual
- \* Support and Instruction for Volunteer Examiners - Coordinating Exams
- \* Member, National Conference of VECs Question Pool Committee
- \* Information on what's required to become an Amateur Radio licensee
- \* Contributing Editor - QST Magazine - Exam Info column
- \* On-the-air interests: VHF/UHF/SHF SSB/CW Weak Signal Operating and Contests

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Michael S. Keller AB5EL  
  
mkeller@flp.mhs.compuserve.com (work)  
71620.447@compuserve.com (personal, checked far less often)

Areas of particular knowledge:

PC-style computers  
Mobile installations (rearranging mobile HF right now)  
Repeaters (after a fashion--building a 1.25m repeater)

+++++

R.D. Keys  
  
Dept. of Crop Science  
NCSU

Raleigh, NC 27695-7620

rdkeys@csemail.cropsci.ncsu.edu

de NA4G, "Boat Anchor Bob", an ol' cw fart .....

If I can be of assistance in older equipment, junk-boxing your way to hamdom, the cheapskate's approach, let me know.

22 yrs a ham, extra class, mostly cw, mostly boat anchors and radio in the traditional sense.

[Telegraphy has been in my family for almost 100 years!]

+++++

Ian Klufft KD6EUI PP-ASEL Amdahl Corporation  
Internet: ikluft@uts.amdahl.com UTS Systems Software Division  
Packet Radio: kd6eui@n0ary.#nocal.ca.usa.na Santa Clara, CA  
[disclaimer: any opinions expressed are mine only - not those of my employer]

Maintainer of rec.radio.amateur.misc and rec.radio.cb FAQ lists

Please direct all FAQ submissions, feedback, and administrivia to hamradio-faq@uts.amdahl.com or cb-faq@uts.amdahl.com.

+++++

I'll be glad to help out with tube circuits and VE testing.  
(W5YI VE# 3182)

73,  
Louis J. Kohnen K2ANC  
Penfield, NY near Rochester

K2ANC.Wbst128@xerox.com

+++++

John Langner WB2OSZ  
115 Stedman St.  
Chelmsford, MA 01824-1823  
(508) 256 6907 (home - civilized times only please)  
johnl@avs.com

Slow-Scan Television

+++++

Alan Larson WA6AZP  
larson@net.com  
larson@w6yx.stanford.edu

My areas are fairly general, and I teach classes (Novice, with code, and upgrade sessions) at W6YX. My

main audience is to the Stanford (University)  
community.

+++++

Zack Lau KH6CP/1           Expertise: Design of SSB/CW amateur transceivers  
c/o ARRL Lab               : up to 222 MHz. Design of transverters  
Newington CT 06111        : up to 10.5 GHz. Basic lossy filter  
(203)-666-1541             : design. Developing repeatable projects  
zlau@arrl.org              : using cheap, easy to get parts.

I'm now starting to look into 24 GHz SSB/CW gear using 10 Ghz as a  
convenient IF.

Especially looking to help anyone wanting to be a QST/QEX  
author--I can't write it all myself!

+++++

Joel Magid WU1F

magid@wrksys.enet.com

ARES/RACES  
Novice Instruction  
General Theory

+++++

Fred O. Maia, W5YI

3511297@mcimail.com

P.O. Box 565101  
Dallas, TX 75356

1-(800)-669-9594

Volunteer Examiner Coordinator  
The W5YI Report  
License Exam Study Materials  
VE Exam Schedules Nationwide

+++++

Bob Myers KC0EW  
Hewlett-Packard Co.  
Ft. Collins, CO

myers@fc.hp.com

Antennas, Novice/Tech instruction, batteries, power supplies, RFI, equip.  
testing/troubleshooting, FAQs, homebrewing. Basic theory questions also  
welcome.

My particular interest is in antennas and transmission lines, but I'm  
also more than willing to answer whatever I can in general radio theory,

propagation, analog and digital electronics, etc.. (I'm a display engineer in "real life", have done my share of digital design, and have taught communication electronics at the local community college. I'm also active in some display and television standards activities.)

+++++

Jeffrey C. Miller, NH6ZW/N8, AFA1HE | The Air Force is  
AFIT School of Engineering | paying me to be a  
Wright-Patterson AFB, OH | student, not write this  
jmillier@afit.af.mil | or any other opinion!

USAF MARS

+++++

Tom Moore K1KAY

[no E-mail address at this time]

home phone: (508) 840-6843

QSX: Fitchburg 145.45 MHz  
Harvard 145.41 MHz  
6m AM 50.40 MHz

Junque-box specialties  
old conversions vhf-oriented  
shoulder to cry (or laugh) on

+++++

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| \_\_\_\_\_ | Dr. Barry L. Ornitz WA4VZQ  
| | / / | | Eastman Kodak Company  
| | / / | | Eastman Chemical Company Research Laboratories  
| |<< K O D A K | | Process Instrumentation Research Laboratory  
| | | | P. O. Box 1972, Building 167B  
| | \_\_\_\_\_ | | Kingsport, TN 37662 615/229-4904  
| | | | INTERNET: ornitz@kodak.com  
-----

Part 15 Low-Power Broadcasting

Antennas (including expertise in computer modelling using MININEC and NIST modelling programs)

Instrumentation (my profession)

+++++

Dave Potter, K1MBO

potter@think.com

electronics theory, regulations, antennas and  
transmission lines, operating practices.

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Terrence R. (Terry) Redding WB5LMJ

DOMAIN: terry%red@lawton.lonestar.org  
UUCP: . . . !rwsys!lawton!red!terry  
PACKET: WB5LMJ @ WB5MJS.OK.USA.NA  
Voice 405 536-8822, Ben's Place (Benjamin Franklin) BBS 536-6988 9p to 6a  
PhD candidate, University of Oklahoma in Adult and Higher Education  
Educational Advisor, American Radio Relay League  
221 SW Crystal Hills Drive, Lawton, Oklahoma 73505

I am primarily an adult educator conducting research in self-directed learning. I have been involved in the following activities:

- Teach licensing classes, since 1974.
- Organize clubs, Stuttagrt Amateur Radio Club, Panama Canal Astronomy Club, Lawton Astronomy Club.
- Public speaking and publish on growth in volunteer organizations, marketing adult and higher education and teaching amateur radio courses.
- Research in adult learning theory, adult motivation and organizational theory.
- Conducted a SAREX activity that involve seven communities, 21 schools and 3,000 children.

I am primarily interested in assisting amateur radio clubs grow.

+++++

Tony Reeves  
KK6XC  
QTH Beach Area of So. Los Angeles  
Torrance, Redondo Beach, Hermosa Beach, Manhattan beach

tony@hacgate.scg.hac.com

Novice training, local VE for Novice-Tech tests,  
General questions

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Stephen R. Salmon	E-mail: steve@carlyle.com
Carlyle Systems, Inc.	Phone: 415-345-2500
2000 Alameda de las Pulgas	Fax: 415-349-3874
San Mateo, CA 94403	

DXing - not Honor Roll, but about 200.

DXpeditioning (some) - did a single-handed one to North Cooks and Palmyra in 1990

Marine operation

I'm a VE (Sunnyvale VEC) and help administer the tests about every two months



at the Berkeley Yacht Club. I also teach a novice class there every year or two.

#### Reciprocal Licensing/Foreign Operation

(I've done some foreign operation, and plan to do more. I'm getting ready for a circumnavigation/worldwide DXpedition).

73, Steve, AA6LF

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Bob Salnick, Spokane,WA | USENET:    oliveb!isc-br!tau-ceti!DejaVu!salnick
  Amiga 1000, WB 1.3    | INTERNET:  salnick@DejaVu.spk.wa.us
  WA9BVE                |
```

I can help people with HF stuff, cheap antennas, and am willing to help troubleshoot problems with rigs.

I believe that one of the pillars of ham radio - construction/understanding at the burn-your-hand-with-a-soldering-iron level - is drifting out of ham radio. With Japanese radios which cost so much, fewer and fewer hams are willing to risk their warranty to service their own equipment. I would like to see a turn-around here...

+++++

Mark Salyzyn, VE6MGS mark@ve6mgs.ampr.ab.ca

#### Qualifications:

Repair Technician  
Electrical Engineer (11+ years)  
Advanced Amateur (Canadian) since 1988

#### Advice of value:

HF + VHF construction, homebrew, repair, circuitry, programming and mods  
Operating Mobile  
Packet Radio (Radio, TNC, AX.25, TCP/IP)  
NTS (Net Control for 80m CW Alberta Traffic Net for 3 1/2 years)  
Canadian Tests, Rules and Regulations  
Antennas, Design and Installation  
General Electronics, Repair, Diagnosis and Design  
CW training  
Having fun with Amateur Radio communications

Maintainer of Hams on Usenet E-mail address directory

Please direct all Hams on Usenet E-mail address feedback, submissions, and administrivia to hams-on-usenet@ve6mgs.ampr.ab.ca.

Moderator of rec.radio.info newsgroup

Please direct all rec.radio.info submissions to  
rec-radio-info@ve6mgs.ampr.ab.ca and all feedback and administrivia to  
rec-radio-request@ve6mgs.ampr.ab.ca.

+++++

Nick Sayer <mrapple@quack.sac.ca.us> | "They robbed from the rich, and gave to  
N6QQQ @ N0ARY.#NOCAL.CA.USA.NA | the... criminally insane!"  
37 19 49 N / 121 57 36 W | --Stimpy  
+1 408 249 963[012] (modem) | (The Adventures of Robin  
Hoek)

HF RTTY/AMTOR, Decoding CHU.  
VHF Packet  
Unix, especially SunOS.

(MC68HC11 Mailing List has moved, mc68hc11-request@elden.cse.nau.edu  
is now the place to write to get connected.)

+++++

Steve Schallehn, KB0AGD | Internet : steve@matt.ksu.ksu.edu  
Kansas State University | UUCP : ..!rutgers!ksuvax1!ksuvm.bitnet!steve  
Manhattan, Kansas 66506 | Bitnet : STEVE@KSUVM  
Packet: KB0AGD @ KOVAY.#NEKS.KS.USA.NA

A contact for people with question about Kantronics packet  
equipment. I am not affiliated with Kantronics, but know quite  
a bit about them.

University Clubs (Member of Kansas State ARC, W0QQQ)

VHF/UHF Repeaters

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Paul W. Schleck, KD3FU

pschleck@unomaha.edu

ARRL Technical Specialist (TS), Nebraska Section

Internet Services (Finding FAQ's, using Usenet, FTP, telnet,  
Archie, FTP mail-servers, mailing lists, etc., etc.)

College Clubs

Ham-Univ mailing list for college clubs has found a new home at the  
University of Maine. E-mail for subscription information.

Maintainer of this list

Please direct all Elmers List submissions, feedback, and administrivia  
to elmers-request@unomaha.edu.

+++++

Tom Sefranek WA1RHP

tcs@ll.mit.edu

Elmering for the last 20 years.  
Almost all fields,  
Specializing in power supplies, micro-controllers, antennas

+++++

/// Mike Shirley - WB6WUI mikey@slic.cts.com \  
/// PO Box 460 Lakeside, CA 92040 GEnie: SLIC \

To join the ACC (Advanced Computer Controls) equipment discussion mailing-list, send E-mail to listserv@gtri01.gatech.edu with "subscribe acc-1 your-name" in the body of the message. An acknowledgement and welcome message will follow.

For archival information about ACC equipment, send E-mail to acc-1-archives@slic.cts.com with "help" in the body of the message or try my BBS at +1 619 390-7542 (390-SLIC).

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Marty Squicciarini NR3Z

skitch@nadc.navy.mil

DX and Contesting  
QSL'ing

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Terry Stader - KA8SCP/1, America Online Ham Radio Club Host

Internet: tstader@aol.com or tstader@attmail.com  
(Files/messages larger than 27K, please send to "tstader@attmail.com")

KA8SCP@WA1PHY.#EMA.MA.USA.NOAM or  
ka8scp@ka8scp.ampr.org [44.56.4.82]

- registered ARRL Instructor (teaching for the last 6 years Novice/Tech classes with an 87% pass rate)
- Host of the America Online Ham Radio Club (like CompuServe only a LITTLE smaller!)
- President for 5 consecutive years of an ARRL Special Service Club (The Police Amateur Radio Team of Westford, MA - WB1GOF)
- ARRL District Emergency Coordinator (DEC) for EMAS section
- Area 1 Communications Officer for the Massachusetts Emergency Management Agency (formerly Mass. Civil Defense Agency)
- Expertise with Apple // and Macintosh computers. (I have over 80 MB of Mac ham radio software available.) and ham-related
- Operate TCP/IP with Macintosh
- plus all around source of information about communications

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Steve Sternitzke, NS5I

sds@sat.datapoint.com

I work with the W5YI-VEC organization ("official" title - assistant VEC) and I write the VE manuals for W5YI. Add my name to the list of people who are available to answer questions about volunteer exams, FCC policies (as related to hams), the licensing question pools, etc.

+++++

David Stockton, GM4ZNX

dstock@hpgmola.sqf.hp.com

SWL since 1960

Licensed since 1984 (UK full class A)

Degrees in electronics&comms and digital techniques etc.

Currently senior design engineer doing RF design

Fairly broad interest in amateur radio (but not contests!)

Antennas, Transmission lines, filters from fundamental theory to practice

Receiver structures and circuits from simple to state of the art.

Transmitters, ATUs

Test equipment

Wide experience of troubleshooting/repairing equipment.

Professional experience of EMC/RFI

QRP

UK Operation and Licensing

My morse is flaky, but I keep working on it

No interest in contests

No interest in packet radio or in fixing computers

+++++

Ken Stuart, W3VVN

48 Johnson Road

Pasadena, Md. 21122

401-437-1758 (home)

kstuart@oasys.dt.navy.mil

via packet: W3VVN @ N3ETI.MD.USA

Have been licensed since '53, currently Advanced class. ARRL Technical Advisor since '80 on Batteries and Power Supplies. You may have seen my article in the Feb. '91 issue of QST on NiCads. Authored the rewrite of the power supply chapter of the ARRL handbook in '85 when the new format was generated (large page, versus the old small size). Most of the stuff is still unmodified. Currently lecturing on battery care and feeding to clubs in the Baltimore/Annapolis area.

I have been employed as a power supply design engineer for about the last 25 years.

+++++

Roger Taylor K9ALD

rtaylor@ux1.cso.uiuc.edu

K9ALD RT 5, Box 70, Mahomet, IL 61853 217-586-4958

Help on antennas, Air Force MARS, components, Tube circuits,  
linear amplifiers, troubleshooting.

+++++

Ren J. Tescher N0PVI	Resume~
ren@ncar.ucar.edu	AAS, Electronic Technology
Electronic Technician/Sysop	AAS, Computer Systems Technology
Research Applications Program (RAP)	4 years consumer electronics repair
National Center for	2 years calibration lab and repair
Atmospheric Research (NCAR)	2 year unix sysop
Rm 2078 Bldg 2, 3450 Mitchell Ln.	ethernet and serial cable
PO Box 3000,	phased-array radar
Boulder, CO 80307 (303)497-8407	doppler weather radar
FAX (303)497-8401	PC's
He knows enough to be dangerous.	non-freon appliance repair
dona nobis pacem	strung interior phone lines, too!
***I will email at your request, morse code programs for the Sun, IBM Basica, and SCO which I've saved off the net.***	

+++++

Bob Tidd KJ6CS

inp@violet.berkeley.edu

Computerized DXCC databases and query software (written in  
BSD-Unix compatible C) available on request. Would welcome ports  
to IBM-PC or Macintosh.

+++++

Clark Savage Turner, Graduate Student Researcher	
Safety Critical Software Group	home:
Department of Info. and Computer Science	1514 Verano Place
Irvine, CA. 92717	Irvine, CA. 92715
(714) 856 4049	(714) 856 2131

WA3JPG, QRP #3526  
HHH WAS #489

Admitted to practice law in California, Massachusetts, and New York.  
ARRL Volunteer Counsel

I would (have been doing it by default) be happy to be an Elmer in the  
area of older HF gear, especially QRP operation with Ten Tec Argonauts  
(and Power Mites, etc.). Also have experience with other 10-20 year-old  
economy HF rigs, particularly the Kenwood TS-520.

+++++

Steve Watt KD6GGD Packet: KD6GGD @

NOARY.#NOCAL.CA.USA.NA

ICBM: 122W 01' 9.2" / 37N 18' 30.1"

Internet:

steve@wattres.SJ.CA.US

Left to his own devices, he'd be /dev/null. ..![apple,mips,decwrl!gigo]!  
wattres

Maintainer of rec.radio.amateur.packet FAQ list

Please direct all FAQ submissions, feedback, and administrivia to  
packet-faq@wattres.sj.ca.us.

Maintainer of On-Line Repeater Directory

For more information about this service, send E-mail to  
repeaters@wattres.sj.ca.us with the word "help" in the message body.

+++++

Areas of Interest: ARES/RACES, Emergency Comm, and ARRL  
Field Organization.

73's de Steve Wilson, KA6S

SCV Section Manager  
813 Berryessa St.  
Milpitas, Ca 95035

Hm (408)946-7410 Wk (408)473-2580  
steve@netcom.com

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Bob Witte                   HP Colorado Springs Division  
bobw@col.hp.com           P.O. Box 2197  
Phone:(719) 590-3230      Colorado Springs, CO 80901  
Radio: KBOCY  
"There is no such thing as ground."  
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Mobile  
RFI  
Equipment Testing (instrumentation)  
Repeaters  
VHF/UHF (including mountaintopping/portable operation)

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End of Directory



Subject: AMATEUR RADIO EXAMINATION OPPORTUNITIES

The following test session information is provided by the ARRL/VEC for the upcoming six to eight week period. For further information, please contact the test session CONTACT PERSON at the telephone number provided. If necessary, you may contact the ARRL/VEC at 203-666-1541 x282 for additional information. Email sent to 2155052@mcimail.com will be printed and sent to the ARRL/VEC. Please include your postal address in email correspondence to this address.

Although the test session information presented here does not indicate whether walk-ins are accepted or not, most test sessions do allow walk-ins. We encourage you, however, to always contact the CONTACT PERSON at the telephone number provided so that the VE Team are aware that you be attending the test session.

STILL NEED TO PREPARE FOR YOUR EXAM?

If you would like information on how to become licensed; or how to locate Amateur Radio clubs, instructors, licensing classes and/or Novice examiners in your area; please contact the ARRL Educational Activities Department (EAD) at 203-666-1541 x219. The EAD can also provide information on recommended study materials.

AFTER THE EXAM - HOW LONG WILL IT BE BEFORE MY LICENSE ARRIVES?

If you've recently passed your initial examination for an Amateur Radio license, or if you've just upgraded, please accept our warmest congratulations! Now that you've passed the test, receiving your license in the mail is the next step.

Since the FCCs current license processing time is at about seven weeks, and since there can be additional time required within the volunteer examiner system of two weeks or so allowing your VE Team and VEC (if for Technician class or higher) time to process your application, your license might not arrive for up to eight to ten weeks.

To keep your wait for that new license or upgrade as short as possible, we are taking the following steps to give you the fastest possible service.

We have begun providing our VE Teams with express OVERNIGHT mailers for the return of applications from ARRL/VEC exam sessions to us at the VEC--and we at the VEC have begun sending our daily packages to the FCCs Licensing Facility via an express OVERNIGHT service.

We are also encouraging our VEs, and imposing the same emphasis upon ourselves, to process examination packages as quickly as possible to expedite your license.

Having implemented the above procedures, the ARRL/VEC wants your wait for your new license to be as short as possible.

If you have any other suggestions about the program, or services we provide, please feel free to contact us.



## THINGS TO BRING TO THE EXAMINATION

Be prepared to bring the following items with you to VEC examinations: Your original current FCC-issued Amateur Radio license (and a copy of it)--if you are licensed; Any original Written or Code Element credit documents (CSCEs) which are currently valid; Two forms of identification (e.g., a photo-ID or drivers license and another item indicating your current name and address); A calculator (if necessary); A pen and two pencils; and, the applicable examination test fee (\$5.25 for 1991 ARRL/VEC Test Sessions).

## TECHNICIAN CLASS GRANDFATHER CREDIT

If you hold a Technician class license which was issued prior to 3/21/87, you are not required to take the Element 3B (General class written) examination if you can provide a copy of your FCC-license dated before that date. If your license has since been renewed, and if you don't have a copy of the pre-3/21/87 license, you must seek a verification letter from the FCC. To do so, write to FCC, 1270 Fairfield Rd, Gettysburg PA 17325-7245 and request a Form 1010-B Verification Letter verifying that you were licensed as a Technician class prior to 3/21/87. After you receive that form from the FCC, bring it to the test session with you in order to claim your deserved credit.

## LOST LICENSES

If you have lost your license, VECs are not permitted to submit any upgrades to the FCC without a copy of your current license attached to the 610 form. In order to expedite your upgrade, you must write the FCC and request a replacement license. Since that will take six weeks or more, we recommend that you also request a Form 1010-B verification letter from the FCC which will arrive in a couple of weeks--and is legally binding license document. You may use that form as a license until your Form-660 license arrives. The original and a copy of Form 1010-B must be brought to the test session verifying that you are currently licensed--the copy of which will be attached to your upgrade application (in lieu of an actual Form-660 license copy). To request the Form 1010-B Verification Letter, write to: FCC, 1270 Fairfield Rd, Gettysburg PA 17325-7245; indicating that you lost your license and that you are requesting that a replacement license be issued to you--also be sure to request that they send you a Form 1010-B Verification Letter verifying that you are licensed.

## ACCOMMODATIONS FOR THE HANDICAPPED OR DISABLED

The FCC requires that the administering VEs must accommodate an examinee whose physical disabilities require a special examination procedure. To do so, the administering VEs may require a physician's statement indicating the nature of the disability before determining which, if any, special accommodative procedures must be used.

The VEs may accommodate handicapped/disabled examinees by administering the examination at a place convenient and comfortable for the examinee--even at bedside; for the hearing impaired the Morse code may be sent using flashing lights or a vibrating surface; for the visually impaired, VEs may read or write for the examinee; where warranted, the VEs may pause the Morse code message after each sentence/phrase, or each word, or even after each character to allow the examinee additional time to absorb and interpret what was sent--also the VEs may substitute a sending test for a receiving test where the examinee's handicap warrants.

VE Teams may need advanced notice in order to provide the necessary accommodations to examinees who require them. If accommodations are necessary, please contact the VE Team in advance to advise them of your needs.

#### EXEMPTION OF THE 13/20 WPM MORSE CODE REQUIREMENTS

If you are severely handicapped or disabled individual and have already passed at least a 5 WPM Morse code examination (or hold a license which meets that requirement), you may be eligible for exemption from the 13/20 WPM Morse code examination requirements. For information and applicable forms, send a SASE to the ARRL/VEC, 225 Main St, Newington CT 06111, and request our Handicapped Information Package.

A separate posting lists the exam schedule.

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Ed Hare, KA1CV | ehare%arrlhq.UUCP@uhasun.hartford.edu  
American Radio Relay League | uhasun!arrlhq!ehare  
225 Main St. |  
Newington, CT 06111 | There is no limit to what  
(203) 666-1541 - voice | you can accomplish  
(203) 665-7531 - FAX | if you don't care  
ARRL Laboratory Engineer | who gets the credit. - origin  
RFI, QRP, mobile, | unknown.  
transmitter and receiver testing



From ikluft@amdahl.uts.amdahl.com Mon Feb 1 06:08:17 1993  
To: bowen@cs.Buffalo.EDU (Devon Bowen)  
Subject: Ham Radio Frequently Asked Questions (FAQ) (1 of 3)

Rec.radio.amateur.misc Frequently Asked Questions  
Part 1 - Introduction to the FAQ and Amateur Radio

---

This is a regular posting of frequently-asked questions (FAQ) about Amateur Radio, also known as Ham Radio. It is intended to summarize some common questions on the rec.radio.amateur.misc newsgroup and Info-Hams mail list as well as to help beginners get started.

Please provide a copy of the FAQ to any new or soon-to-be Hams you know.

Regular FAQ postings can help save network bandwidth and maintain a good signal-to-noise ratio in the newsgroup. However, they can't do it alone - you, the reader, have to use them. If you are a new user, please print and review the FAQ articles and look at the instructions in the news.newusers newsgroup before posting any articles. If you are an experienced user, please help by refraining from answering frequently-asked questions on the newsgroup if they are already answered by the FAQ articles. Instead, send e-mail to the user who asked the question. (It will be helpful if you include the part of the FAQ that answers their question, but not the whole thing.)

To reduce the size of each article, the FAQ information is posted in 3 parts:  
Part 1 - Introduction to the FAQ and Amateur Radio  
Part 2 - Amateur Radio Organizations, Services, and Information Sources  
Part 3 - Amateur Radio Advanced and Technical Questions

#### Table of Contents

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Dates indicate last modification.

#### Part 1 - Introduction to the FAQ and Amateur Radio

- \*\* Table of Contents (1/93)
- \*\* Introduction to the FAQ (11/92)
  - \* How to Contribute to the FAQ Articles (1/93)
  - \* Acknowledgements (7/92)
  - \* Notes on "Netiquette" (1/93)
- \*\* What is Amateur Radio? (11/92)
- \*\* Who can become a ham in the United States? (11/92)
- \*\* Where can I locate information and books on Amateur Radio? (4/92)
- \*\* How much does it cost? (4/92)
- \*\* Where can I take the tests? (pre-4/92)
- \*\* What are the tests like? (4/92)
- \*\* What can I do with a ham radio license? (5/92)
- \*\* What can't I do with an Amateur Radio license? (pre-4/92)
- \*\* I'm interested, who will help me? (11/92)
- \*\* Should I build my own equipment or antenna? (11/92)

#### Part 2 - Amateur Radio Organizations, Services, and Information Sources

- \*\* Where can I find Ham Radio information with a computer? (11/92)

- \* The rec.radio.\* newsgroups (new 1/93)
- \* The ARRL e-mail server (1/93)
- \* The Internet File Transfer Protocol (FTP) (1/93)
- \* Access to FTP archives via electronic mail (1/93)
- \* The Info-Hams mail list: rec.radio.amateur.misc by mail (1/93)
- \* Telephone BBS's with Ham-related information (11/92)
- \* Callsign servers and geographical name servers (11/92)
- \* FTP access to FCC Part 97 and FCC Amateur Radio question pools (11/92)
- \* Lists of radio modifications and extensions (11/92)
- \*\* Can I send ARRL or W5YI electronic mail? (11/92)
- \*\* "Why doesn't the ARRL do...?" (11/92)
- \*\* What magazines are available for Ham Radio? (pre-4/92)
- \*\* How do I use the incoming and outgoing QSL bureau? (11/92)
- \*\* Are there any news groups for CAP? (11/92)
- \*\* What's the name of the QRP club that issues QRP numbers? (pre-4/92)
- \*\* How do I become a 10-10 member? (pre-4/92)
- \*\* How do I join MARS? (1/93)
- \*\* How do I join RACES? (pre-4/92)
- \*\* What organizations are available to help handicapped hams? (pre-4/92)
- \*\* I am looking for a specific ham, can anyone help me find him? (pre-4/92)
- \*\* Can I post my neat new ham related program on rec.radio.amateur.misc? (pre-4/92)
- \*\* Where can I get ham radio software for my computer? (4/92)
- \*\* Are there Dialup News services or BBSs for Amateur Radio? (4/92)
- \*\* Where can I find VE sessions in my local area? (6/92)
- \*\* Why isn't XXX available electronically? (4/92)

### Part 3 - Amateur Radio Advanced and Technical Questions

- \*\* What are the different US amateur classes and what can each of them do? (pre-4/92)
- \*\* What is the best way to learn Morse Code? (10/92)
- \*\* What is the standard for measuring Morse code speed? (pre-4/92)
- \*\* I'm confused. What do all those abbreviations mean?? (5/92)
- \*\* What do all those "tones" mean? (pre-4/92)
- \*\* Where can I learn more about Amateur Radio if I live outside the US? (4/92)
- \*\* How can I get a "reciprocal license" if I am a licensed ham from another country or if I am a FCC licensed ham who wants to operate in another country (on vacation)? (11/92)
- \*\* My apartment or housing complex does not allow outdoor antennas, now what do I do? (pre-4/92)
- \*\* I got TVI...HELP!!! (pre-4/92)
- \*\* Did you know that you can get college credit for being a ham? (pre-4/92)
- \*\* On what frequencies do JPL and GSFC retransmit the shuttle audio? (10/92)
- \*\* Can I take my HT on an airplane and operate it if I get the permission of the captain? (4/92)
- \*\* How do I modify my current Amateur license? (4/92)
- \*\* I'm confused about XXX, should I ask the FCC? (4/92)
- \*\* Is there any information on antique radios? (pre-4/92)
- \*\* Where can I buy vacuum tubes? (pre-4/92)
- \*\* What do I need to get started in packet radio? (5/92)
- \*\* What do I need to get started in satellite communications? (pre-4/92)
- \*\* What is available to get started in ATV, SSTV and WEFAX? (5/92)
- \*\* What are these contests I sometimes hear, and how do I participate? (7/92)

\*\* Introduction to the FAQ

\* How to Contribute to the FAQ Articles

We accept suggestions from the Amateur Radio community. Please consider the following criteria:

- is it a commonly asked question?
  - will its inclusion help reduce the usage of network bandwidth?
  - how useful is it to beginning Hams or to the majority of Hams?
- Contributions don't have to meet all of these but the minimum is

one.

We actually only ask that you consider these before contributing.

We can't necessarily include every question or every topic - the network simply doesn't have enough bandwidth to carry that much information. Besides, the point is that we're trying to conserve network bandwidth. You can find the locations of much more

informa-

tion by referring to the "Index to the rec.radio.amateur.\* Supplemental Archives" posted monthly by Paul Schleck KD3FU.

If you suggest a question for this FAQ, please include the answer. You'll get credit for your contribution and you'll speed up the

pro-

cess of getting the information ready for distribution.

If you feel your contribution is sufficient to meet the

considerations

shown above, send it to hamradio-faq@amdahl.com so that it will reach all the FAQ coordinators: (listed in alphabetical order)

CT, USA)	Ed Hare	KA1CV	ehare@arrl.org	(Newington,
USA)	Ian Kluft (editor)	KD6EUI	ikluft@uts.amdahl.com	(San Jose, CA,
USA)	Michael Larish	KD6CTZ	nomad@ecst.csuchico.edu	(Chico, CA,
USA)	Paul Schleck	KD3FU	pschleck@unomaha.edu	(Omaha, NE,
USA)	Tom Sefranek	WA1RHP	tcs@ll.mit.edu	(Shirley, MA,
USA)	Chris Swartout	N6WCP	cas30@uts.amdahl.com	(San Jose, CA,
USA)	Diana L Carlson	KC1SP	dls@genrad.com	(Hudson, NH,
USA)	Rosalie White	WA1STO	rwhite@arrl.org	(Newington, CT,
USA)	Derek Wills	AA5BT	oo7@astro.as.utexas.edu	(Austin, TX,

\* Acknowledgements

All questions listed as modified "pre-4/92" are entirely Diana Carlson's work or her editing of a contributor's work. Diana

estab-

lished this FAQ. She is now one of the larger group that maintains it but we didn't want her effort to be lost in the crowd.

\* Notes on "Netiquette"

The rec.radio.amateur.misc newsgroup and Info-Hams mail list have a large daily volume of traffic. They can operate more efficiently if the following netiquette guidelines are followed. Please take them seriously.

\* If you are new to UseNet, the introductory articles in news.announce.newusers are required reading. Go to that newsgroup

now.

\* When posting a followup article, ALWAYS try to minimize the number of lines of quoted material from the original article.

\* As a general rule when you try to determine whether to reply to someone by e-mail or with a followup article, remember to "praise in public, criticize in private." It's OK to disagree technically but be careful not to attack the person with whom you disagree.

Also, be careful with your use of the word "you" when posting a follow-up article. Many unnecessary flame wars have started that way.

\* Use a descriptive subject. For example, a message subject of "Ham Radio" tells the reader NOTHING about the contents of your article

since the whole newsgroup is about Ham Radio. Other examples of subjects which are so broad that they become useless could

include, "Help," "A Question," "Antennas," or "Frequencies." Maybe

"Books on Antennas?" or "Where can I find Repeater Frequencies?" would be better, for example. Remember, in a busy newsgroup a lot of

users decide which articles to read from the subject line alone. If you post, don't deprive yourself of an audience!

\* Before answering a question, check if the FAQ adequately answers it or if someone else already answered it. If you have more to add, make sure to reference either the FAQ or the related articles.

\* If a user posts a question which is directly answered by the FAQ, there is no need to post an answer - the information is already available on the newsgroup. Instead, just send an e-mail

message which politely explains where to find the FAQ. They will probably

appreciate it if you include the answer to their question.  
(Don't send a "nastygram" - that would just discourage future participation.)  
\* Pay attention to the size of your audience - use the "Distribution:" header. If you leave it blank, your message will go to every civilized country in the world and occupy disk space in all news systems in all those places. If that's what you intend, that's fine but make sure your article is relevant outside your country.  
(In particular, Hams should already know there is more to the world than just their own country.)  
\* If you have an item for sale, please limit the distribution area so that, for example, an article about a radio for sale in New Jersey won't get to California or Europe. If you wish, you may cross-post your for-sale article to rec.radio.swap.  
\* Software sources should be posted to either alt.sources, comp.sources.misc, or comp.sources.\* for a specific machine type.  
Software binaries should be posted to the appropriate subgroup of comp.binaries.

\*\* What is Amateur Radio?  
Amateur Radio is a non-commercial radio communication service whose primary aims are public service, technical training and experimentation, and communication between private persons. Amateur Radio operators are commonly called hams. Hams often communicate with each other recreationally but also provide communications for others at public events or in times of emergency or disaster.

\*\* Who can become a ham in the United States?  
Anyone who is not a representative of a foreign government can be an Amateur Radio operator in the USA. There are tests that you must pass to get a license, however the tests are not insurmountable.

\*\* Where can I locate information and books on Amateur Radio?  
Your local Radio Shack sells some ham radios and Amateur Radio license books. Books can also be obtained through the mail from ham radio organizations, such as ARRL in Newington, CT (203-666-1541) and W5YI in Dallas, TX (1-800-669-9594). There may be one or two ham radio stores in the local area (ie,



within 50 miles). Try looking in the Yellow Pages under Radio Communications.

per-  
lic-  
FCC  
idea  
manual  
License.

For the Novice license, get a Novice License manual, plus 5-word-minute Morse code tapes, costing around \$25. For the Technician license, get a combined Novice and Technician License manual, and an FCC Rules manual, costing around \$32. The FCC Rules manual is a good idea for Novice also, but not necessary, since the Novice License manual contains all the FCC Rules that are required for the Novice License.

The ARRL Education Activities Department has several programs to help amateurs (or prospective amateurs) to get started. Ask for a "New prospect package" available free of charge, from ARRL HQ, Educational Activities Department, 225 Main St, Newington, CT 06111.

\*\* How much does it cost?

currently)  
used

To take the Novice tests, it's free. To take the Technician or higher class tests, there is a small charge (around \$5-\$6 to cover copying costs and running the testing sessions. The cost of a radio is really dependent on what you want to do. You can make your own radio and antenna for under \$150. You can buy a single-band radio for \$150-\$300. Or you can buy a new multi-band multi-mode radio with all the doodads for \$300-\$3000. I'd suggest you learn more about ham radio, talk to local hams, find out what you want to do with ham radio first.

\*\* Where can I take the tests?

(VEs)

The Novice tests can be given by any two qualified hams of General class license or above. The Technician tests and all higher class license tests are given by three qualified Volunteer Examiners who volunteer their time.

To locate an ARRL testing session in your area, you can contact ARRL at 203-666-1541 x282.

\*\* What are the tests like?

pen  
license

First off, come prepared to VE sessions. Bring: TWO forms of ID, one of which has a picture on it; a calculator (if necessary); a pen and two pencils; the applicable examination fee (around \$5-\$6 for 1992); the original AND a copy of your current Amateur Radio license (if you have one); the original AND a copy of any CSCEs for tests you've already passed (if you have any).

Each of the written tests (Novice, Technician, General, Advanced, and Extra) are generally a multiple choice test of approximately

one-

tenth of the question pool. For example, if the question pool is approximately 300 questions, then the test will be a 30-question test. You need to get 75% correct to pass. Note that they

truncate

to determine the correct number of questions. That means for a 30 question test, you need to get 22 right, which is actually only

73.3%.

costs

Once you've paid the small fee for Technician-Extra tests, it

no extra to take another test, so I'd suggest you keep taking the next more advanced test until you fail. If you pass the written but not the Morse code (or vice versa) for a specific class

license,

you have up to one year to take the other test before you would

have

to retake the written test again. Note that some VEs will not

allow

you to take the written test unless you've first taken the Morse

code

test.

choice

The Morse code test is a receiving test only. The test run 5 to 7 minutes. After the test, you are given a 10-question multiple-

fail

or fill-in-the-blank test. Passing grade is 7 or more. If you

sheet

the 10-question test, the examiner team will examine your copy

wpm,

to see if you have 1 minute of solid copy with no errors. For 5

wpm,

that's 25 characters, for 13 wpm, that's 65 characters, for 20

you've

that's 100 characters. If they can find 1 minute solid copy,

still passed.

Hints on Morse code tests: Generally, it will be a standard QSO (conversation), and it MUST contain at least one of each of the following:

26 letters A-Z, 10 numbers 0-9, comma (,), period (.), slant or slash (/), question mark (?), double dash prosign (BT), end of message prosign (AR), end of contact prosign (SK).

The letters count as one character, all others count as two characters. There are a couple other prosigns which are worth knowing, but will not be on the test, like "I'm done talking,

next"

is K, "I'm done talking, back to you" is KN, "Please wait" is AS.

\*\* What can I do with a ham radio license?

There are so many things, it's a difficult question to answer, but here's some ideas:

- \* Talk to people in foreign countries.
- \* Talk to people (both local and far away) on your drive to work.
- \* Help in emergencies by providing communications.
- \* Provide communications in parades or walkathons.

- \* Help other people become hams.
- \* Hook your computer to your radio and communicate by computers.
- \* Collect QSL cards (cards from other hams) from all over the United States and foreign countries and receive awards.
- \* Participate in contests or Field Day events.
- \* Provide radio services to your local Civil Defense organization thru ARES (Amateur Radio Emergency Service) or RACES (Radio

Amateur

Civil Emergency Service).

Affiliate

- \* Aid members of the US military by joining MARS (Military Radio System).
- \* Participate in transmitter hunt games and maybe build your own direction-finding equipment.
- \* Have someone to talk to on those sleepless nights at home.
- \* Receive weather pictures via satellites.
- \* Build radios, antennas, learn some electronics and radio theory.
- \* Talk to astronauts in space, or use the moon to bounce signals back to people on the Earth.
- \* Experiment with Amateur TV (ATV), Slow-Scan TV (SSTV), or send still-frame pictures by facsimile.
- \* Experiment with amateur satellite communications.

\*\* What can't I do with an Amateur Radio license?

The most important thing you can't do is transact business of any kind over ham radio. Interference to other hams or services, as well as obscene, profane or indecent language is not tolerated and is illegal. Music and broadcasting are not allowed on ham radio. Some personal conversations may not be appropriate to Amateur

Radio.

Do you really want the whole world to hear about Aunt Mabel's hemorrhoids?

\*\* I'm interested, who will help me?

There are hams who are willing to become "Elmers" (mentors, helpers) in your local area. Look around and ask local hams. Search out local radio clubs. As well, some people have volunteered to be an Elmer over the Usenet. A list of UseNet Elmers and their e-mail addresses is posted to the newsgroup monthly. If anyone wants to be an Elmer, send e-mail to [elmers-request@unomaha.edu](mailto:elmers-request@unomaha.edu)

\*\* Should I build my own equipment or antenna?

"Homebrewing" is a fun and educational part of ham radio. It is a thrill to build your own transmitter and put it on the air. However, building your own receiver can be quite complicated; if you don't have electronics experience, you may want to buy a receiver instead. Most homebrew transmitters are QRP (transmit very low power). That's fine for an experienced ham with a very good antenna, but a Novice ham

will  
home-

just get frustrated. Your first rig, therefore should NOT be a brew.

anten-

Antennas can be much simpler projects than the transceiver, though some types are also quite involved. Most hams build their own nas for base station use and buy antennas for mobile (car) use.

Most

beginner ham books describe how to build different types of

antennas.

Order of difficulty, from easiest to more difficult, for some

common

antennas are: wire dipole, Zepp, Yagi, Quad, and Log-Periodic.

Books

from many sources, including ARRL and several Hams, discuss

antennas

in depth.

the

When building or even understanding antennas, it is good to know

or

relationship between the antenna element length and the frequency

multiples

wavelength it is designed for. An antenna performs best at

qualit-

of 1/4 of that wavelength, though 5/8 wave also has beneficial

following

ies. The wavelength is related to the frequency with the

formula:

wavelength (in meters) = 300 / frequency (in megahertz)

around

You do not need a huge antenna or tower like ones you may see

very

your neighborhood. Large beam antennas and 40-foot towers are

expensive. As a beginner, a simple dipole antenna is perfectly adequate. As you gain experience (and money :-), you may want to invest in something bigger.

a

If you can afford new rigs and antennas, there are many mail order stores that advertise in ham radio magazines. If you want to buy

equipment

used rig, the best place is at a "hamfest" (ham flea market). You should take along an experienced ham, since some of the used

answer

may be inoperative, overpriced or poor quality. You can also

often, by

ads in ham magazines or posted at ham radio stores, although

the time you call, the equipment has already been sold.



From ikluft@amdahl.uts.amdahl.com Mon Feb 1 06:08:20 1993  
To: bowen@cs.Buffalo.EDU (Devon Bowen)  
Subject: for FTP - Ham Radio FAQ (2 of 3)

Rec.radio.amateur.misc Frequently Asked Questions  
Part 2 - Amateur Radio Organizations, Services, and Information Sources

---

Questions discussed in Part 2: (dates indicate last modification)

- \*\* Where can I find Ham Radio information with a computer? (11/92)
  - \* The rec.radio.\* newsgroups (new 1/93)
  - \* The ARRL e-mail server (1/93)
  - \* The Internet File Transfer Protocol (FTP) (1/93)
  - \* Access to FTP archives via electronic mail (1/93)
  - \* The Info-Hams mail list: rec.radio.amateur.misc by mail (1/93)
  - \* Telephone BBS's with Ham-related information (11/92)
  - \* Callsign servers and geographical name servers (11/92)
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- \*\* Where can I find VE sessions in my local area? (6/92)
- \*\* Why isn't XXX available electronically? (4/92)

--Rec.radio.amateur.misc Frequently-asked Questions-----Part 2--

- \*\* Where can I find Ham Radio information with a computer?  
This question has many answers spanning several electronic media including UseNet, electronic mail, the Internet, dialup bulletin board systems (BBS) and others. Various electronic information sources are summarized under the subheadings that follow.  
  
All electronic mail addresses listed are in Internet format. If your site is not connected to the Internet and does not support Internet-style mail addresses, you will need to contact either your system administrators or a local "guru" to find out how or if you can send mail to the sites listed. Ask them, "how can I get mail to the Internet?" and show them the address you're interested in.

\* The rec.radio.\* newsgroups

aspects The primary distribution mechanism for this FAQ is UseNet. There are several newsgroups dealing with Amateur Radio and other aspects of radio. The full list is as follows:

rec.radio.amateur.misc (*)	Ham Radio - misc/general topics
rec.radio.amateur.packet	Ham Radio - computer/packet radio
rec.radio.amateur.policy	Ham Radio - policy & regulation
rec.radio.broadcasting	public broadcast radio
rec.radio.cb	Citizens' Band Radio
rec.radio.info (*)	periodic info from all rec.radio groups
rec.radio.noncomm	misc non-commercial radio topics
rec.radio.shortwave	Shortwave Radio
rec.radio.swap	radio equipment wanted and for sale

(\*) This FAQ is cross-posted to the newsgroups marked with asterisks and to news.answers, UseNet's general repository for FAQs. These should be the first places to look for new current copies of the FAQ.

Most of the rec.radio newsgroups have their own FAQs as well.

\* The ARRL e-mail server

promoting ARRL is the American Radio Relay League, representing and promoting Amateur Radio in the USA. They have established an automated file server which responds to information requests via electronic mail. To use the server, send mail to info@arrl.org with any number of one-line commands in your message. Valid commands are as follows:

server	help	sends more detailed instructions about the e-mail server
	index	sends a list of the files currently available
	send file	sends a file (replace "file" with the file's name) several files are referenced by name in parts of this FAQ
be	quit	ends command processing - use it if a signature will be appended to your message

separate The server program will respond to the commands, each in a separate message. Among many other informative files, a current copy of the FAQ (updated monthly) can be obtained from the ARRL e-mail server.

\* The Internet File Transfer Protocol (FTP)

way Sites connected to the Internet can access large amounts of data almost anywhere in the world, often at high speeds. One common way of to transfer the data you want is FTP. Some sites offer a service called "anonymous FTP" which allows remote users to access a set of

public files without requiring a password.

Tom Czarnik coordinates a fairly definitive list of anonymous FTP sites, their IP numbers, time zones, general contents, and access policies which he posts to the comp.misc, comp.sources.wanted, alt.sources.wanted, and news.answers newsgroups. It is itself available via anonymous FTP (how about that?? :-) from (among

other

places) pit-manager.mit.edu (18.172.1.27) under directory /pub/usenet/news.answers/ftp-list.

For specific information about exact locations of files by name, the Archie database server may be of help. First check if anyone

has

installed the "archie" program on your machine and use it. Archie

may

also be accessed by telnetting to one of the following sites (use

the

one closest to you):

Finland/Europe: archie.funet.fi (128.215.6.100)  
Canada: archie.mcgill.ca (132.206.2.3)  
Australia/New Zealand: archie.au (128.184.1.4)  
Israel: cs.huji.ac.il (132.65.6.5)  
UK/Ireland: raquel.doc.ic.ac.uk (146.169.11.3)  
USA (Maryland): archie.sura.net (128.167.254.179)  
USA (Nebraska): archie.unl.edu (129.93.1.14)  
USA (New York): archie.ans.net (147.225.1.2)  
USA (New Jersey): archie.rutgers.edu (128.6.18.15)

Login is archie. Type "help" at the prompt for a description of server commands.

all

For those without telnet capability, the database may be accessed interactively via mail server. Send E-mail with the word "help" archie@host where host is one of the Archie sites above.

non-

to

The above two resources (the FTP list and the Archie server) are extremely powerful tools for finding out "what's out there" at

various

FTP sites around the world. \*PLEASE\* exhaust their capabilities before posting requests to the net.

The following is a brief summary of major ham-related FTP sites:

ftp.cs.buffalo.edu (128.205.32.9)  
(submissions to this ftp site should be made to bowen@cs.buffalo.edu) - contains many ham radio files, including the FAQs, Elmer list, SWL and scanner info, FAQ, examination opportunities, information on various regulations, information on commercial radios (i.e. GE Motorola), SSTV (slow-scan TV), HTs (handheld

Packet

or



transceivers) and the KA2UGQ worldwide BBS list. See ~pub/ham-  
radio. This FAQ is updated monthly here.  
wsmr-simtel20.army.mil (192.88.110.20)  
Keith Peterson, W8SDZ, has apparently returned as the  
maintainer of this huge repository of ham-radio  
(software and modifications), MS-DOS, and CP/M files. To find out  
how to submit files to this archive, please read his  
informational posts to the comp.binaries.ibm.pc.archives newsgroup.  
If you cannot directly FTP from wsmr-simtel20, there is a  
mail server that can help. Send mail with the text "help" to  
listserv@vm.ecs.rpi.edu (128.113.5.11).  
wuarhive.wustl.edu (128.252.135.4)  
A "mirror" of the files available on Simtel20, plus a  
\*LOT\* more. A more user-friendly Unix environment (plus a  
faster net connection) makes this site preferred over  
Simtel20.  
faster/easier If you are on a Unix box locally, see if your system  
administrator will "NFS-mount" these files for  
access.  
ucsd.edu (128.54.16.1)  
largest The "home" site (with the most recent versions for the  
number of different computer platforms) of the KA9Q  
TCP/IP Network Operating System (NOS), other ham-related  
software, and the archives for the Info-Hams, Packet-Radio, Ham-  
Policy, Radio-Info and TCP-Group digests.  
uxc.cso.uiuc.edu (128.174.5.50)  
Hamstacks cd pub/ham-radio - This site contains the HyperCard  
radio written by Diana Syriac as well as ASCII readable ham  
question pools.  
ftp.apple.com (130.43.2.3)  
especially cd pub/ham-radio - Ham software and information,  
MacIntosh software  
ftp.uu.net (137.39.1.9)  
wuarhive.wustl.edu (128.252.135.4)  
wolfen.cc.uow.edu.au (130.130.68.4)  
athene.uni-paderborn.de (131.234.2.32)  
nic.funet.fi (128.214.6.100)  
system ham radio files and software for the Amiga computer  
ftp.amdahl.com (129.212.11.1)

FAQ

cd pub/radio/amateur - the most up-to-date copy of the

(updated nightly when changes are made)

some

here

hookups,

trouble

If you experience difficulty connecting to the above FTP sites, troubleshooting hints are shown below. The unfortunate situation is that Netnews is far more prevalent than direct Internet accurate name servers, smart mailers and routers, and of course, telnet and FTP client services. What this means is that your may be caused by MANY factors.

Here's some hints to check what's wrong:

line

If

Internet

computer

host

or

hosts,

these

servers

number

knowledgeable

is,

maintenance

- \* It may very well be that your newsfeed and email are via dialup and UUCP (Unix-to-Unix copy) in the wee hours of the morning. If this is the case, then you have no direct connection to the Internet and thus cannot use real-time interactive services like FTP and telnet.
- \* If you are at a college or university, your host (ie, the computer you are logged onto) may be on the Bitnet network, which has an email gateway to the Internet, but no direct connect capability.
- \* If you do have a direct connection to the Internet, does your host have telnet and/or FTP client programs? (ie, if you type "ftp" or "telnet" at your command prompt, do you get anything?) Many hosts, particularly IBM mainframes not running Unix, do not support these services!
- \* Can you telnet to other hosts and get a login prompt? It may very well be that some hosts are "not recognized" due to misconfigured connections and inaccurate host tables/name servers (\*.mil computers are \*NOTORIOUS\* for this!)
- \* If you get "host not in host table" or "host unknown" or similar error, try telnetting via the IP number, a set of four 1-3-digit numbers separated by periods (eg, 137.48.1.1). The exact IP number for the site can be obtained via the nslookup utility, if your computer supports it....or check the FAQs. Your host may not recognize the "fully-qualified domain name" (like callsign.cs.buffalo.edu), but it should ALWAYS recognize an IP number if their network is reachable from yours.
- \* If you get "network unreachable" check with some more knowledgeable users if your site is actually connected to the Internet. If it is, a link in the network may be temporarily disconnected for maintenance

(or by accident.)

\* In the case of telnetting to a non-default port (as in the case with the callbook servers), if telnet <host> <port#> doesn't work, but you can telnet to the default login port (ie, no qualifiers), then the manner at which the port qualifier is entered may be system dependent.

\* Syntax for telnetting from different operating systems differ. Some common command syntaxes are: (angle brackets are for readability, do not type these in literally)  
 Berkeley Unix or VMS with Wollongong TCP/IP uses syntax:  
 telnet <host> <socket#>  
 Other possibilities to try:  
 telnet console <host> (for 2000 port)  
 telnet <CR> open <host>:<port#>  
 telnet <host>/<port#>  
 telnet <host>/port=<port#> (for Multinet on VMS)

\* Compression techniques are different for different operating systems. However, these hints should help: foo.sit needs MacIntosh UnStuffit to unstuff; foo.hqx needs MacIntosh BinHex to uncompress; foo.Z needs Unix 'uncompress' to uncompress or VMX compress\_vms.exe (on gatekeeper.dec.com) will work too. If more than one method was used, like for foo.hqx.Z, start at the outside and work in (so uncompress on Unix with 'uncompress' first, transfer to MacIntosh, then uncompress with BinHex to get uncompressed file).

\* There is an excellent introduction to FTP and archiving software regularly posted to comp.binaries.ibm.pc and news.answers.

\* If all else fails, ASK your system administrator or check system documentation.

\* Access to FTP archives via electronic mail  
 ANY BITNET, EARN, or NorthNET site can access the Princeton mail server. It will be most efficient if you know the complete path and filename for anything you wish to transfer, but you can use 'cd' and 'ls -l' commands to move about and browse the remote site's directories. The Archie database server may also be useful to search for files and their directory locations on FTP sites around the world (see below). Please be patient when using non-interactive mail servers such as BITFTP as each request may take several hours (or longer) to be fulfilled.

For access to the FTP server, send email to bitftp@pucc.bitnet (for BITNET, EARN and NorthNET users ONLY!). Subject doesn't matter. The text of the email is the FTP commands one after another. For example, suppose you wanted to access the FTP site lcs.mit.edu:  
 FTP lcs.mit.edu  
 USER anonymous

```
PASS yourname@yoursite          (not required)
ASCII
CD telecom-archives
GET filenames
BYE
```

A help file is available giving detailed instructions by putting the single word HELP into the text of the email.

For nonBITNET users, there is also a FTPMAIL server at ftpmail@decwrl.dec.com (16.1.0.1). Commands include: REPLY <mailaddr>, CONNECT [HOST [user [pass]]], ASCII, BINARY, COMPRESS, COMPACT, UUENCODE, BTOA, LS <directory>, DIR <directory>, GET

<file>,

mail

try

of

QUIT, HELP. Get the help file for more information by sending with the single line "help". The ftpmail site may complain if you try to get more than 1 file per email request. Here is an example

a request:

```
reply your_name@your_site
connect uxc.cso.uiuc.edu
binary
uuencode
get pub/ham-radio/Tech.v3.3.sit.hqx.Z
quit
```

that

cut

mail

amounts

it

A note on the use of FTP mailservers: If you want to use FTP mailservers, like FTPMAIL, please be considerate of any systems your mail must pass through. The quickest way to find yourself off from the world is to make the admins of sites that pass your pass 60Mb of X11 graphics system source. If you need large amounts of information from a mailserver, contact your admin for help -- it may already be available, or he may know a better way to get it.

\* The Info-Hams mail list: rec.radio.amateur.misc by mail

NetNews

You can use rec.radio.amateur.misc even if your site has no

feed. To subscribe to rec.radio.amateur.misc, send email to:

Info-Hams-Request@ucsd.edu

In the body of the message, write:

subscribe Info-Hams

address

If your local e-mail software does not provide a valid return

packages)

(i.e. Bitnet, many Milnet sites, and many non-Unix e-mail

the

you can provide your return address between the "subscribe" and

name of the mailing list (i.e. "subscribe myname@here.org Info-

Hams".)

Similarly, to subscribe to some other rec.radio.\* newsgroups, use

the following directions:

Radio".

- \* To subscribe to rec.radio.amateur.packet, send email to Packet-Radio-Request@ucsd.edu, message is "subscribe Packet-Radio".
- \* To subscribe to rec.radio.amateur.policy, send email to Ham-Policy-Request@ucsd.edu, message is "subscribe Ham-Policy".
- \* To subscribe to rec.radio.info, send email to Radio-Info-Request@ucsd.edu, message is "subscribe Radio-Info".
- \* To subscribe to rec.radio.shortwave, send email to listserv@cuvma.columbia.edu, message is "subscribe swl-1 (your name)".

TO UNSUBSCRIBE, follow directions above, changing the command word "subscribe" to "unsubscribe"

command

DON'T POST TO THE NEWSGROUP ITSELF! USE THE REQUEST ADDRESS! Help is available by using the command word "help". Note that words MUST be the first word on each line of the message.

at

You can post to rec.radio.amateur.[misc,packet,policy] by sending your posting email to Info-Hams, Packet-Radio, or Ham-Policy, all

ucsd.edu. Since rec.radio.info is a moderated newsgroup, requests to post to it should be mailed to the moderator, Mark Salyzyn (mark@ve6mgs.ampr.org).

ucsd.edu

All of the Amateur radio newsgroups are archived for FTP on under subdirectory mailarchives/[Ham-Policy, Info-Hams,Packet-Radio].

Radio-Info is not archived at UCSD. (See the news.answers archives at pit-manager.mit.edu.)

password.

- \* Telephone BBS's with Ham-related information  
WB3FFV has one, phones are 301-625-0817 or 301-625-9482 or 301-625-9663. Data settings are 8 bits, NO parity, 1 stop bit. Login is bbs, no password.  
This BBS is also available via UUCP, login is uucpanon, no

For a listing of available archived, try:  
uucp wb3ffv!~/FILES /usr/spool/uucppublic

settings

Another one is N8EMR at phone 614-895-2553, login hbbs. Data are 8 bits, NO parity, 1 stop bit. N8EMR has a comprehensive list of other ham-related BBS's on-line.

- \* Callsign servers and geographical name servers  
If you are at an Internet site you can connect using telnet to one of the two primary servers:

callsign.cs.buffalo.edu (currently 128.205.32.2)  
ham.njit.edu (currently 128.235.1.10)

There is also a general geographical name server at:

martini.eecs.umich.edu (currently 141.212.100.9)

these  
you  
of  
done

The callbook servers sit on port number 2000 and the geographical name server sits on port 3000. These are different port numbers than what telnet usually defaults to. So if you just telnet to machines, you will get a login prompt instead of the server. How tell your telnet program to connect to port 2000 or 3000 instead the default port is operating system dependent but it is usually with a line like

```
telnet callsign.cs.Buffalo.EDU 2000
```

string.

If this doesn't work, check the telnet/FTP troubleshooting hints above or consult your local systems guru for the proper command

explanatory  
command  
"info".  
You  
more  
name,  
trim

The interactive servers are designed to be somewhat self- and they support fairly detailed help facilities. The first you should execute when connecting to one of these servers is "info". This will list general info about that server and how to use it. You should then type "help" to list the various commands available. Typing "help" followed by a command name will give you a little detail about that command. Servers allow searches by call, last name, zip code or city and also provide regular expression filters to trim your searches so you get a reasonable amount of output.

Both these servers are built from a database distributed by Rusty Carruth, N7IKQ. This database currently contains US and Canadian callsigns and it does not contain club calls. A new version of the database is sent around approximately once a year.

There is also an email callsign server at  
callbook@sat.datapoint.com  
the  
at

(The UUCP address is ...!uunet!dptsdp!callbook). In the body of text, say "lookup" followed by callsigns you want to look up. If your mailer appends signature files, you should put a line "quit" at the end of your request (before the signature file). If you want help, put the word "help" on a line by itself. Here is what a request might look like:

```
help
lookup kc1sp wn4bbj
lookup n0fzd
quit
```

There is another email callsign server at  
callbook@n8emr.cmhnet.org.

The subject line is the list of callsigns to lookup. All other  
lines  
are ignored. This same callsign server can be accessed with  
packet  
radio via cbook@n8jyv.#cmh.oh.usa.na. The body of the message  
should  
include "REPLY n8jyv!HOME\_BBS!CALL" (where HOME\_BBS is YOUR home  
BBS,  
and CALL is YOUR callsign), carriage return, "CALL call1  
call2 ..."  
(where call1 call2 .... is space separated list of callsigns you  
want  
to lookup).

If you are a packet radio station, callserver data is available  
from  
REQQTH@WA4ONG.VA.U.S.A.N.A, subject line should be up to 5 US  
callsigns,  
separated by spaces. For Canadian calls, use the callserver at  
REQQTH@VE3JF.ON.CAN. Body of message is ignored. The server is  
an  
OS interface to the MBL packet BBS using the Buckmaster CD-ROM  
callsign database.

The REQQTH address is for the AX.25 radio-linked amateur packet  
network, \*NOT\* the Internet. If you attempt to send Internet mail  
to  
this address, and use the old .NA suffix instead of the new .NOAM  
suffix, it will get routed to Nimibia (Internet suffix .na) which  
is  
currently paying a lot of money for misdirected ham mail. Help  
maintain a positive example for amateur radio and please do not  
attempt this!

The FCC "call sign hotline" at 717-337-1212 is available for those  
who wish to listen to the call signs allocated in each group for  
each  
district. This requires only a touch-tone telephone to use.

\* FTP access to FCC Part 97 and FCC Amateur Radio question pools  
Part 97 is part of the FCC regulations and only applies to the  
USA.

The text to part 97 is available by ftp from several locations:  
Western US

ftp.amdahl.com /pub/radio/amateur/part97.txt.Z

Central US

pacific.mps.ohio-state.edu /msdos/ham/part97.arc

Eastern US

gandalf.umcs.maine.edu /pub/ham-radio/part97.txt

ftp.uu.net /networking/ka9q/part97.arc

The \*.arc files are MSDOS ARC files with the same ASCII text.

An ASCII copy of the question pools are available by ftp from

uxc.cso.uiuc.edu (128.174.5.50) in /pub/ham-radio/<class>-  
pool.txt.Z,  
where <class> is novice, technician, general, advanced or extra.

- \* Lists of radio modifications and extensions  
Some mods can be found on wsmr-simtel20.army.mil or  
the Simtel20 mirror directories on wuarchive.wustl.edu.

There is a new server at pcserver@novell.business.uwo.ca. Some  
examples of main body email requests are as follows:

```
HELP
SENDME RADIO MODS
SENDME TH215 MODS
SENDME ALLBAND MODS
```

There is a packet radio Mods Server. To get the directories, send  
a packet as follows:

```
SP REQFIL@N2IMC.NJ.USA.NA
Subject: MODS.1
/EX
```

To get the mod, send to same place, with Subject MODS.ext.

REMEMBER that any modification is likely to void your warranty and  
that these mods are NOT guaranteed to work. This list is supplied  
here because it is sometimes a frequent question on the newsgroup.

- \*\* Can I send ARRL or W5YI electronic mail?

Several ARRL HQ staffers can be contacted via the net. Their e-  
mail

addresses are available from the ARRL e-mail file server in the  
file called "email". See above for more information on the ARRL  
e-mail server.

ARRL requests that you include your postal address (the slow kind) in  
case they need to send you nonelectronic material in answer to your  
request.

W5YI, a large VEC, can be reached at the following address:

Fred Maia, W5YI 3511297@mcimail.com

- \*\* "Why doesn't the ARRL do...?"

If you want the ARRL to do something, tell them! Direct input  
from a  
concerned member (or, actually, any concerned Ham) carries a lot  
more  
weight than hearsay from any source. Their e-mail addresses are  
available from the ARRL e-mail file server (see above). They want  
direct input - that's why those addresses are available.

- \*\* What magazines are available for Ham Radio?

Your local ham store may have some, but here's some popular ones  
(this is NOT a complete list!):  
QST, ARRL, 225 Main St, Newington, CT 06111 - basic projects and  
contesting  
CQ The Radio Amateur's Journal, 76 North Broadway, Hicksville, NY  
11801 - beginner ham radio articles  
73 Amateur Radio Today, WGE Center, Forest Rd, Hancock, NH 03449,



FAX (603) 525-4423, email: COMPUSERVE 70310,775 or  
Internet 70310.775@compuserve.com - more technical ham radio  
articles QEX, ARRL, 225 Main St, Newington, CT 06111 - more technical  
projects WorldRadio, 2120 28th St, Sacramento, CA 95818, (916) 457-3655.  
CA 95815, Subscriptions to 201 Lathrop Way, Ste D, Sacramento,  
like QRP, (800) 365-SUBS - lots of special interest columns,  
ATV, YL, etc.  
W5YI Report, PO Box 565101, Dallas, TX 75356, 1-800-669-9594 -  
including up-to-date information on Amateur Radio happenings,  
VE information and statistics

\*\* How do I use the incoming and outgoing QSL bureau?

To use the outgoing QSL bureau, you must be a member of ARRL. In general, you send a bundle of foreign (not States!) QSL cards to the outgoing bureau in Newington, Connecticut, along with a label off of your QST magazine (which shows ARRL membership), along with \$2 per pound of cards (approximately 150 cards) or \$1 for 10 cards or less.

To use the incoming QSL bureau, you do NOT have to be a member of ARRL. Send one or more Self-Addressed Stamped Envelopes (size 5x7 or 6x9, NO BIGGER, NO SMALLER) with one ounce of postage attached and with your callsign in 3/4" letters in top left hand corner

where

the return address label would go. If you expect a large quantity of foreign QSL cards, attach extra money or postage with a paper clip; do NOT affix extra postage to envelope. Send the envelopes

to

the QSL bureau for your callsign area. If your callsign

is xx3xxx/5,

you would send it to the 3rd call area, NOT the 5th call area. Addresses for QSL bureaus are listed in QST and on the ARRL e-mail server (see below); if you don't have access to a QST magazine,

ask

another ham. IMPORTANT: BE PATIENT! Turnaround time for a US

QSL

bureau, not considering foreign QSL bureaus, is about 3 months. Foreign QSL bureaus and hams can be as fast as 2 months or as slow

as

TEN YEARS, while average is about 6-12 months.

Addresses for the US incoming and outgoing QSL Bureaus are

available

from the ARRL e-mail server in the files called "qsl-in" and "qsl-out".

See the question above

\*\* Are there any news groups for CAP?

There is no news group just for Civil Air Patrol discussions.

However,

rec.aviation.misc is appropriate for CAP aviation discussions and

for

CAP radio information, these rec.radio.amateur.\* groups are available.

CAP-related files are also stored on the FTP site sunburn.cps.udayton.edu in pub/capital.

\*\* What's the name of the QRP club that issues QRP numbers?

QRP Amateur Radio Club International, c/o Bill Harding K4AHK, 10923 Carters Oak Way, Burke, VA 22015.

\*\* How do I become a 10-10 member?

10-10 is simply an organization to sponsor the use of the 10 meter band. It was first conceived when propagation was poor on 10 meters,

as a method to get more hams to use 10 meters. The past few years have been great for 10 meters worldwide. However, "the bands are closing down" again, and 10 meters will once again be limited more for local communications, except for sporadic band openings, until the next sunspot cycle.

To join 10-10, work ten 10-10 members and LOG each 10-10 number, call

sign, operator's name and location. Send the list to your numeric call sign or DX area manager (as shown below), with \$5.00 U.S. new membership registration fee (\$6.00 for foreign addresses).

10-10 International Area Managers:

06450	USA 1 - Al Kaiser N1API,	194 Glen Hills Rd,	Meriden,	CT	
11566	USA 2 - Larry Berger WA2SUH,	9 Nancy Blvd,	Merrick,	NY	
21042	USA 3 - Chester Gardner N3GZE,	9028 Overhill Dr,	Ellicott Cty,	MD	
TN 37363	USA 4 - KY, TN, FL, VA, NC, SC only	Rick Roberts N4KCC,	7106 Ridgestone Dr,	Ooltewah,	
30540	USA 4 - GA, AL, Puerto Rico only	Jim Beswick W4YHF,	112 Owl Town Farm,	Ellijay,	GA
78559	USA 5 - Grace Dunlap K5MRU,*	Box 445,	LaFeria,	TX	
80473	*summer addr Jun-Oct	Box 13,	Rand,	CO	
94538	USA 6 - Dick Rauschler W6ANK,	4371 Cambria St,	Fremont,	CA	
85345	USA 7 - Willie Madison WB7VZI,	10512 W Butler Dr,	Peoria,	AZ	
45211	USA 8 - John Hugentober N3FU,	4441 Andreas Ave,	Cincinatti,	OH	
61611	USA 9 - Jim Williams N9HHU,	240 Park Rd,	Creve Coeur,	IL	
50532	USA 0 - Debbie Peterson KF0NV,	RR 1 Box 35,	Duncombe,	IA	
45211	All DX- Carol Hugentober K8DHK,	4441 Andreas Ave,	Cincinatti,	OH	

\*\* How do I join MARS?

To join MARS, you have to be 14 years or older (parental consent required under age 17), be a US citizen or resident alien, possess a valid Amateur Radio license, possess a station capable of operating on MARS HF frequencies, and be able to operate the minimum amount of time for each quarter (12 hours for Army and Air Force; 18 hours for Navy-Marines). Novices must upgrade to Technician within 6 months, else be dropped from MARS. No-Code Techs can apply, provided they have transmit and receive HF capability for MARS frequencies (they don't need transmit capability for Amateur HF frequencies). For application forms contact:

Chief, Air Force MARS  
HQ AFCC/SYXR (MARS)  
203 W. Losey St. Room 1020  
Scott AFB, IL 62225-5219  
(618)256-5552 Fax: (618) 256-5126

Chief, Army MARS  
HQ, US Army Information Systems Command  
ATTN: AS-OPS-OA  
Fort Huachuca, AZ 85613-5000

Chief, Navy-Marine Corps MARS  
Naval Communication Unit  
Washington, DC 20397-5161

\*\* How do I join RACES?

Contact your nearest Civil Defense or Emergency Management Agency. The Radio Amateur Civil Emergency Service is a part of a municipal, county, or state government. This does not mean, however, that every such government has a RACES program. If your government does not have a RACES, ask them to refer you to the nearest jurisdiction that does have a RACES program.

\*\* What organizations are available to help handicapped hams?

Courage Center  
Handihams  
2915 Golden Valley Rd  
Golden Valley, MN 55422  
(612) 520-0515

ARRL has a Handihams information package (get it by requesting it thru 2155052@mcimail.com) and a book called "The ARRL Plan for the Disabled", available at no charge from the ARRL Regulatory Information Branch.

\*\* I am looking for a specific ham, can anyone help me find him?

Rather than sending out a message on Usenet, you might first try directory assistance from the phone company or the locator service provided by the Salvation Army. A Salvation Army post in your

local area may be able to help you. If you have his/her callsign or name, you might also try one of the on-line callservers shown above. Also, the Quarter-Century Wireless Assn maintains a collection of callbooks going back to "the beginning of time". Their address is: 1409 Cooper Drive, Irving, TX 75061. Also, the Callbook has a dial-in line for accessing new ham callsigns. Try (1-708-234-8011) at 2400 baud.

\*\* Can I post my neat new ham related program on rec.radio.amateur.misc? This is really not a good idea, since many of the readers receive these newsgroups as mail digests. Posting is also a one-shot thing. If you post and someone missed it, it is gone. A better way would be to announce the existence of your program here, along with information on how to obtain a copy of your program. You can also submit it to one of the FTP archive sites, which will allow the world to access it without you having to mail it to each requestor. If you just GOTTA post it somewhere, post it to more appropriate groups, like comp.sources.unix or alt.sources or comp.binaries.ibm.pc.

\*\* Where can I get ham radio software for my computer?  
Atari: John Adams KC5FW, 17106 Happy Hollow, San Antonio, TX 78232  
"or tune into the weekly net Sundays 1600 UTC on 14.325 MHz".  
MacIntosh: MacNet, John Seney WD1V 144 Pepperidge Dr, Manchester, NH 03103 (sent 2 800k FORMATTED diskettes, one of which contains a TEXT file containing your name, address, home PBBS, your radio & computer interests and equipment).

(See also the information about Anonymous FTP and ham-related telephone BBS's above.)

\*\* Are there Dialup News services or BBSs for Amateur Radio? There are two major news services for ham radio. Both are run by amateurs, hence they are perfectly legal to rebroadcast on ham bands according to FCC Regulation 97.111B(6). To lessen the load on the dialup lines, consider getting your local repeater operator to rebroadcast it, or tape record it to play at your favorite HF net.

RAIN (Radio Amateur Information Network) is produced by Hap Holly, KC9RP, located in Illinois. The news is typically updated 8am CST Fridays. Phone numbers are 1-708-299-INFO (299-4636) and 1-708-827-RAIN (827-7246).

NEWSLINE is another, produced by Bill Pasternak, WA6ITF.

Donations

for NEWSLINE are accepted at Newsline Support Fund, c/o Dr. Norm Chalfin K6PGX, Pasadena, CA 91102. Phone numbers are:

Chicago	1-708-289-0423
N.Florida	1-407-259-4479
West Palm Beach	1-407-965-1234
Los Angeles	1-805-296-2407 (Instant Update Line)
Los Angeles	1-213-462-0008
NYC	1-718-353-2801
Ohio	1-513-275-9991
Seattle	1-206-368-3969

\*\* Where can I find VE sessions in my local area?

VE sessions are often announced in the local newspapers, but more often, they are announced by local radio bulletin boards. The local packet BBS will most likely have a monthly updated schedule for VE sessions. ARRL or W5YI can generally be called and asked

for

local VE sessions as well. Don't forget that you will need the following when you go in for an upgrade: a copy of your current Amateur license; your original Amateur license; any CSCEs

(duplicate

not required), if applicable and less than a year old; a picture

ID,

preferably a driver's license, passport or visa; and the VE test fee (approximately \$5 right now).

a

Bart Jahnke, KB9NM, the ARRL VEC Manager (bjahnke@arrl.org) posts a definitive listing of VE exams indexed by state (and some overseas sites, usually at embassies and military bases) to the net every 6 weeks or so.

\*\* Why isn't XXX available electronically?

This is a theme for a lot of common questions. For the "XXX" above, substitute any of the following:

- Callbooks
- DX QSL Lists
- Radio station lists
- ARRL publications (i.e. conference proceedings, repeater directory) and more...

Except for the Callbook (via callsign servers), these are not available

because of any of several reasons. Either there are copyright restric-

tions, royalty fees, or the source just may not have done the work. Also, not everyone that has information has reliable UseNet access.

In one example of someone's effort to bridge the information gap, there

is a new repeater-mapping project which can automatically accept entries via e-mail. If you can get enough details about a

repeater

for a complete listing, you may want to help by submitting an

entry.

For more information, use the following e-mail addresses:

repeaters@wattres.sj.ca.us

message Just send a message with only the word "help" in the

instructions. body. The project's software will reply with

steve@wattres.sj.ca.us

For other questions (Steve Watt KD6GGD)

make As soon as the list is big enough to be useful, the project will

it it available electronically. That will mean one less "why isn't

available electronically" question for the net.



From ikluft@amdahl.uts.amdahl.com Mon Feb 1 06:08:19 1993  
To: bowen@cs.Buffalo.EDU (Devon Bowen)  
Subject: for FTP - Ham Radio FAQ (3 of 3)

Rec.radio.amateur.misc Frequently Asked Questions  
Part 3 - Amateur Radio Advanced and Technical Questions

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Questions discussed in Part 3: (dates indicate last modification)

- \*\* What are the different US amateur classes and what can each of them do? (pre-4/92)
- \*\* What is the best way to learn Morse Code? (10/92)
- \*\* What is the standard for measuring Morse code speed? (pre-4/92)
- \*\* I'm confused. What do all those abbreviations mean??? (5/92)
- \*\* What do all those "tones" mean? (pre-4/92)
- \*\* Where can I learn more about Amateur Radio if I live outside the US? (4/92)
- \*\* How can I get a "reciprocal license" if I am a licensed ham from another country or if I am a FCC licensed ham who wants to operate in another country (on vacation)? (11/92)
- \*\* My apartment or housing complex does not allow outdoor antennas, now what do I do? (pre-4/92)
- \*\* I got TVI...HELP!!! (pre-4/92)
- \*\* Did you know that you can get college credit for being a ham? (pre-4/92)
- \*\* On what frequencies do JPL and GSFC retransmit the shuttle audio? (10/92)
- \*\* Can I take my HT on an airplane and operate it if I get the permission of the captain? (4/92)
- \*\* How do I modify my current Amateur license? (4/92)
- \*\* I'm confused about XXX, should I ask the FCC? (4/92)
- \*\* Is there any information on antique radios? (pre-4/92)
- \*\* Where can I buy vacuum tubes? (pre-4/92)
- \*\* What do I need to get started in packet radio? (5/92)
- \*\* What do I need to get started in satellite communications? (pre-4/92)
- \*\* What is available to get started in ATV, SSTV and WEFAX? (5/92)
- \*\* What are these contests I sometimes hear, and how do I participate? (7/92)

--Rec.radio.amateur.misc Frequently-asked Questions-----Part 3--

- \*\* What are the different US amateur classes and what can each of them do?
  - Novice - has CW (Morse code) privileges on 4 HF bands (80, 40, 15, and 10 meter), Voice privileges on 10 meters, and privileges on 2 VHF/UHF bands (220 MHz and 1290 MHz).
  - Required are 5 wpm Morse code test and 30-question Novice test.
  - Technician - has full privileges on all VHF/UHF bands above 30 MHz.
  - Required are Novice test and 25-question Tech test.
  - Technician may access Novice HF bands by passing the 5 wpm Morse code test.
  - General - has all Technician privileges, plus larger access to more HF bands, including CW and Voice on 160, 80, 40, 30, 20, 17, 15, 12, and 10 meter bands. A General class amateur can give



Novice

tests.

question

Required are 13 wpm Morse code test, Novice, Tech and 25-

80,

General test.

Advanced - has all General privileges, plus wider band access on

difficult

40, 20, and 15 meter bands. An Advanced class amateur can also become a VE and give tests to Novice and Tech tests. Required are 13 wpm Morse code test, Novice, Tech, General and 50-question Advanced test. The Advanced test is the most

of the five written tests.

Extra

Amateur Extra - has full privileges on all amateur bands. An

can become a VE and give all amateur tests.

Required are 20 wpm Morse code test, Novice, Tech, General, Advanced and 40-question Extra test.

\*\* What is the best way to learn Morse Code?

if

This is becoming an increasingly common question as many "no-code" Technicians realize they can add more privileges to their license

they learn Morse Code. The following list of suggestions should be helpful in finding ways to approach the effort.

whenever

\* Listen to code at a rate faster than you can copy.

\* Participate in Novice-Roundup and/or Field Day. Practice

you get the chance!

\* Avoid the "deciphering" plateau around 5 WPM and and character plateau at 10 WPM by listening to the fast Farnsworth-paced "beat" of each letter and the "beat" of common words. (See the question on Morse code speed for more information on Farnsworth pacing.)

characters

\* Practice to develop a "copy buffer" so you copy about 5

done.)

characters behind. (This is not easy but it's how the higher speeds are

test

\* Practice both with headphones and "open-air" copy as the code

fumble

may be in either format. (If you only practice one, you may

on the other.)

\* Most of all, don't give up! Recognize when you reach plateaus and keep trying until you break through them.

\*\* What is the standard for measuring Morse code speed?

speed.

The word PARIS was chosen as the standard length for CW code

three

Each dit counts for one count, each dash counts for three counts, intra-character spacing is one count, inter-character spacing is

is

counts and inter-word spacing is seven counts, so the word PARIS

exactly 50 counts:

PPPPPPPPPPPP AAAAA RRRRRRRRR IIIII SSSSSSSSS  
 1 1 3 1 3 1 1 3 1 1 3 3 1 1 3 1 1 3 1 1 1 3 1 1 1 1 1 7 =  
50 ^ ^ ^  
 ^Intra-character ^Inter-character Inter-word^

So 5 words-per-minute = 250 counts-per-minute / 50 counts-per-word  
or  
one count every 240 milliseconds. 13 words-per-minute is one  
count every ~92.3 milliseconds. This method of sending code is  
sometimes called "Slow Code", because at 5 wpm it sounds VERY SLOW.

The "Farnsworth" method is accomplished by sending the dits and  
dashes and intra-character spacing at a higher speed, then increasing the  
down inter-character and inter-word spacing to slow the sending speed  
to the desired speed. For example, to send at 5 wpm with 13 wpm  
spacing characters in Farnsworth method, the dits and intra-character  
the would be 92.3 milliseconds, the dash would be 276.9 milliseconds,  
spacing inter-character spacing would be 1.443 seconds and inter-word  
spacing would be 3.367 seconds.

\*\* I'm confused. What do all those abbreviations mean???

AM	Amplitude Modulation
AMSAT	Amateur Satellite Corporation
AMTOR	Amateur Teleprinter Over Radio. A more sophisticated version of RTTY. Also used commercially as SITOR (Simplex Teleprinter Over Radio).
ARRL	American Radio Relay League
ATV	Amateur Television - a way to see who you're talking to!
CAP	Civil Air Patrol is a volunteer organization that searches for downed aircraft and missing kids and uses frequencies just outside of the ham bands and often uses modified Amateur radios
CB	Citizen's Band radio, this is NOT part of Amateur Radio and does not require any license to operate
CQ	An on-the-air request for a conversation with anyone
"dupes"	A dupe sheet is a duplicate check sheet, in matrix format, used to quickly check that you have not had a "duplicate" contact with someone (on a specific band or mode) in a contest
Elmer	An amateur radio mentor, or "Master Craftsman" to a new ham.

Could refer to anyone, regardless of age or gender.  
 FCC Federal Communications Commission, the "law enforcers"  
 FM Frequency Modulation  
 FieldDay A June activity to practice emergency communications for  
 24 hours....wives call it 'an exercise in male  
 bonding' :-).  
 HF High Frequency - 3 MHz to 30 MHz  
 HT Handy-Talky, a shorthand for "hand held radio"  
 LF Low Frequency - 30 kHz to 3 MHz  
 MARS Military Affiliate Radio System, military affiliated  
 Amateurs who provide free communications for overseas GIs and  
 other Federal services. MARS operators are licensed under  
 DoD instead of FCC.  
 NTS National Traffic System, a way to send radiograms  
 OF Old Friend, or Old F#\$%, used to denote an older ham  
 OM Old Man, refers to any ham, including female hams  
 packet computer bulletin boards/electronic mail via Amateur  
 Radio  
 PRB Private Radio Bureau, administers Amateur and CB  
 services  
 QSO One of the Q signals used in Morse code to mean  
 "conversation"  
 QCWA Quarter Century Wireless Association, membership means  
 you've been a ham for more than 25 years  
 RTTY Radio Teletype - older form of computer communications  
 on HF  
 SAREX In Amateur Radio talk, Shuttle Amateur Radio  
 EXperiment, a chance to talk to astronauts in space. In CAP talk,  
 Search and Rescue EXercise, practicing for the real thing.  
 SK Silent Key, a nice polite way to say a ham has passed  
 on "to that great antenna farm in the sky"  
 SSB Single Side Band - need less band width than AM or FM  
 SSTV Slow Scan TeleVision - REALLY slow, low data rate,  
 typically used on the lower frequency bands  
 UHF Ultra High Frequency - 300 MHz and above  
 ULF Ultra Low Frequency - 30 Hz to 300 Hz  
 VHF Very High Frequency - 30 MHz to 300 MHz  
 VLF Very Low Frequency - 300 Hz to 30 kHz, audio  
 frequencies  
 WARC World Administrative Radio Conference, a summit  
 meeting that occurs every few years, required by international  
 treaty to determine how the spectrum get sliced up to all vying  
 communications services (last one was in 1992)  
 XYL eX-Young Lady, or wife  
 YL Young Lady, non-ham girlfriend or female ham  
 2m Shorthand for "2 meters" (144-147.995 MHz), which is a  
 reference to the wavelength of a common Amateur

frequency

band used for local communications

\*\* What do all those "tones" mean?

Sub-Audible Tone: A low tone that you're not supposed to be able to hear. It's used as a "PL Tone." PL is "Private Line", a trademark of Motorola for their implementation of CTCSS (Continuous Tone Coded Squelch System). Basically, the transmitter sends the signal with the Sub-Audible tone and the receiver only opens when it hears signals with that tone. Signals without the proper tone are ignored.

This

is useful for "closed" repeaters, or for repeaters on the same frequency that have overlapping geographic areas.

transmit.

Tone encode refers to the feature of providing the tone on

receive.

Tone decode refers to the feature of responding to the tone on

DTSS

Tone squelch refers to all of the above. DTMF refers to Dual Tone Multi-Frequency, or "Touch Tone" which is a trademark of AT&T.

of

probably means Dual Tone Squelch System and refers to the feature

which

providing a predefined sequence of Touch Tone digits to open the repeater for transmit. DTSS is an alternate method from CTCSS,

doesn't

provides a way to use a "closed" repeater even if your radio

do Sub-Audible Tones.

\*\* Where can I learn more about Amateur Radio if I live outside the US?

Write to the ARRL and ask. They can usually tell you how to get a license in your country.

Send

If you know of any location where this information is available electronically, whether by an e-mail server, anonymous FTP, or a contact person, please mail it to us so we can include it here.

it to hamradio-faq@amdahl.com.

\*\* How can I get a "reciprocal license" if I am a licensed ham from another country or if I am a FCC licensed ham who wants to operate in another country (on vacation)?

Editor's note (11/92): the regulations affecting this question are being changed. Contact your local Volunteer Examiner (VE) and ask about a VE 60-day pass. More details will be included in future revisions of the FAQ.

This paragraph is soon to be obsolete:

You need to submit a FCC Form 610-A to the FCC, PO Box 1020, Gettysburg, PA 17326. They will then send you a reciprocal permit for alien amateur licensee (FCC Form 610-AL). You must be a

citizen

of a country with which the United States has arrangements to grant reciprocal operating permits to visiting alien Amateur operators.

This information is still current:

For FCC licensed hams operating abroad, the following guidelines apply:

have \* A reciprocal license is required in all foreign countries (that where a reciprocal operating agreement with the US), except Canada,

the FCC license is automatically valid.

\* Send a SASE to ARRL Regulatory Information Branch, telling them which country you are going to visit and they will send you the info and an application form. Foreign hams can likewise request information from their national Amateur radio society.

draft \* Submit your application with a certified copy of your Amateur license (ie, notarized copy), and fee if applicable (use a bank

of a bank that does business in that country) to the appropriate licensing administration of the foreign country. Processing may take 30 to 90 days.

and \* If less than one month, you could try sending the application pick up the permit upon arrival in that country.

equipment \* Most countries will not allow you to bring communications into their country without a license or permit. If you applied,

but haven't received the permit yet, show the copy and your FCC

license to the customs officer, however, the equipment may still be held at customs until your departure.

license \* Be sure to use only those frequencies covered by your FCC

which are also used in the foreign country, unless otherwise authorized.

\*\* My apartment or housing complex does not allow outdoor antennas, now what do I do?

Many First of all, don't despair. Many hams have similar problems.

up books offer advice for the growing group of hams that cannot put

antennas. Some options are:

up \* Install an "invisible" antenna made of magnet wire.

\* Disguise an antenna as a flag pole.

\* Install an antenna in the attic.

\* ASK the apartment manager. You may find they will let you put

something as long as it "is invisible" or "doesn't disturb your neighbors" or "doesn't attract lightning".

\* Operate primarily from your car.

\* If the restriction is due to local ordinance, you may have

relief

via PRB-1. Meet with the local government and seek an informal compromise. It is possible to win in court...but it's expensive

and

time consuming.

your

\* If you are restricted by "covenants" attached to the deed of

considered

home, your options are severely limited. Covenants are

you

to be private, voluntary contracts between individuals and are outside of the intended application of PRB-1. In many cases,

Sometimes

can petition the Homeowner's Association for an exception.

you can win in court on the basis that other violations of the covenants by others without action taken constitutes abandonment of the agreement.

the

\* For further information, contact the General Counsel's office of

ARRL, 225 Main St, Newington, CT 06111.

\*\* I got TVI...HELP!!!

Here's some hints on Television interference, but this is not a complete list. There are also books on the subject available from ARRL.

distribution

\* If cable TV is an underground feed, look for central

box. Check for a grounding rod.

and

\* Try installing torroids on the cable TV cable close to the TV,

maybe torroids on the AC cord as well.

\* VCRs are notorious for RF leakers, try disconnecting the VCR.

\* Check to see if interference is better or worse when cable is disconnected and you use rabbit ears instead. It could be the cable company's problem!

\* Calling the cable company may get results, since they are also responsible for RF leakage from their equipment. However, they are very often obstinate. Good luck! Try some or all of these suggestions before calling the cable company:

frequency,

1. Log the interference, noting geographical location,

and characteristics.

preferably

2. Bring it to the cable company's attention in writing,

addressed to "Chief Engineer", or "Technical Staff".

3. Don't be accusatory, instead ask for assistance in resolving the problem. Try to work it out with someone technically knowledgeable.

too

4. Do mention your "licensed radio system", but try not to be

specific about "ham" or "CB" unless requested.

Make

\* Try moving the radio antenna further away from the TV sets.

sure the SWR is LOW.

\*\* Did you know that you can get college credit for being a ham?

It's true! You can receive up to 14 credits in electronics and

engineering thru placement tests for CLEP (College Level Entrance Placement) exams and DANTEs (Defense Activity for Non-Traditional Educational Support) exams if you have an Advanced or Extra class Amateur license. For more information, ask your campus education office or (for DANTEs) your military education office.

\*\* On what frequencies do JPL and GSFC retransmit the shuttle audio?

Station	VHF	10m	15m	20m	40m	80m	Video
WA3NAN	147.45	28.650	21.395	14.295	7.185	3.860	
W6VIO	224.04		21.280	14.282	7.165		
K6MF	145.585				7.165	3.840	
W5RRR	146.64	28.495	21.350	14.280	7.227	3.850	
W6FXN	145.46						
KA9SZX	146.88						426.25
K4GCC	146.94						
WA4VME	145.17						

All frequencies are in MHz. Use FM on VHF, USB on 10-20m, LSB on 40-80m.

WA3NAN - NASA Goddard Space Flight Center (GSFC), Greenbelt, MD  
W6VIO - NASA Jet Propulsion Laboratory (JPL), Pasadena, CA  
K6MF - NASA Ames Research Center (ARC), Moffett Field, CA  
W5RRR - NASA Johnson Space Center, Houston, TX  
W6FXN - Los Angeles, CA  
KA9SZX - Champaign-Urbana, IL  
K4GCC - Titusville, FL (near or at Kennedy Space Center)  
WA4VME - Melbourne, FL (near or at Kennedy Space Center)

\*\* Can I take my HT on an airplane and operate it if I get the permission of the captain?

Technically, maybe. But don't count on it. In general, you can't use a radio or scanner on an airline (or charter) \*unless\* the airline allows it and the pilot-in-command (PIC) determines that it will not interfere with the instruments and radios on that specific aircraft. Very few US airlines allow passengers to use radios so be ready to disconnect the antenna when you ask. (Don't even ask to transmit.) For reference (in the US) the pertinent portion of the Federal Aviation Regulations (FARs) is Part 91, paragraph 91.21. Due to airport security, you may have a little difficulty carrying the HT (or any electronic equipment) onto the airplane. Generally, you can appease the security guards, simply by showing that the unit is operational and doesn't have a bomb inside. For a radio, just turning it on and opening the squelch satisfies them. Expect more difficulty during periods of increased security.

you  
radio to  
so  
knows

On a private airplane, it is legal to operate an amateur radio if you have the permission of the PIC. It is still possible for the radio to interfere with the plane's navigation or communication equipment, so be sure to ask first. Always obey the requests of the PIC. He knows his airplane and radios better than you do.

\*\* How do I modify my current Amateur license?  
location,  
FCC  
a  
Check  
SIGN  
letter  
you  
CALLSIGN,  
keep  
1020,  
only)

To modify your license (change of address, change of station change of name, renewal, or even change of callsign), submit an Form 610 to the FCC. Forms are available from the FCC or ARRL or a local VE session or ham radio store. Do NOT use a photocopy. Check off the appropriate boxes, fill in the new/changed information, SIGN THE FORM, and attach a copy of your current license (or a brief letter of explanation for its absence, ie, "my dog ate it"). NOTE: If you check the box to change your callsign, YOU WILL GET A NEW CALLSIGN, even if all you wanted was to supply a new address; if you want to keep your callsign, DON'T CHECK THAT BOX. Send the form to FCC, POB 1020, Gettysburg, PA 17326. Turnaround time (for CURRENT licensees only) is about 2-4 weeks.

past  
You  
pool  
on  
sure to

ANY ham can apply for a new callsign (this is different from the where you can only get a new callsign if you move or upgrade). You can't specify WHICH ONE you want, a new one comes from the same pool as new licensees for that class of license. The callsign is based on your mailing address. For overseas military and civilians, be sure to specify a station location that is within FCC jurisdiction.

before  
after  
renew  
year

New licenses are for 10-year terms. If you apply for renewal before its expiration date, the expired license is valid for 60 days after expiration to allow for the new license to arrive. You have up to 2 years after expiration (5 years for an old 5-year license) to renew before re-examination is required (but you can't operate with an expired license). You will lose your current callsign after 1 year



after expiration if you don't renew.

\*\* I'm confused about XXX, should I ask the FCC?  
Whatever "XXX" is in this case, the overwhelming ARRL and net opinion is a resounding "NO!", at least not as a first step. Amateurs are generally very law-abiding people and have historically written the FCC asking for clarification on some operating practice or another. This is a very dangerous practice, for several reasons. Most amateur radio regulations (contained in Part 97) are generally very loosely-worded, so as not to restrict experimentation and new motion techniques. But asking the FCC for a clarification will set in the process of "clarifying" it for everyone (i.e. new rulemaking.) when Examples of such restrictive rulings include varying topics like BBS Hams can help non-profit agencies or effectively forcing packet result sysops to screen messages before forwarding them. They were the a of well-intentioned questions by Hams that forced the FCC to make to ruling where they previously allowed the amateur radio community to police itself. Under all circumstances, it is better to first read the rules yourself. Then, if there's a problem, ask your national amateur radio organiza- tion (such as the ARRL in the US) which can give qualified advice about interpretation of FCC regulations. Organizations like the ARRL also have the influence to ask the FCC informally, without forcing a ruling. Even if asking the FCC doesn't result in a restrictive ruling, it is generally a good idea to not overburden an under-staffed and under- funded government agency with a lot of correspondence. The Amateur Radio Service has traditionally been a low-workload "hands-off" don't service, and has enjoyed a wide latitude from the FCC. Please ruin this image for your fellow amateurs.

\*\* Is there any information on antique radios?  
Antique radio classifieds: ARC, PO Box 802-B6, Carlisle, MA 01741  
- old radios, TVs, ham equipment, 40s and 50s radios,

telegraph, books, etc.  
Hallicrafter Service manuals: Ardco Electronics, PO Box 95, Dept  
Q,  
Berwyn, IL 60402  
Antique Wireless Association, Bruce Kelley, W2ICE, Route 3,  
Holcomb,  
NY 14469 - sponsors the Wireless Museum

\*\* Where can I buy vacuum tubes?

Kirby, 298 West Carmel Drive, Carmel, IN 46032 (1-317-843-2212)  
Antique Electronic Supply, Box 1810, Tempe, AZ 85281 (1-602-894-  
9503)

Fair Radio Sales, Box 1105, Lima OH 45802  
Fala Electronics, Box 1376-1 Milwaukee, WI 53201  
Southern Radio Supply, 1909 Tulane Ave, New Orleans, LA 70112  
(10504-524-2343)

\*\* What do I need to get started in packet radio?

Packet radio is a digital form of communication using radios.  
There

are OTHER digital forms, as well, like CW, RTTY and AMTOR. To use  
packet radio, you'll need a radio (2 meters and 70 centimeters are  
most popular), a box that converts radio signals to digital

signals

control- that a computer can understand (called a TNC or terminal node  
ler) and a computer or terminal. For some computers or TNCs you

may

need special software as well. However, most TNCs and computers  
get along quite well with just a terminal emulator software package.

Most

personal computers can be interfaced to use with packet radio.

Since

there are many digipeaters, generally even an HT will work with  
packet radio.

Your first source of information on Packet Radio should be the  
rec.radio.amateur.packet newsgroup. It has its own regularly-

posted

FAQ that goes into much more depth on the subject than this one  
can.

See also the mailing list and archives info in Part 2.

For more information on packet radio, you might try TAPR (Tucson  
Amateur Packet Radio), PO Box 12925, Tucson, AZ 85732 (602-749-  
9479).

\*\* What do I need to get started in satellite communications?

For more information about Amateur Satellite Communications, try  
AMSAT (Radio Amateur Satellite Corporation), PO Box 27,  
Washington,

DC 20044 (301-589-6062). They also have an international net on  
Sundays on 14.282 MHz at 1900Z.

\*\* What is available to get started in ATV, SSTV and WEFAX?

This is a large subject area in itself. Amateur Television (ATV),

transmitted Slow-scan TV (SSTV), and Weather FAX (WEFAX) all deal with pictures. (ATV includes moving pictures and audio just like your household TV.)

Equipment is available to interface to most common microcomputers including PC clones, Amigas (which are prominent in most video applications anyway), Atari ST, and others. (At last check, we didn't see Macintosh on the list.) There are also a handful of publications on the subject.

All this information is available via FTP in the /pub/ham-radio directory at ftp.cs.buffalo.edu. (See Part 2 for more information on FTP.) The file called sstv\_wefax\_info is maintained by John Langner WB2OSZ (johnl@avs.com).

mail The ARRL e-mail server contains an introduction to SSTV in the file sstv-info. (See Part 2 for more information on the ARRL e-mail server.)

and Another resource is the regularly-posted UseNet Elmers Directory. The list contains a volunteer Elmer who can help with ATV, SSTV, WEFAX questions.

\*\* What are these contests I sometimes hear, and how do I participate?

can Dozens of contests are held each year, usually at weekends, and provide useful operating experience. They typically last for 24 or 48 hrs, and are usually on SSB or CW only (the Russian CQ-Mir contest is on both modes at the same time). You can participate by making one QSO or several thousands. In most contests you send a signal report (traditionally 59 or 599) followed by a number that is different for different contests - the most common one is a serial number (so you send 599 001 for your first QSO, then 599 002 etc). The exchange may, however, be your age (All Asian contests), your CQ or ITU zone (CQWW and IARU contests, respectively), your state (ARRL contests) or something else. Read "Contest Corral" in QST for the rules for all major contests - the more serious contester may wish to subscribe to the National Contest Journal, or join the e-mail contest mailing group (write to Trey, WN4KKN, at garlough@tgv.com). Knowing the rules can

W

work

(worked

not

operating

recommended

prevent embarrassment - you will get a cool reception if you are a  
or VE and call a W/VE in the ARRL contests, since they can only  
non-W/VE stations. Otherwise, QSOs made in contests are just as  
valid for DXCC (DX Century Club - more than 100 contacts), WAS  
all states) and other awards as are 30-minute ragchews. Although  
strictly a contest, the annual Field Day provides very useful  
experience under less than optimal conditions and is highly  
for new operators - check with your local club for their Field Day  
plans some weeks before the (late June) event.



Subject: Frequently Asked Questions  
for  
Amateur Packet Radio

Version 1.5  
4 October 1991

This document is for unlimited distribution.

Please send corrections and additions to Steve Schallehn  
(steve@matt.ksu.ksu.edu). The Packet Radio FAQ's will be posted  
on a monthly basis to rec.radio.amateur.packet. The current  
version of this document is available via anonymous FTP at  
ftp.cs.buffalo.edu.

- 1.0 Basic Packet Radio Information
  - 1.1 What is packet radio?
  - 1.2 What is amateur radio?
  - 1.3 What can I do on packet radio?
  - 1.4 Why packet over other digital modes?
  - 1.5 What elements make up a packet station?
    - TNC (Terminal Node Controller)
    - Computer or Terminal
    - A radio
  - 1.6 What do you mean we can all use the same channel?
  - 1.7 What is AX.25 ?
  - 1.8 Definitions: Commonly used terms in Amateur Packet Radio
  - 1.9 Do's and Don'ts : Rules and Regulations
- 2.0 Computing Network Resources for Amateur Packet radio
  - 2.1 What Newsgroups/ mailing lists are available?
  - 2.2 What anonymous FTP sites are available
  - 2.3 Are there any gateways for mail or news
    - Internet / Packet Radio BBS Gateway
    - LAN Gateways (Packet wormholes via Internet)
- 3.0 Networking and special packet protocols
  - 3.1 Are there any other protocols in use other than AX.25?
  - 3.2 What is TCP/IP?
  - 3.3 Networking Schemes
    - What are some of those other networking schemes?
    - Digipeaters
    - KA-Nodes
    - NET/ROM
    - ROSE
  - 3.4 BBS message transfer

1.0 Basic Packet Radio Information

### 1.1 What is packet radio?

Packet radio is digital communications via amateur radio. Packet radio takes any digital data stream and sends that via radio to another amateur radio station. Packet radio is so named because it sends the data in small burst, or packets.

### 1.2 What is amateur radio?

Amateur Radio (sometimes called Ham Radio) is individuals using specified radio frequencies for personal enjoyment, experimentation, and the continuation of the radio art. Amateur radio operators must be licensed by their government. In the United States, the Federal Communications Commission issues amateur radio licenses. Normally, a test on operating practices, radio theory, and in some cases morse code proficiency test is administered. Amateur radio is not to be used for commercial purposes. Also, amateur radio operators are restricted from using profanity and using amateur radio for illegal purposes.

For more information on Amateur Radio in general, see the monthly frequently asked questions posting in rec.radio.amateur.misc.

### 1.3 What can I do on packet radio?

#### Keyboard-to-Keyboard contacts:

Like other digital communications modes, packet radio can be used to talk to other amateurs. For those who cannot use HF frequencies, 2 amateurs can talk to each other from long distances using the packet radio network.

#### Packet BBS operations:

Many cities have a packet Bulletin Board System (BBS) attached to their local packet network. Amateurs can check into the BBS's and read messages from other packet users on almost any topic. BBS's are networked together over the packet network to allow messages to reach a broader audience than your local BBS users. Private messages may also be sent to other packet operators, either locally or who use other BBSs. BBS's have the latest ARRL, AMSAT, and propagation bulletins. Many BBS's have a file section containing various text files full of information on amateur radio in general.

#### DX Packet Cluster:

A recent development is use of packet radio for DX spotting. HF operators connect to the local DX Packet Cluster for the latest reports on DX. Often a user will 'spot' some hot DX and distribute the DX report real time.

#### File Transfer:

With special software, amateurs can pass any binary files to other amateurs. Currently, this is done with TCP/IP communications, YAPP, and other specialized protocols.

#### Satellite Communications:

Many of the amateur radio satellites contain microcomputer systems that can provide special information to amateurs. Some satellites contain CCD cameras on board and you can download images of the earth and the stars. Others provide store and forward packet mailboxes to allow rapid message transfers over long distances. Some satellites use AX.25, some use special packet protocols developed for satellite communications. A few transmit AX.25 packets over FM transmitters, but most use SSB transmissions.

#### 1.4 Why packet over other digital modes?

Packet has three great advantages over other digital modes: transparency, error correction, and automatic control.

The operation of a packet station is transparent to the end user; connect to the other station, type in your message, and it is sent automatically. The Terminal Node Controller (TNC) automatically divides the message into packets, keys the transmitter and sends the packets. While receiving packets, the TNC automatically decodes, checks for errors, and displays the received messages. In addition, any packet TNC can be used a packet relay station, sometimes called a digipeater. This allows for greater range by stringing several packet stations together.

Packet radio provides error free communications because of built in error detection schemes. If a packet is received, it is checked for errors and will be displayed only if it is correct.

With VHF/UHF packet, many countries allow packet operators to operate in automatic control mode. This means that you can leave your packet station on constantly. Other users can connect to you at any time they wish to see if you are home. Some TNC's even have Personal BBS's (sometimes called mailboxes) so other amateurs can leave you messages if you are not at home.

Another advantage of packet over other modes is the ability for many users to be able to simultaneously use the same frequency channel simultaneously.

#### 1.5 What elements make up a packet station?

##### TNC (Terminal Node Controller)

A TNC contains a modem to decode the audio signals into digital signals. It also contains a modem and a micro-computer to convert the digital signals into text that can be sent over a RS-232 port to the computer. The CPU also handles the protocol overhead of the packet station. When you send data, it takes the text, puts error checking on it (CRC) and also puts it in an envelope for sending. When receiving a signal, it takes it out of the envelope, and sends the message to the computer.

Most TNC's use 1200 baud for local UHF/VHF packet and 300



baud for long distance HF packet communications. For VHF/UHF packet, higher speeds modems are available, but often are harder to interface.

#### Computer or Terminal

This is the user interface. A computer running a terminal program or just a dumb terminal can be used. For computers, any phone modem communications program can be adapted for packet use or customized packet radio programs are available.

#### A radio

For 1200 baud UHF/VHF packet, commonly available narrow band FM voice radios are used. For HF packet, 300 baud data is used over single side band modulation. For high speed packet (anything greater than 1200 baud), special radios or modified FM radios must be used.

### 1.6 What do you mean we can all use the same channel?

Packet radio uses a protocol called AX.25. AX.25 specifies channel access (ability to transmit on the channel) to be handled by CSMA (Carrier Sense Multiple Access) If you need to transmit, your TNC monitors the channel to see if someone else is transmitting. If no one else is transmitting, then the radio keys up and the TNC sends it's packet. All the other stations hear the packet and do not transmit until you are done. Unfortunately, 2 stations could accidentally transmit at the same time. This is called a collision. If a collision occurs, neither TNC will receive a reply back from the last packet it sent. Each TNC will wait a random amount of time and then retransmit the packet.

In actuality, a more complex scheme is used to determine when the TNC transmits. See the "AX.25 Protocol Specification" for more information.

### 1.7 What is AX.25 ?

AX.25 (Amateur X.25) is the communications protocol used for packet radio. A protocol is a standard for how two computer systems are to communicate with each other, somewhat analogous to using business format when writing a business letter. AX.25 was developed in the 1970's and based of the wired network protocol X.25. Because of the difference in the transport medium (radios vs wires) and because of different addressing schemes, X.25 was modified to suit amateur radio's needs. AX.25 includes a digipeater field to allow other stations to automatically repeat packets to extend the range of transmitters. One advantage of AX.25 is that every packet sent contains the senders and recipients amateur radio callsign, thus providing station identification with every transmission.

### 1.8 Definitions: Commonly used terms in Amateur Packet Radio

HDLC : (High-Level Data Link Control Procedures) A standard for high level link control. (ISO 3309)

AX.25 : Amateur X.25 protocol. The basis of most packet systems. See section 1.7.

TAPR : Tucson Amateur packet Radio. Was the first group to create a packet radio TNC using AX.25. Soon a TAPR TNC became cloned by many others. TAPR continues development of packet radio equipment.

digipeater : A packet radio station used for repeating packets. See section 3.3.1 for more information.

digi : Short name for a digipeater

NET/ROM : A scheme for packet radio networking. See section 3.3.3 for more information.

TCP/IP : Transmission Control Protocol/Internet Protocol. A set of utility programs used over AX.25. See sections 3.2 for more information.

KA9Q NOS : (KA9Q Network Operating System) A TCP/IP program originally developed by Phil Karn, KA9Q. Currently there are many different versions available. See section 3.2 for more information.

NODE : A network node. Often a network node running NET/ROM.

KA-Node : A simple networking scheme developed by TNC maker Kantronics. See section 3.3.2 for more info.

CSMA : Carrier Sense Multiple Access. A system allowing many stations to use the same radio frequency simultaneously for packet communications.

TNC : Terminal Node Controller. See section 1.5 for more information.

AMPR : Amateur Packet Radio.

44 net : The class A network designator for TCP/IP amateur packet radio. All numerical TCP/IP addresses are in the format of 44.xxx.xxx.xxx .

ampr.org : The high level domain recognized on Internet for amateur packet radio TCP/IP.

RS-232 : (RS-323C) A standard for interconnection of serial peripherals to small computer systems. In packet radio, RS-232 is the most common interface between TNC's and the Computer/Terminal.

protocol : A standard used for intercommunications between different computer systems.

CRC : Cyclical Redundancy Code. The error detection scheme included in each packet. Verify that the packet was received error free.

KISS : Keep It Simple Stupid. A simple interface developed for communications between TNCs and computers. This allows for most of the packet processing to be handled by the computer. Commonly used with packet TCP/IP software.

modem : Modulator/Demodulator. Converts the analog signals into binary data stream (a series of ones and zeros) for the TNC or a micro-computer . First step in decoding packets.

FCC : Federal Communications Commission. Regulates and issues licenses for amateur radio in the United States.

FM : Frequency Modulation. The radio modulation scheme used for VHF and UHF packet communications.

SSB : Single Side Band Modulation. The radio modulation scheme use for HF packet and satellite packet communications.

AFSK : Audio Frequency Shift Keying. A method of representing digital information by using different audio frequencies modulated on a carrier.

FSK : Frequency Shift Keying. A method of representing digital information by shifting the radio carrier different amounts to represent ones and zeros.

LAN : Local Area Network. A packet network developed for communications throughout a city or region. Often, the LAN uses separate frequencies from inter-city packet links.

## 1.9 Do's and Don'ts : Rules and Regulations

NOTE: These regulations apply only to amateurs regulated by the FCC (United States), but often are similar to regulations in other countries.

[Since I have no experience with amateur radio in other countries, I cannot make any comments. Please bring any notable exceptions to my attention. -Steve]

Although there are no specific rules that apply to amateur packet radio, the general amateur radio rules force some restrictions on packet usage.

Can I set up a TNC at home and one at work so I can check my Electronic mail via packet?

This cannot be done without special restrictions. Amateur radio rules prohibit any business. Since you could have mail from your boss (or maybe even someone selling you

something over Internet), that would constitute business activity and is specifically prohibited.

Profanity can also be a complication. Since you have no control over the language used in E-mail, proper filtering is required. Since no filter scheme can catch every offense, it is best to say every message must be hand filtered.

I would like to set up a packet radio gateway between a land line computer network and the packet network. Is this possible?

Yes, and there are several such gateways in use, but they must be managed with caution. Electronic mail may be pass FROM the packet network INTO the land line network without intervention. However, mail passed TO packet radio is considered third party traffic (the sender is not an amateur) and these messages must be hand filtered to assure that rules of message content are followed.

It's my license if I send use packet radio illegally anyway, so what does anyone else care!

Packet radio is one of the few NETWORKED systems in amateur radio. Many people have helped develop the network and there are many amateurs who own parts of the packet radio network. Sending packet BBS mail, digipeating, and sharing the channel involves the licenses of MANY people. Because of FCC rules stating that anything to come out of a transmitter (either in automatic mode or via your direct control) is the licensee's responsibility, one illegal message sent over the packet radio network could literally jeopardize the license of thousands of other amateurs. When in doubt, it is best to check with other amateurs about sending the message before it is sent.

I have some ideas on how to use packet radio in a new way, but I don't know if it is legal. Who could tell me if I can do it legally?

The worst thing you can do is talk to the FCC about such an issue. The FCC rules are written to be general enough to encompass but not restrict new radio activities. In the past, any non-thought-out requests sent to the FCC have meant a reduction of privilege for all amateur radio operators.

The best source for legal assistance is your national amateur radio association. In the United States, that is the American Radio Relay League (ARRL). Another good place for such conversations is over Usenet/packet mailing lists, or the amateur radio BBS network.

## 2.0 Computing Network Resources for Amateur Packet radio

This section summarizes the resources available on Internet for amateur packet radio operators.

### 2.1 What Newsgroups/mailing lists are available?

This is a list of all groups that regularly discuss amateur packet radio. For newsgroups, join the group through use of your news reader. For mailing lists, add a '-request' to the end of the list name to request subscriptions. For listserv groups, send mail to 'listserv' at the node which contains the list. The first line of the mail should be 'SUBSCRIBE groupname yourname'. Send the command 'help' for more information.

rec.radio.amateur.packet (Newsgroup):

General discussions involving Packet Radio.

rec.radio.amateur.misc (Newsgroup):

General amateur radio discussion. Usually does not contain any particular information about Amateur Packet Radio.

rec.radio.amateur.policy (Newsgroup):

Discussion of regulation policies regarding every aspect of amateur radio. Occasionally deals with policies of packet coordination and legal issues of packet radio.

rec.radio.swap (Newsgroup):

General For-Sale for any radio equipment. Occasionally will have packet equipment for sale. Recommended location for any amateur packet radio for-sale items.

info-hams@ucsd.edu (Listserv group):

A digest redistribution of the rec.radio.amateur.misc Usenet discussion.

packet-radio@ucsd.edu (Listserv group):

A digest redistribution of the rec.radio.amateur.packet Usenet discussion.

ham-policy@ucsd.edu (Listserv group):

A digest redistribution of the rec.radio.amateur.policy Usenet discussion

hs-modem@wb3ffv.ampr.org (Mailing list):

Discussion of high speed modems and radios available and future plans. Also includes discussion of networking using high speed modems.

tcp-group@ucsd.edu (Mailing list):

Group discussion technical developments of TCP/IP over packet radio and use of the NOS TCP/IP programs.

gateways@uhm.ampr.org (mailing list):

Discussion of current gateways and future plans for gateways. May deal with sensitive internetworking issues.

For all lists at ucsd.edu, archives may be found via anonymous FTP at ucsd.edu. Some listserv groups also have archives. Send the command 'help' to the group's listserv for more information. Digest mailings for the ucsd.edu discussions are also available. Send mail to listserv@ucsd.edu with the first line being 'longindex' for more information.

## 2.2 What anonymous FTP sites are available for getting packet radio information and programs?

This is a sampling of FTP sites that carry amateur packet radio related files. Consult the Archie archive server for info on locating particular files. For more information on using archie, send mail to archie@cs.mcgill.edu with the line 'help'.

ucsd.edu

Primary distribution site of KA9Q's derived TCP/IP packages. Also, general packet radio information.

wsmr-simtel20.army.mil

Very large collection of amateur radio software.

wuarchive.wustl.edu

Mirror site of Simtel20 archives. Unix directory structure - Easier to use than the simtel20 archive.

ftp.cs.buffalo.edu

Supplemental archive site for amateur radio information. Contains current copies of all rec.radio.amatuer.\* FAQ's.

tomcat.gsfc.nasa.gov

Packet software including Baycomm, Rose, G8BPQ, NOS, etc.

## 2.3 Are there any gateways for mail or news between Internet and Amateur Packet radio?

Internet / Packet Radio BBS Gateway

Jim Durham, W2XO, maintains a gateway between Internet and the Packet radio BBS system.

To mail from Internet to Packet:

1. Mail to: "bbs@w2xo.pgh.pa.us"
2. Make the first line of the text a Packet BBS "send" command, ie:  
SP TOCALL @ BBSCALL.ROUTING-HINTS < FROMCALL
3. The "subject" line of the Internet mail becomes the "title" line of the Packet BBS mail.

NOTE: Because of FCC regulations, Jim must hand filter each message sent FROM Internet TO the Amateur Packet Radio BBS system. Messages should be of minimal length and appropriate content. Read Section 1.9 (Do's and Don'ts: Rules and Regulations) regarding appropriate usage of packet radio for more information. Always include the routing hints with the BBS callsign.

To mail from Packet to Internet:

1. The amateur radio operator must have his callsign registered in the gateway alias list. If you want to mail from packet to a specific amateur on Internet, send mail to 'durham@w2xo.pgh.ps.us' (Internet) or 'W2XO @ W2XO.#WPA.PA.USA.NAOM' (Packet BBS mail) with his/her amateur callsign and their Internet address.
2. Once the above is accomplished, packet BBS mail should be sent to 'CALL @ W2XO.#WPA.PA.USA.NAOM'. The mail will automatically be forwarded to the Internet address of the amateur with the 'CALL' callsign.

Jim Durham's Internet address is 'durham@w2xo.pgh.ps.us'.

LAN Gateways (Packet wormholes via Internet)

Currently a group of amateurs are experimenting with connecting packet LANs together via Internet IP inside IP Encapsulation. Some of the gateways only accept TCP/IP packets, others AX.25 packets. These gateways uses the Internet as a transport medium, thus it is impossible to access the packet radio network from Internet. For more information, join the Gateways mailing list by sending mail to "gateways-request@uhm.ampr.org".

### 3.0 Networking and special packet protocols

This is a sample of some of the more popular networking schemes available today. By far, there are more customized networking schemes used than listed. Consult your local packet network guru for specific network information.

#### 3.1 Are there any other protocols in use other than AX.25?

AX.25 is considered the defacto standard protocol for amateur radio use and is even recognized by many countries as a legal operation mode. However, there are other standards. TCP/IP is used in some areas for amateur radio. Also, some networking protocols use other packet formats than AX.25.

Often, special packet radio protocols are encapsulated within AX.25 packet frames. This is done to insure compliance with

regulations requiring packet radio transmissions to be in the form of AX.25. However, details of AX.25 encapsulation rules vary from country to country.

### 3.2 What is TCP/IP?

TCP/IP stands for Transmission Control Protocol/Internet Protocol. This is commonly used over the Internet wired computer network. The TCP/IP suite contains different transmission facilities such as FTP (File Transfer Protocol), SMTP (Simple Mail Transport Protocol), Telnet (Remote terminal protocol), and NNTP (Net News Transfer Protocol)

The KA9Q NOS program (also called NET) is the most commonly used version of TCP/IP in packet radio. NOS originally was written for the PC compatible. However, NOS has been ported to many different computers such as the Amiga, Macintosh, Unix, and others. Smaller computers like the Commodore 64 and the Timex-Sinclar do not currently have version of NOS available.

### 3.3 Networking Schemes

What are some of those other networking schemes?

During the early days of amateur packet radio, it became apparent that a packet network was needed. To this end, the following packet network schemes were created.

#### Digipeaters

The first networking scheme with packet radio was Digipeaters. Digipeaters would simply look at a packet, and if it's call was in the digipeater field, it would resend the packet. Digipeaters allow the extension of range of a transmitter by retransmitting any packets addressed to the digipeater.

This scheme worked well with only a few people on the radio channel. However, as packet became more popular, digipeaters soon were clogging up the airwaves with traffic being repeated over long distances. Also, if a packet got lost by one of the digipeaters, the originator station would have to retransmit the packet again, forcing every digipeater to transmit again and causing more congestion.

#### KA-Nodes

Kantronics improved on the digipeater slightly and created KA-Nodes. As with digipeaters, KA-Nodes simply repeat AX.25 frames. However, a KA-Node acknowledges every transmission each link instead of over the entire route. Therefore, instead of an end-to-end acknowledgement, KA-Nodes allow for more reliable connections because acknowledgments only carried on one link.



KA-Nodes therefore are more reliable than digipeaters, but are not a true network. It is similar like having to wire your own telephone network to make a phone call.

#### NET/ROM

NET/ROM was one of the first networking schemes to try to address the problems with digipeaters. A user connects to a NET/ROM as if connecting to any other packet station. From there, he can issue the NET/ROM commands to instruct it to connect to another user locally or connect to another NET/ROM. This connect then connect again means that to a user's TNC, you are connected to a local station only and it's transmissions does not have to be digipeated over the entire network and risk loosing packets. This local connection proved to be more reliable.

NET/ROM don't use all of the AX.25 protocol. Instead, they use special AX.25 packet called Unnumbered Information (UI) packets and then put their own special protocol on top of AX.25. This is again used to increase efficiency of it's transmissions.

NET/ROM is a commercial firmware (software put on a chip) program that is used as a replacement ROM in TAPR type TNC's. Other programs are available to emulate NET/ROM. Among them are TheNet, G8BPQ node switch, MSYS, and some versions of NET.

NET/ROM nodes, at regular intervals, transmit to other nodes their current list of known nodes. This is good because as new nodes come on-line, they are automatically integrated in the network, but if band conditions such as ducting occur, often unreachable nodes are entered into node lists. This causes the NET/ROM routing software to choose routes to distant nodes that are impossible. This problem requires users to develop a route to a distant node manually defining each hop instead of using the automatic routing feature.

#### ROSE

Rose is another networking protocol derived from X.25. Rose nodes have a static list of the nodes it can reach. For a user to use a ROSE switch, he issues a connect with the destination station and in the digipeater field places the call of the local rose switch and the distant rose switch the destination station can hear. Other then that, the network is completely transparent to the user.

The static routing tables ROSE uses ensures that packet routing does not use unreliable links such as NET/ROM suffers from. However, ROSE suffers from it's inability to change it's routing table as new nodes come on line. The operator must manually change every routing table, thus ROSE networks require greater maintenance times.

### 3.4 BBS message transfer

Many of the BBS programs used in packet radio allow for mail and bulletins to be transferred over the packet radio network. The BBS's use a special forwarding protocol developed originally by Hank Oredsen, WORLI.

Besides full service BBS's, many TNC makers have developed Personal BBS software to allow full service BBS to forward mail directly to the amateurs TNC. This allows operators to receive packet mail at night and avoid tying up the network during busy hours.

- End of Amateur Packet Radio Frequently Asked Questions -



Subject: Shortwave Listening FAQ

Compiled by Ralph Brandi, ralph.brandi@att.com  
128 Greenoak Blvd., Middletown, NJ 07748 U.S.A.

[Note from the compiler--This article is posted monthly on the USENET groups rec.radio.shortwave and rec.radio.info. It is also available electronically on CompuServe, America Online, the ANARC BBS, the WELL, and from the rec.radio.shortwave ftp archive on ftp.funet.fi, and in print from the ARRL. If you find this article somewhere else and/or find it useful, I would appreciate if you could drop me a postcard or send me e-mail letting me know where you found it, what the Last modified date on the copy you have is, and if you have any suggestions to make the article more helpful. If you don't find it useful, I'd like to hear about that as well.]

This posting contains answers to the following questions:

- o What is shortwave radio?
- o Where can I find broadcasts by Radio Foobar?
- o Where can I find a list of broadcasts in the English language?
- o What kind of receiver should I get?
- o Where can I get a shortwave radio?
- o Could you explain the frequencies used? What's the 40 meter band? etc.
- o What is SINPO/SIO?
- o Why can't I receive all of the broadcasts listed in Monitoring Times/WRTH/Passport/etc.?
- o What are some books or other resources that can help me get started?
- o Where can I find further information?

o What is shortwave radio?

>From a purely technical point of view, shortwave radio refers to those frequencies between 3 and 30 MHz. Their main characteristic is their ability to "propagate" for long distances, making possible such worldwide communications as international broadcasting and coordination of long-distance shipping.

>From a social point of view, shortwave radio is a method of facilitating worldwide dissemination of information and opinion, and a way to find out what the rest of the world thinks is important. Many countries broadcast to the world in English, making it easy to find out what a given country's position is on those things it finds important. Shortwave radio can also provide a way to eavesdrop on the everyday workings of international politics and commerce.

o Where can I find broadcasts by Radio Foobar?

The World Radio TV Handbook is the standard reference for this sort of information. The WRTH provides SWLs (shortwave listeners) and DXers (listeners specializing in distant [DX] and weak stations) worldwide with virtually

everything they need on frequencies, schedules and addresses. It comes out annually, right about the first of the year. It covers virtually every shortwave station in the world, and many of the medium wave (AM), FM, and television stations as well. The body of the book is a listing of stations by country, with a cross-reference in the back by frequency. It's available from any radio store dealing in shortwave. You can also contact the WRTH through their publishers, Billboard.

World Radio TV Handbook 1993  
ISBN 0-8230-5924-3

The past several years have seen competition of a sort for the WRTH, in the form of Passport to World Band Radio. Passport's main section is a graph/table of what's on the air, by frequency. The beginning of the book is filled with articles of interest to the beginner. There is also a comprehensive review section of shortwave receivers currently available, one of the few places all this information can be found in one place. The book is more useful for identifying a station you've already tuned in than for searching out a particular transmission; the WRTH is useful at both, however, rendering the purchase of this book not essential. It can still be worthwhile, though, especially for beginners who won't be put off by the "gee whiz, look what we can listen to" tone of some of the articles. The book is unabashedly an advocate of making the hobby of "World Band Radio" accessible to people who wouldn't have participated before the advent of good, cheap portables. There also seem to be efforts being made to address some of the shortcomings of the book, such as a comprehensive address section (finally!) that also contains useful information on how stations respond to correspondence, based on the experience of other hobbyists. Much of this information has been difficult or impossible for hobbyists to obtain outside of a small elite group, and provides a useful addition to the hobby. It does tend to weaken the focus of the book, which has previously seemed aimed at mainly beginners.

For utility band (non-broadcast transmissions) listeners, there are a couple of books that perform much the same function as the above two books, although due to the nature of such point-to-point communication, not with the same sense of definitiveness.

Confidential Frequency List  
Published by Gilfer Shortwave

The Shortwave Directory  
Published by Grove Enterprises

o Where can I find a list of broadcasts in the English language?

The World Radio TV Handbook has a list of English Language Broadcasts, starting on page 566 of the 1993 edition. Unfortunately, since the WRTH only comes out once a year the data tend to go out of date fairly quickly. There are a number of sources for current lists:

-Monitoring Times magazine carries a listing every month, one of the best arguments I know of for subscribing (it's what keeps me on their rolls....)

-The North American Shortwave Association (NASWA) periodically publishes a complete listing in their bulletin, *The Journal*, sent to all members monthly; each month there are updates to the list. See the address at the end of this article.

-Tom Sundstrom, W2XQ, offers custom IBM PC-compatible software and a subscription service with constantly updated electronic versions of his data files (which are also the source for the NASWA listings, as well as forming part of the listing in the WRTH). The data files are in the standard dBASE III format, capable of being imported into any software that reads DBF files, and are distributed in a compressed self-extracting file for IBM PC users and .ARC format for those using other operating systems. The data files are available on the Pics OnLine BBS in Atco, New Jersey, U.S.A. (+1 609 753-2540 US Robotics HST, +1 609 753 1549 V.32 9600 baud), or by special arrangement with Tom on the commercial GENIE service. See the address for TRS Consultants at the end of this file, including e-mail addresses.

o What kind of receiver should I get?

That depends largely on what kind of listening you expect to do. There are two or three basic kinds of radios. The first is the travel portable. These usually cost between US\$30 and US\$250. Their main characteristic is their extremely small size, making them most suitable for the person who spends a lot of time on airplanes. They do an adequate job of receiving the major broadcasters, such as the BBC, the Voice of America, Radio Nederland, etc. They are generally not capable of receiving hams, or utility transmissions, and they do not do a good job on weak stations. They may, therefore, not be the best choice for expatriates wishing to listen to their home stations, for instance, especially the less expensive radios. Many of them also lack frequency coverage beyond the major international broadcasting bands. As such, they cannot receive the channels outside the defined bands that often provide clearer reception (due to lessened interference) of such stations as the BBC, Kol Israel, and the Voice of Iran.

There are a few very low cost (under US\$50) SW receivers that are the subject of frequent inquiries in rec.radio.shortwave: the DAK MR-101s, and a Chinese-built unit that is sold under (at least) the names Pomtrex, MCE, TEK, Windsor, and Citizen. The DAK, despite its digital tuning, has received generally negative reviews. The Pomtrex, which is an analog unit, has had much greater acceptance by users. Unfortunately, the radio seems to have virtually disappeared from the market. A recent radio that has garnered attention is the Casio PR-100. Initial evidence indicates that this radio is similar to the DAK radio. In general, radios in this price range can be expected to perform poorly, but may provide an inexpensive introduction to the world of shortwave and acceptable reception of the strongest international stations.

The second category of radios overlaps with the first, and consists of slightly larger portables. Common among this category are radios like the Sangean ATS-803A, (also sold around the world as the Realistic DX-440, Emerson 803A, Siemens RK 651, and many other names), a fine starter radio with many capabilities for the inexpensive price of US\$200. These radios often have digital readout, making it easier to know which frequency you are tuned to, and such features as dual conversion (which decreases the possibility of your radio receiving spurious signals from other frequencies), audio filters (which allow you to decrease interference from stations on adjacent frequencies) and beat frequency oscillators (which allow you to decode morse code and single sideband (SSB) transmissions on the ham and utility bands). The top range of this kind of radio includes technically sophisticated radios like the Sony ICF-2010, Sony ICF-SW77, and Grundig Satellit 700, which contain innovative circuitry to lock on to a given signal and allow you to choose the portion of the signal you want to listen to, depending on which part gets the least interference. If you follow the newsgroup for any amount of time, you're bound to notice some discussion of the relative merit of these features versus their cost (about double that of the Sangean radio.) Many of these radios can be and have been used to receive distant and weak stations from a number of countries, and can provide a cost-effective way for expatriates to receive programs from their native countries; they're also suitable for listening to programs from the major broadcasters.

The third category of receivers is the tabletop receiver. These receivers cost from US\$600 upward, with a concentration of radios around US\$1000. These radios naturally contain many more features than the portables, and are used by serious hobbyists who specialize in rare and weak stations. Current radios in this group include the ICOM R-71A, the Kenwood R-5000, the Japan Radio Corporation NRD-535 and NRD-535D, the Lowe 150 and 225, and the Drake R-8. These radios can be very complex to operate, and are generally not recommended for the beginner. Radios from the first two categories can give a beginner a very good idea of what's on the air and where their interests lie, at which point one of these radios may be an appropriate acquisition. Strangely enough, not all of these radios contain the kind of innovative circuitry that are part of less expensive portables like the Sony 2010 mentioned above. Newer radios, such as the NRD-535D, the Lowe radios, and the R-8 are starting to include such capabilities.

There are many sources for detailed information on specific radios, most of it provided by two groups. Larry Magne, who publishes the Passport to World Band Radio, includes a review of virtually all shortwave radios currently available in that publication. For more extensive reviews of selected receivers, he offers detailed "white papers", which run between ten and twenty pages or so. Magne also contributes a monthly review column to Monitoring Times.

The other main source for equipment reviews is a group centered around Radio Nederland and the WRTM in Holland. The WRTM, as mentioned above, has a review

section covering mainly new receivers, but also contains a table with ratings of most currently available radios. Radio Nederland also offers a free booklet with receiver reviews. The WRTH has also released a new book, \*The WRTH Equipment Buyers Guide\*, available from the end of 1992. The book contains extended versions of the reports available in the past five years of the WRTH, as well as new and updated reports. It also contains information on accessories and antennas, as well as a fairly technical tutorial on receivers.

There are also two books published by Gilfer Shortwave in New Jersey that cover the subject of receivers, called \*Radio Receivers, Chance or Choice\*, and \*More Radio Receivers, Chance or Choice\*. These books are fairly out of date now.

The Sony ICF-2010 and the Drake R-8 have Internet mailing lists devoted to discussions of their features among users. Joining these mailing lists can be a good way to keep up on modifications or workarounds for your radio. You can join the mailing lists with requests to the following addresses:

Sony ICF-2010: [icf-2010-request@cup.hp.com](mailto:icf-2010-request@cup.hp.com)  
Drake R-8: [DrakeR8-request@hpsesuka.pwd.hp.com](mailto:DrakeR8-request@hpsesuka.pwd.hp.com)

o Where can I get a shortwave radio?

Many stereo stores and discount chains carry the Sony and Panasonic lines of receivers; the people there, however, generally don't know much about shortwave, and you're not likely to find many accessories there. Mail order stereo sources like J&R Music or 47th Street Photo in New York generally give the cheapest prices, but have the same problem. There are lists available on the photography newsgroups that can indicate whether a given store of this type is reliable and provides acceptable service. More knowledgeable, and falling roughly between the two in price, are the mail order houses that specialize in ham and/or shortwave radio. Many of them offer catalogs that contain useful tips for the beginner. Addresses for some of the better-known and respected businesses can be found at the end of this article.

o Could you explain the frequencies used? What's the 49 meter band? etc.

As you tune around, you'll notice certain kinds of signals tend to be concentrated together. Different services are allocated different frequency ranges. International broadcasters, for instance, are assigned to ten frequency bands up and down the dial. These are:

3900-4000 kHz (75 meter band)	13600-13800 kHz (22 meter band)
5950-6200 kHz (49 meter band)	15100-15600 kHz (19 meter band)
7100-7300 kHz (41 meter band)	17550-17900 kHz (16 meter band)
9500-9900 kHz (31 meter band)	21450-21850 kHz (13 meter band)
11650-12050 kHz (25 meter band)	25600-26100 kHz (11 meter band)

In general, lower frequencies (below 10000 kHz) are better received at night and for a few hours surrounding dawn and dusk, and higher frequencies (15000 kHz and up) are better received during the day. The frequencies in between are



transitional, with reception being possible at most times. In practice, these guidelines are not absolute, with reception on high frequencies being possible at night, and lower frequencies can provide decent medium-distance reception during the day.

Hams (who have their own newsgroups, rec.radio.amateur.\*) and point-to-point, or utility communications, fill most of the rest of the frequencies. The Confidential Frequency List and The Shortwave Guide mentioned above can provide more information on what can be heard in these areas, as can utility loggings in magazines like Monitoring Times and Popular Communications, and in club bulletins.

o What is SINPO/SIO?

The SINPO code is a way of quantifying reception conditions in a five-digit code, especially for use in reception reports to broadcasters. The code covers Signal strength, Interference (from other stations), Noise (from atmospheric conditions), Propagation disturbance (or Fading, in the SINFO code), and Overall. The code is as follows:

(S)ignal	(I)nterference	(N)oise	(P)ropagation	(O)verall
5 excellent	5 none	5 none	5 none	5 excellent
4 good	4 slight	4 slight	4 slight	4 good
3 fair	3 moderate	3 moderate	3 moderate	3 fair
2 poor	2 severe	2 severe	2 severe	2 poor
1 barely aud.	1 extreme	1 extreme	1 extreme	1 unusable

In recent years, many broadcasters have tried to steer listeners away from the SINPO code and toward the simpler SIO code. SIO deletes the extremes (1 and 5)

and the noise and propagation categories, which were confusing to too many people to be useful. In sending reports to stations other than large international broadcasters who are likely to understand the codes, it is better to simply describe reception conditions in words.

o Why can't I receive all of the broadcasts listed in Monitoring Times/WRTH/Passport/etc.?

This is a fact of life on shortwave. Because of propagation, antenna headings, the kind of radio you have, your local environment, etc., you're never going to be able to hear all the things you find in a list. The lists in Monitoring Times, etc., aren't lists of what's being heard in a general location. They're lists of everything that you could possibly hear, from a daily powerhouse like the BBC to a once or twice a year rarity like Bhutan. They're listed because you \*might\* hear them, depending on where you are and the given circumstances, not because they're necessarily being heard outside of their immediate target area.

If you want lists of what is actually being heard in something roughly

analogous to "your area", the best source for these are the logging sections of the bulletins of the SWL/DX clubs. You might want to sample a few club bulletins to see if they'll help. The bulletins also offer articles from experts on many facets of the hobby.

o What are some books or other resources that can help me get started?

There are a number of books dealing with the basics of the hobby. The most recent book, one that has been getting good reviews, is \*The Shortwave Listening Guidebook\* by Harry Helms. The book should be easily available from most shortwave specialty outlets. It is also being published directly by Mr. Helms, and is therefore likely to stay in print for a while.

o Where can I find further information?

There are a number of hobby publications available. Two glossy magazines which cover the hobby are Monitoring Times and Popular Communications. They both cover a number of aspects of the hobby, including international broadcasts, scanning, pirate radio, QSLing, and Utility broadcasting. Monitoring Times also contains listings of broadcasts and programs in English, which gives it a slight edge. PopComm, however, is the one you're more likely to find on your local newsstand.

There are many clubs catering to the hobbyist, many of which publish bulletins.

Many of these groups are part of an all-encompassing group known as ANARC, the Association of North American Radio Clubs. ANARC has a list available of its constituent clubs, listing addresses, what the focus of each club is, club publications, and current dues. You can contact them by writing to ANARC, 2216

Burkey Dr., Wyomissing, PA 19610, USA. You should include some form of return postage when asking for the club list. The WRTH contains contact addresses for the clubs that constitute ANARC.

ANARC has counterpart organizations in Europe and the south Pacific. The European organization is the European DX Council (EDXC). More information on their constituent clubs is available for 2 International Reply Coupons from P.O. Box 4, St. Ives, Huntingdon, PE17 4FE, England. In the south Pacific, the organization is the South Pacific Association of Radio Clubs, or SPARC. They offer information from P.O. Box 1313, Invercargill, New Zealand.

A company called The Radio Collection offers a number of publications in a series called "Radio 101" aimed at the beginner. The compiler hasn't seen any of the publications, but judging from the titles, they look like they would be useful to anyone getting seriously interested in the hobby aspects of shortwave radio. A catalog is available for US\$1 from The Radio Collection, P.O. Box 149, Briarcliff Manor, NY 10510.

And, naturally, listening to the radio can provide you with excellent information on radio. There are a number of excellent "DX" programs on the

air

for the radio hobbyist. The WRTH contains a comprehensive list of such shows; Tom Sundstrom also has a list as part of his Shortwave Database subscription service. Different shows have different strengths. DX Party Line on Ecuador's

HCJB is directed toward the beginner. Sweden Calling DXers on Radio Sweden is a compendium of news about shortwave and satellites, including frequency changes, station reactivations and deactivations, and such. Radio Nederland's Media Network is a slickly produced general-coverage program. Radio Havana Cuba's "DXers Unlimited" often offers construction tips for people who like to do things themselves, especially for antennas. And Saturday nights on WWCR 7435 kHz offer an excellent combination of Glenn Hauser's World of Radio, which

covers mostly DX tips, and Signals, a media magazine which covers a wide variety of topics, including scanners, satellites, and shortwave.

o Addresses

Billboard Publications  
1515 Broadway  
New York, NY 10036  
United States

Billboard Ltd.  
23 Ridgmount St.  
London WC1E 7AH  
United Kingdom

WRTH  
Soliljevej 44  
DK-2650 Hvidovre  
Denmark

Radio Nederland Receiver Guide  
Engineering Department  
PO Box 222  
1200 JG Hilversum  
The Netherlands

Passport to World Band Radio  
International Broadcast Services, Ltd.  
Box 300  
Penn's Park, PA 18943 USA

Electronic Equipment Bank  
137 Church St. N.W.  
Vienna, VA 22180 USA  
800 368 3270 (orders)  
+1 703 938-3350 (local and  
technical information)  
+1 703 938-6911 (FAX)  
Free catalog

Gilfer Shortwave  
52 Park Ave  
Park Ridge, NJ 07656 USA  
800 GILFER-1 (445-3371) (orders)  
+1 201 391-7887 (New Jersey, business  
and technical)  
Free Catalog

Grove Enterprises  
(also Monitoring Times)  
P.O. Box 98  
Brasstown, NC 28902 USA  
800 438-8155 (toll free N. America)  
+1 704 837-9200  
Free Catalog

Radio West  
850 Anns Way Drive  
Vista, CA 92083 USA  
+1 619 726-3910  
Price list: US\$1

Universal Radio  
6830 Americana Pkwy.  
Reynoldsburg, Ohio 43068 USA  
800 431-3939 (toll free N. America)  
+1 614 866-4267  
SWL Catalog: US\$1.00

Popular Communications  
76 North Broadway  
Hicksville, NY 11801 USA

NASWA  
45 Wildflower Road  
Levittown, PA 19057

TRS Consultants  
PO Box 2275  
Vincentown, NJ 08088-2275

Membership costs: US\$25/yr;  
sample issue US\$2

+1 609 859-2447  
+1 609 859-3226 (FAX)  
E-mail: 2446376@mcimail.com  
GENIE E-mail: T.SUNDSTROM  
Free catalog.

[Final note to readers not in North America; this article focuses largely on North American sources and information. This is simply because it is sometimes difficult to find information on practices and sources outside of North America from where I live. If you have any suggestions to adapt this article to readers around the world, they are more than welcome.]



From: acmnews@zeus.unomaha.edu (Paul W. Schleck KD3FU)  
Subject: Text of FCC PR Docket 91-36 (FCC Scanner regs)  
Date: 9 Apr 91 20:10:00 CST

To help quell rumors and speculation, the following is the actual text of PR Docket 91-36. Read the document for yourself and form your own opinions. In my opinion (and based on the docket) it would appear that the FCC is trying to take our side and need some more technical information to bolster its decision.

Much thanks to Dave Sumner, K1ZZ, of the American Radio Relay League (2155052@mcimail.com) for promptly replying to my E-mail request and sending a copy of the docket.

73, Paul W. Schleck, KD3FU

ACMNEWS@zeus.unomaha.edu

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Before the  
Federal Communications Commission  
Washington, DC 20554

PR Docket No. 91-36

In the Matter of

Inquiry into the Need to Preempt  
State and Local Laws Concerning  
Amateur Operator Use of  
Transceivers Capable of Reception  
Beyond the Amateur Service  
Frequency Allocations

NOTICE OF INQUIRY

Adopted: February 13, 1991; Released: February 28, 1991

By the Commission:

I. INTRODUCTION

1. On November 14, 1989, the American Radio Relay League, Incorporated (ARRL) filed a Request for Issuance of Declaratory Ruling (1) requesting that the Commission preempt certain state statutes and local ordinances affecting transceivers (2) used by Amateur Radio Service licensees. Some of these laws are so broad as to prohibit mere ownership of such transceivers if they are capable of reception of communications on certain frequencies other than amateur service frequencies. On March 15, 1990, we released a public notice (3) inviting comment on ARRL's request. Although comments were received supporting ARRL's position, no comments were received addressing certain technical issues that are before us in this matter. Furthermore, the majority of comments addressed a broader

preemption than was discussed in our public notice. We initiate this present inquiry to assist us further in considering ARRL's request.

## II. BACKGROUND

### A. State and Local Laws

2. The ARRL request discussed eleven state statutes and one local ordinance. These laws are commonly known as "scanner laws" the violation of which is typically a criminal misdemeanor, with equipment confiscation a possibility (4). The New Jersey statute is representative of these laws:

Any person who installs or has in any automobile, a short-wave radio receiver operative on frequencies assigned by the Federal Communications Commission for fire, police, municipal, or other governmental uses, is guilty of a misdemeanor, unless a permit therefor has first been obtained from the chief of the county police, or from the chief of the police of the municipality, wherein such person resides.

This section does not apply to any fire, police, or other governmental official of the State, or of any county or municipality thereof (5).

This statute regulates the mere acts of installing or possessing in a vehicle certain receivers, and it includes a permit requirement for those who are not governmental officials. Also, although the New Jersey statute prohibits the capability to receive "fire, police, municipal or other governmental" channels, our review of the subject laws cited by the ARRL indicates that most of the statutes at issue are more narrowly drawn to prohibit the capability to receive police channels.

3. Most of these laws are directed primarily toward frequency reception capability by equipment located in vehicles, but at least one law reaches possession of this equipment merely outside the home (6). Some laws, however, specifically exempt amateur operators who possess equipment in motor vehicles (7). These state and local laws appear to be aimed at promoting the health, safety, and general welfare of the citizenry (8).

### B. The ARRL Declaratory Ruling Request

4. ARRL makes two arguments in support of preemption. First, it states that the receiver sections of the majority of commercially available amateur station transceivers can be tuned slightly past the edges of the amateur service bands to facilitate adequate reception up to the end of the amateur service bands. ARRL seeks a preemption ruling that would permit amateur operators to install in vehicles transceivers that are capable of this "incidental" reception (9). Although ARRL's formal request is couched in terms of this first, technical point, the request focuses almost entirely on a second, broader issue of whether state and local authorities should be permitted, via the scanner laws, to prohibit the capability of radio reception by amateur operators on public safety and special emergency frequencies that are well outside the amateur service bands.

5. In regard to the broader issue, ARRL argues that amateur operators have special needs for broadscale "out-of-band" reception, and that the marketplace has long recognized these needs by offering accommodating transceivers. According to ARRL (1), many commercially manufactured amateur service HF transceivers and the majority of such VHF and UHF

transceivers have non-amateur service frequency reception capability well beyond the "incidental" -- they can receive across a broad spectrum of frequencies, including the police and other public safety and special emergency frequencies here at issue. This additional capability, argues ARRL, permits amateur operators to take part in a variety of safety activities, some in conjunction with the National Weather Service, that are legitimately available to amateur operators. Such activities benefit the public, especially in times of crisis, and some require the mobile use of the amateur stations (11). ARRL states that the "vast majority" of amateur operators take part in these mobile activities, and that the widespread enforcement of laws such as New Jersey's would make illegal the possession of "essentially all" modern amateur mobile equipment (12). (As of January 31, 1991, the Commission's licensing database indicates that there are 502,133 amateur station licensees in the United States and its territories and possessions.) ARRL states that, as a result of scanner laws, "several dozen instances of radio seizure and criminal arrest [have been] suffered by licensed amateurs in recent months." (13)

### C. Comments

6. In response to our public notice on this matter, we received 45 comments, including one from ARRL, and no reply comments. All support ARRL's broader request and almost all appear to be from amateur operators. Twenty-four comments are from individuals who are aware of one or more of the subject laws and express support for ARRL's position in very general terms. Of the twenty-one remaining comments, four are from individuals who had first-hand experience with such laws, where law enforcement warnings or confiscation have resulted from transceiver possession. Five are from individuals in law enforcement, either currently or formerly. Six are from the following associations and organizations: Association of North American Radio Clubs, Associated Public-Safety Communications Officers, Spectrum Resources, Uniden America Corporation, Personal Radio Steering Group (which requests that we extend this proceeding to cover General Mobile Radio Service licensees), and Utilities Telecommunications Council (which requests that we extend this proceeding to cover other mobile licensees that wish to receive fire and other public safety service transmissions). Although this inquiry is primarily focused on the Amateur Radio Service, we additionally take this opportunity to request comment on whether the scanner laws are affecting other licensed radio services.

7. ARRL describes an incident in which a licensed amateur operator who resided in New York was driving his vehicle through New Jersey when the New Jersey police, acting under authority of the New Jersey statute, stopped him, arrested him, and confiscated his VHF amateur service transceiver. ARRL notes that the New York licensee, as a non-resident of New Jersey, would not be eligible to obtain the operator's permit required by the New Jersey statute for receiver operation within New Jersey (14). Another commenter, a licensed amateur operator, states that although he is a New Jersey resident, his request for a permit under the New Jersey statute has been denied by the local issuing authority on the grounds that the authority issues the permits only to "emergency personnel." (15) In three other comments, amateur operators state that while traveling in vehicles in Illinois, Ohio, New Jersey, and Texas, they have been stopped by state or local police and threatened with the possibility of confiscation of their mobile amateur service transceivers (16).

8. A few commenters state that they have found vital their volunteer safety work the use of certain out-of-band channels used in governmentally sponsored



activities such as the Civil Air Patrol's search and rescue undertakings. Another commenter explains how use of his out-of-band receiver allowed him to listen to the National Weather Service on VHF maritime channels for critical information during a flood. These commenters emphasize that there is a public service value in having their transceivers be capable of receiving these channels, which are not amateur, public safety, or special emergency services frequencies. (17)

9. As noted above, Associated Public-Safety Communications Officers, Inc. (APCO) filed a comment in support of the ARRL Request. APCO is this nation's oldest and largest public safety communications organization representing the public safety radio community. APCO states:

Every radio amateur is not the law-abiding citizen we would prefer them to be. However, it is patently unfair to penalize the entire community for the actions of the few who utilized their equipment to circumvent the law. Amateur radio operators have, historically, been vital assets to public safety community. They have assisted government and the public in virtually every disaster that has occurred throughout the world.

There are other methods of protecting communications available to public safety, such as encryption, which is easy to procure and much less invasive of the citizen's right (or privilege) to listen to what is being transmitted over the radio. APCO believes that, in this modern age, it is the responsibility of an agency to protect its own confidential communications through the use of technology, not by arresting innocent citizens (18).

### III. DISCUSSION

10. We believe additional information would assist us to make a decision in this matter (19). For example, it would be helpful to have more information on the current (and future) marketplace availability of mobile equipment meeting the restriction of the subject laws, and on the technical and financial feasibility of modifying existing equipment to meet the laws. We especially encourage the manufacturing community, which is best suited to comment on the current state of amateur radio technology, to provide this technical information. We also desire comment from the states and municipalities that have enacted the subject laws. Specifically, we solicit comment on the following questions:

(1) Is there VHF or UHF mobile (or portable) amateur equipment now being manufactured that complies with the state and local laws in question? If so, give the purchase costs and the make and model numbers.

(2) What percentage of existing VHF or UHF mobile amateur equipment has a reception capability (a) only on amateur service bands, (b) on amateur bands plus a capability just beyond the amateur bands (within 25 kHz of the band edge), and (c) on the amateur bands plus a capability on (at least) any of the public safety or special emergency services channels? What are the above percentages when calculated only in the context of equipment that is currently being manufactured (as opposed to equipment that no longer is manufactured or is built by an amateur)? What are the purchase costs for such equipment?

(3) What percentage of amateur operators purchase and use manufactured

mobile equipment?

(4) What is necessary technically for manufacturers to produce equipment that complies with the laws, and what are the associated costs?

(5) What is required technically to modify amateur equipment that is capable of receiving on police radio service channels or other public safety or special emergency services channels to eliminate such reception capability, and what is the cost associated with such a modification? Does the intercategory sharing permitted in the private land mobile services (20) and the diversity of frequency restrictions throughout the country affect the technical requirements or costs of such modifications?

(6) What specific instances have occurred where the state and local laws in question have adversely affected amateur radio operation?

(7) Is there a public interest in having amateur equipment available that can receive non-amateur frequencies, e.g. an interest in providing a pool of equipment that facilitates emergency operations in states where local authorities expressly desire the assistance of amateur licensees?

(8) Given that the amateur radio equipment market is essentially world-wide, what would be the effect, if any, on the availability and price of amateur equipment if United States requirements were made more restrictive than those of the rest of the world? Do any other countries have restrictions on amateur radio transceiver receipt of public safety transmissions?

(9) What effect do the scanner laws have on the interstate sale of amateur service equipment and the interstate transport of equipment by amateur licensees?

#### IV. PROCEDURAL MATTERS

11. Accordingly, we adopt this Notice of Inquiry under the authority contained in Sections 4(i), 303(r), and 403 of the Communications Act of 1934, as amended, 47 USC 154(i), 303(r), and 403. Pursuant to applicable procedures set forth in Sections 1.415, 1.419, and 1.430 of the Commission's Rules, 47 CFR 1.415, 1.417, & 1.430. Interested parties may file comments on or before June 7, 1991, and reply comments on or before July 8, 1991. Extensions of these time periods are not contemplated. We will consider all relevant and timely and timely comments before taking final action in this proceeding. In reaching its decision, the Commission may consider information and ideas not contained in the comments, provided that such information or a writing indicating the nature and source of such information is noted in any subsequent actions. As noted above in a footnote, comments filed pursuant to our previous public notice are deemed to be filed in response to this Notice of Inquiry as well, and therefore need not be refiled. We do not, however, discourage additional filings from the entities who filed previously.

12. To file formally in this proceeding, participants must file an original and five copies of all comments, reply comments, and supporting comments. If participants want each Commissioner to receive a personal copy of their comments, an original plus nine copies must be filed. Persons who wish to

participate informally may do so by submitting one copy. Comments and reply comments should be sent to the Office of the Secretary, Federal Communications Commission, 1919 M Street NW, Washington, DC 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room (room 239) of the Federal Communications Commission, 1919 M Street NW, Washington, DC 20554.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy  
Secretary

FOOTNOTES

(1) The American Radio League, Inc. Request for Declaratory Ruling Concerning the Possession of Radio Receivers Capable of Reception of Police or other Public Safety Communications (Nov. 13, 1989) (hereinafter "ARRL Request").

(2) Radio equipment capable of both transmission and reception. We are concerned herein, however, only with reception capability. Transmission by amateur operators on unauthorized frequencies is prohibited.

(3) Public Notice, 4 FCC Rcd 1981 (1990), 55 Fed. Reg. 10805 (Mar. 23, 1990). Comments were due by May 16, 1990, and reply comments by May 31, 1990.

(4) Three of the laws, however, are "aiding and abetting"-type statutes, which would prohibit the use of any radio receiver in connection with criminal activity. See ARRL Request, supra note 1, at 10 n.7. Such statutes do not penalize a radio owner for mere possession of a radio receiver, but instead specify that, in the context of criminal activity, the unlawful act consists of reception and divulgence (or use) of the communication. Such statutes are not addressed by this inquiry.

(5) N.J. Stat. Ann. 2A 127--4 (West 1985) (cited in party only). See generally note 8 infra (discussing case upholding New Jersey statute, which dates from 1933).

(6) See Ky. Rev. Stat. Ann. 432.570 (Michie/bobbs-Merrill 1985). Under Kentucky's statute, certain users are exempted, such as radio and television stations, sellers of the "scanner" radios, disaster and emergency personnel, and those using the weather radio service of the National Oceanic and Atmospheric Administration. Some such users need to obtain local governmental permits, others do not.

(7) See e.g., Minn. Stat. Ann. 299C.37 (West Supp. 1990): N.Y. Veh. & Traf. Law 397 (McKinney 1986).

(8) Such was noted by a New Jersey court in upholding, on other than preemptive grounds, the constitutionality of New Jersey's law.

It seems reasonable to assume that there may have been a determination by the Legislature that if persons in automobiles could without restriction listen to fire, police, and other governmental communications

their high degree of mobility coupled with their possible desire to proceed to locations referred to in such communications, for reasons of curiosity or otherwise, might well result in interference with essential government activities. Likewise, the Legislature may have determined that if persons engaged in illegal activities were able to receive such information in their automobiles, they would become aware of their detection and their escape would be facilitated.

State v. Smith, 130 N.J. Super. 442, 446-47, 327 A.2d 462,464-65 (1974).

(9) ARRL Request, supra note 1, at 1, 3 n.2, 5 n.3, "Most commercial amateur radio VHF and UHF transceivers ... are incidentally capable of reception (but not transmission) on frequencies additional to those allocated to the Amateur Radio Service. These frequencies are adjacent to amateur allocations. This is true even though the equipment is primarily designed for amateur bands, and results from the intentional effort to insure proper operation of the transceiver throughout the entire amateur band in question." Id. at 3 n.2.

(10) Id. at 12.

(11) See generally House Comm. on the Judiciary, Electronic Communications Privacy Act of 1986, H.R> Rep. No. 647, 99th Cong., 2d Sess. 42.

(12) ARRL Request, supra note 1, at 2, 12.

(13) Id. at 11.

(14) Comments of the American Radio Relay League, Incorporated at 2-3 (May 16, 1990).

(15) Comment of Emory L. Brown, Jr. (Mar. 23, 1990).

(16) Comment of L.W. Bradford (May 1, 1990); Comment of Rich Casey (May 9, 1990); Comment of Todd L. Sherman (April 21, 1990).

(17) It should be noted that in the 30-50 MHz, 150-174 MHz, and 450-512 MHz bands the public safety and special emergency services channels are intermixed with frequencies allocated to non-public-safety services. Thus, eliminating the capability to receive the public safety channels would have to be done on a case-by-case, frequency-by-frequency basis. In these segments of the spectrum, there does not exist a contiguous range of frequencies that constitute a "public safety band," with upper and lower frequency limits, that could more easily be excluded.

(18) Comments of APCO at 2-3 (May 16, 1990).

(19) Comments filed pursuant to our previous public notice are deemed to be filed in response to this Notice of Inquiry as well, and therefore need not be refiled. We do not, however, discourage additional filings from the entities who filed previously.

(20) See 47 CFR 90.176. For example, a Police Radio Service licensee may be authorized to operate on frequencies allotted to the Highway Maintenance Radio Service, the Forestry-Conservation Radio Service, or any other public safety land mobile service.

\*\*\*\* END OF DOCUMENT \*\*\*\*



Date: 25 May 91 22:13:00 CDT  
From: "Paul Schleck" <acmnews@zeus.unomaha.edu>  
Subject: Florida State Antenna Law

From: William=E.=Newkirk%Pubs%GenAv.Mlb@BANYAN9.cgad.CR.rok.COM  
Subject:Florida State Antenna Law  
Date: 23 May 91 19:40:50 GMT

FLORIDA STATE ANTENNA LAW

CHAPTER 91-28

Committee Substitute of House Bill No. 203

An act relating to radio communication; creating ss. 125.0185 and 166.0435, F. S.; prohibiting counties and municipalities from enacting or enforcing restrictive ordinances governing amateur radio antenna; providing for construction of such antennas in conformance with federal requirements; providing for the applications of the act; providing an effective date.

Be It Enacted by the Legislature of the State of Florida:

Section 1. Section 125.0185, Florida Statutes, is created to read:

125.0185 Amateur radio antennas; construction in conformance with federal requirements.

(1) No county shall enact or enforce any ordinance or regulation which fails to conform to the limited preemption entitled ``Amateur Radio Preemption, 101 FCC 2d 952 (1985)'' as issued by the Federal Communications Commission. Any ordinance or regulation adopted by a county with respect to amateur radio antennas shall conform to the above cited limited preemption, which states that local regulations which involve placement, screening, or height of antennas based on health, safety, or aesthetic considerations must be crafted to reasonably accommodate amateur communications and to represent the minimum practicable regulation to accomplish the local authority's legitimate purpose.

(2) Nothing in this section shall effect any applicable provisions of chapter 333.

Section 2. Section 166.0435, Florida Statutes, is created to read:

166.0435 Amateur radio antennas; construction in conformance with federal requirements.

(1) No municipality shall enact or enforce any ordinance or regulation which fails to conform to the limited preemption entitled ``Amateur Radio Preemption, 101 FCC 2d 952 (1985)'' as issued by the Federal Communications Commission. Any ordinance or regulation adopted by a municipality with respect to amateur radio antennas shall conform to the above cited limited preemption, which states that local regulations which involve placement, screening, or height of antennas based on health, safety, or aesthetic considerations must be crafted to reasonably accommodate amateur communications and to represent the minimum practicable regulation to accomplish the local authority's legitimate purpose.

(2) Nothing in this section shall effect any applicable provisions of chapter 333.

Section 3. This act shall take effect upon becoming a law.

Became a law without the Governor's approval April 27, 1991.

Filed in Office Secretary of State April 29, 1991.

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typos courtesy of wb9ivr@n4jlr...





Subject: Guide to Ham Radio Newsgroups on Internet

(Note: The following is reprinted with the permission of the author.)

This message describes the rec.radio.amateur.\*, rec.radio.cb, and rec.radio.swap newsgroups. It is intended to serve as a guide for the new reader on what to find where. Questions and comments may be directed to the author, Jay Maynard, K5ZC, by Internet electronic mail at jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 3 June 1992.

#### History

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Way back when, before there was a Usenet, the Internet hosted a mailing list for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions were held on the mailing list, and sent to the mailboxes of those who had signed up for it. When the Usenet software was created, and net news as we now know it was developed, a newsgroup was created for hams: net.ham-radio. The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began to dominate other topics in the group and on the list. This resulted in the logical solution: a group was created to hold the packet discussion, and another corresponding mailing list was created as well: net.ham-radio.packet and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great Renaming essentially unchanged, moving from net.ham-radio[.packet] to rec.ham-radio[.packet]. Readership and volume grew with the rest of the network.

The INFO-HAMS mailing list was originally run from a US Army computer at White Sands Missile Range, SIMTEL20. There were few problems with this arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.\* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.\* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the structure we now use.

## The Current Groups

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I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.packet is for discussions related to (surprise!) packet radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The never-ending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.\* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.amateur.misc, .packet, and .policy groups are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for details. You can also post to rec.radio.swap by sending email to rec-radio-swap@ucbvax.berkeley.edu; if you do it this way, be sure to include an address for responses by electronic mail, as the gateway does not automatically do so.

## A Note on Crossposting

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Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's

headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

--

Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can  
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by a .sig virus.  
"Liking clean systems and hating buggy ones is about as controversial as  
preferring a warm puppy to the cholera bacillus." -- Tom Neff

--

73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu



Newsgroups: rec.radio.amateur.misc  
From: sgreene@access.digex.com (Stephan Greene)  
Subject: Summary - Getting onto the Hamsats  
Keywords: Satellites, OSCAR, AMSAT  
Organization: Express Access Public Access UNIX, Greenbelt, Maryland USA  
Date: Fri, 20 Mar 1992 16:57:07 GMT  
Lines: 249

On Wednesday, 11 March 1992, I posted a message to rec.radio.amateur.misc asking for suggestions and advice on equipment for using the amateur satellites. This article is a summary of the responses I received, as well as some related e-mail and news articles.

A big thank-you to those who responded directly to my posting or posted a related article:

mbutts@mentorg.com or mbutts@qcktrn.com (Mike Butts), KC7IT  
psmith@mozart.convex.com (Presley Smith), N5VGC  
rwa@cs.athabascau.ca (Ross Alexander), VE6PDQ  
gary@ke4zv.uucp (Gary Coffman), KE4ZV  
Andy MacAllister, WA5ZIB (via CompuServe's Internet gateway)  
Don\_R.\_Moberly.El\_Segundo@xerox.COM, WB6LFC

Here's the consensus opinions (any misrepresentations or misquotes are my own - so flame me, not the nice folks who contributed!)

Antennas:

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For AO-13, the consensus is get to get KLMs, Telex/Hy-Gains, or roll-your own, Nobody liked the Cushcraft satellite antennas - they appear to have problems in wet weather. Bigger is also better, if you have the space. Several people mentioned the KLM 22C and 40CX pair as excellent performers (again - you need the room for those long booms!) KE4ZV stated his pair of KLMs (the big ones!) lets him work AO-13 with 3 to 30 watts (hardline feed and rigorous attention to routing the feedlines and cables properly to maintain the antenna patterns helps, too.). Others mentioned the KLM 14C/18C pair as good performers - but you need more power on the uplink.

Telex/Hy-Gain antennas were recommended by several people as a less expensive alternative to KLMs that work almost as well. There's also M2 (started by an engineer from KLM). While no one who responded uses them, the information I received from a call to their factory in California suggests they are comparable to slightly better than the KLMs in performance, and about the same in cost. Dave, WB6LFC, said homebrewing antennas is also feasible - it takes work, but attention to detail results in top-notch performance for very little money. Finally, Ross, VE6PDQ, reported good results using a pair of Cushcraft 215WBs on receive.

Problems encountered with AO-13 antennas include routing

cables and feedlines off the back of the antennas (to preserve antenna patterns), use of fiberglass cross booms, mounting preamps as close to the feedpoint as possible, and long antenna booms drooping. (Gary, KE4ZV, recommends using a rope to brace the boom or stiffening booms and fiberglass masts internally with foam-in-a-can insulation.)

On antenna rotators, it appears the Alliance UD-100 is no longer made, though it should still show up at hamfests. People with long-boom antennas report the Alliance rotator is too weak to move a big array anyway, and recommended Yaesu's elevation-only rotator or their Model 5400 azimuth-elevation unit.

Antennas for the low-altitude satellites appear to be much less critical. J-poles were most frequently mentioned (the design from the AMSAT Journal?), but dipoles, ground-planes, and yagis are also in use. Several people work RS-10 quite well with antennas in the attic. Best results are with steerable antennas, but the high operator workload during a pass (unless the satellite is just grazing your access circle) almost demands computer control of the rotators.

Preamps:

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You need a preamp for AO-13. (I can hear the downlink after a fashion on a Ringo fed with cheap coax and a 10 dB preamp in the shack, but it's not communications quality reception!) Only two people mentioned a specific brand name (Advanced Receiver Research and the unit included with the Ten-Tec 2510), so I assume almost any GASFET preamp in the 20dB gain class is adequate. THE PREAMP MUST (almost always) BE MOUNTED AT THE ANTENNA (check the discussion in Chapter 9 of the Satellite Experimenter's Handbook and you'll see why!). KE4ZV recommends mounting the preamp AT the antenna feedpoint, if your elevation rotator can handle the unbalanced load.

While no one mentioned it (maybe it's obvious), if the antenna is used to transmit (say Mode J) as well as receive (on Mode B, for example), the preamp MUST either include RF-sensed switching, or be switched out of the line before you transmit. TRANSMITTING INTO AN UNPROTECTED PREAMP WILL DESTROY IT INSTANTLY!

Preamps also seem to help on RS-10 (especially with older HF rigs) and on the Pacsats. It seems to be a case of "try it, and get a preamp if it looks like it would help").

Rigs:

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Three radios were mentioned by name - Yaesu FT736 (and it's predecessor, the 726 with satellite module), Kenwood TR751 (a mobile-capable 2 meter multimode), and Ten-Tec's 2510. The Ten-Tec unit is out of production. The few units left are selling for about \$300-350. I'm sure other multi-mode radios, and setups with converters and transverters work well, too - it's just that no one mentioned any by name.

Power output required is a function of the satellite, your antennas, and how badly you want to communicate. [QRP on the satellites is just like QRP on HF - you need good antennas and feedline, you have to pick optimal passes, and skilled operators at both ends are needed. Given the apparent "calmer" operating style on AO-13, QRP is probably easier there than on 20 meters!]

Anyway -about power for AO-13. 3-30 watts will work if you have top-notch antennas (KE4ZV). KC7IT uses 50-100 watts (Ten Tec 2510, Mirage D1010 amplifier, KLM 14C/18C fed with 50 feet of 9913). Both KE4ZV and KC7IT use Mirage D1010 amplifiers on 70 cm when they need a little extra power. For an "optimum station", WA5ZIB recommends 60 watts on 70 cm and 80 watts on 2 meters for AO-13, assuming good antennas (Telex/Hy-Gain or better) and feedlines, and 20 watts to a 5' dish for Mode L. Andy emphasized that you can get by and have lots of fun with much less!

For Mode A, WA5ZIB said 6 watts to the AO-13 2 meter antenna will work well. People using omnis report success with the Pacsats running 50-70 watts to a J-Pole (N5VGC). Several people said they (or someone they know) have no trouble using RS-10 at lower power (10-25 watts) with simple, omnidirectional antennas. Again, it's a case of "try it and see if it works."

There was unanimous consensus that the receiving quipment (antenna, preamp, feedline, and receiver) is more important than the transmit equipment. Running more power "to hear yourself" is frowned upon, to say the least! It's also important to be able to vary uplink power to adjust to specific conditions. Both the Ten Tec 2510 and the Yaesu 736 have continuously variable power output (I guess the rest of us just have to fiddle with the drive controls on our rigs!).

Accessories and Other Stuff:

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You need a PSK modem to use the Pacsats. PacCom makes fully assembled units, either already integrated



with their own TNC, or as a board you install in your TNC-2 clone. They make similar 9600 bps units for accessing UO-22. The downlink receiver (on 70 cm) should be capable of being tuned by the PSK modem's AFC lines. Newer radios can use the up/down lines from the microphone jack or an accessory connection on the rear panel. Older radios must be modified, or be tuned manually. N5VGC told me he sees about 20KHz of doppler on an AO-16 pass, and that without automatic tuning, operator workload is too high to do much else besides tune the receiver!

Just about any radio suitable for packet on 2 meters will work for AO-16, WO18, and LU-19. To run 9600 bps on UO-22, modifications to bypass the microphone and speaker's audio processing circuits are required. I've seen some reports on rec.radio.packet and in the various Hamsat columns that differences between UO14 and UO-22's transmitters make UO-22 more difficult to copy. (I'll worry about that problem later - I'll start with AO-16 and LU-19 first!)

No one mentioned computers - again, it must be obvious (also, we're "talking" using computers!). They're handy, and you need one IN THE SHACK when working the Pacsats or for automated, real-time control of antenna rotators (useful for low altitude satellites).

Other operator aids mentioned, or I thought of on my own: If your radio can't slave uplink and downlink tuning (Ten Tec 2510 and Yaesu 736 can), you need something to help convert between uplink and downlink frequencies (and account for doppler shift and calibration errors on the radios' frequency readouts). A cardboard slide scale or dial will work. I'm thinking of programming my HP48 to do the conversion for me. You need something like this to know where to tune on the uplink to hear a given downlink frequency.

Software to track satellites and predict passes. There are many programs that work. Price ranges from free to \$70 for state-of-the-art QuickTrack or InstantTrack (available from AMSAT). Special software is also needed to use the Pacsats, and to interpret telemetry data. This software is also available from the usual ham sources, and from AMSAT (BTW, software sales support the amateur satellite program!)

Polarity switchers optimize antenna performance by allowing switching antenna feeds from RHCP to LHCP as the need arises. They are a very useful add-on, but don't appear essential.

Equipment to measure power output, SWR, transmit frequency - all useful (see - satellites are not that different from HF!).

Conclusion:

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Finally, there's AMSAT! They're the people who build and run several of the satellites (AO-10, AO-13, AO-16), and have a hand in many of the others! They're also beginning development of the replacement for Oscar 13 (known as Phase 3-D). ANYONE INTERESTED IN THE AMATEUR SATELLITES SHOULD BECOME AN AMSAT MEMBER. Its' the closest place I've found to one-stop-shopping for information on the satellites (this newsgroup is number two, at least until I get onto the satellites myself!). You can reach AMSAT at:

AMSAT  
PO Box 27  
Washington, DC 20044  
(301)589-6062

I know there are several AMSAT members in this newsgroup (who even have satellite experience. I'm still working on it!) - so you can always ask here!

Again, thanks to everyone who answered my query!  
You've helped a great deal. I'll look for you on the birds!

73, Steve (AMSAT Member 21876)

packet:: KA1LM@N4WJN.VA or KA1LM@WA3ZNW.MD  
Internet: sgreene@access.digex.com



Subject: Hams on Internet - List

```
# Network address to name or call letters lookup table maintained by
# Mark Salyzyn VE6MGS mark@ve6mgs.ampr.org
#
# Please send corrections/deletions/additions hams-on-usenet@ve6mgs.ampr.ab.ca
# (if unreachable, mark@ve6mgs.ampr.org or adec23.UUCP!mark is ok)
#
# archived for ftp @ ftp.cs.buffalo.edu:hams_on_usenet courtesy of
# Devon Bowen KA2NRC bowen@cs.buffalo.edu
#
# Last update Jan 28 1992
#
# This document may be distributed freely, as long as there is no financial
# gain. I do not condone this list being used for generating junk mail or
# other annoyances as this is not the purpose of the list. If you are in this
# list and wish to keep your entry hidden, or that the name I have here be
# changed (My middle name is Gregory and I am **** proud of it :-), I would
# oblige.
#
# Entries have this format (-> denotes separated by at least one tab):
#      Address (Name)           ->           Call           ->           Date
#
# Address
#      Network address popularily used by individuals on the network.
Although
#      the address that many news posters add may be incorrect, personal
#      e-mail contacts or updates are always placed first in the list of
#      duplicate calls. Removal of entries is by complaint only, so some
#      (mainly .EDU) may be invalid over time. Some GENIE Hams are
included
#      (Generated by Brian Murrey/KB9BVN) in this list, their addresses
are
#      listed as ??@<GENIE> which of course is unaddressable. Mike
Shirley
#      WB6WUI mikey@slic.cts.com is willing to relay manually to GENIE.
#      The same goes for fidonet addresses ??@<Fido), but without a
#      gateway contact person ...
# Name      Name of the individual.
# Call      Call letters of the individual. Old and alternate calls '/'
separated.
# Date      Last update YY-MM[-DD] International format.
#           A trailing * denotes not searched in call book for verification
yet, @
# means not found in call book (1987 or 1991 US). ? after means recheck may be
# required (eg. Call does not match name).
#
## ISRAEL 4X,4Z
gorski@cs.HUji.ac.IL (Azriel Gorski)           4x1pi/w7si  91-12-
14
RAFI%BGUVMS.BITNET@TAUNIVM.TAU.AC.IL (Earl Rafi)  4z4tj 92-8-16@
RAFI@BGUVMS.BGU.AC.IL (Earl Rafi)           4z4tj 92-11-1@
## CYPRUS 5B
ami9667@venus.tamu.edu (Andreas Michael Iacovides) 5b4sj/5      92-4-
24
## ALGERIA 7X
layaida@imag.fr (Nabil Layaida)             7x2kt 92-7-14@
```

## CHILE CE	
CE3BUC%UCHCECVM.BITNET@VTVM2.CC.VT.EDU (Christian)	ce3oyw92-8-7@
rerodrig@nyx.CS.du.EDU (Rodrigo E Rodriguez)	ce6nug92-11-18@
R5SOP337@UTFSM.BITNET (Rodrigo E Rodriguez)	ce6nug92-11-18@
## PORTUGAL CT	
A_VALE@INESCN.PT (Antonio Couto Vale)	ct1dzy 92-9-
5@	
## GERMANY DB-DH Y2-Y9	
klaus@ccsq.hanse.de (Klaus Kleemann)	db2hk 91-10
lsmichae@immd4.informatik.uni-erlangen.de (Lars Michael)	db3bw 92-11-2?
pit@tequila.ni.sub.org (Lars Michael)	db3bw 92-10-6?
meyer@fuhainf2.fernuni-hagen.de (Bernd Meyer)	db6ag 91-10
BTITMARS@ESOC.BITNET (Barry Titmarsh)	dc0hk 92-12-15@
olaf@dc1ik.ka.sub.org (Olaf Erb)	dc1ik 92-2-20*
uj65@dkauni2.bitnet (Olaf Erb)	dc1ik 92-2-20*
erb@insul.etec.uni-karlsruhe.de (Olaf Erb)	dc1ik 93-1-26*
dc1ik@db0sao.ampr.org (Olaf Erb)	dc1ik 93-1-26*
DC2SF@DC2SF.ampr.ORG (Stefan Siebenhaller)	dc2sf 91-10
alf@dfv.rwth-aachen.de (Ralf Crumbach)	dd2kz 92-4-24
sww@versatc.versatec.COM (Stephan Wendl)	dd2rs 91-10
herman@chamber.in-berlin.de (Martin Gebert)	dd6mf 92-9-22@
herman@obh.in-berlin.de (Martin Gebert)	dd6mf 92-9-22@
root@chamber.in-berlin.de (Patrick Wendt)	dd6pf 92-9-15@
root@megiddo.in-berlin.de (Patrick Wendt)	dd6pf 92-9-15@
pwendt@opal.cs.tu-berlin.de (Patrick Wendt)	dd6pf 92-9-15@
df1on@lifra.lif.de (Ines-Marein Koch)	df1on 93-1-14
UPP200@DBNRHRZ1.BITNET@cunyv.cuny.edu (Guido Kueppers)	df2kw 91-10
UPP200@rhrz.uni-bonn.de (Guido Kueppers)	df2kw 92-11-20
UPP200@ibm.rhrz.uni-bonn.de (Guido Kueppers)	df2kw 92-11-20
UPP200@DBNRHRZ1.BITNET (Guido Kueppers)	df2kw 92-11-20
fritz@multinet.DE (Fritz Raab)	df2rf 92-9-24
illies@drnhh.neuhaus.de (Thomas Illies)	df7hi 91-11-5
sven%anl433.uucp@Germany.EU.net (Sven Werner)	dg1hqo92-12-11@
Sven.Werner%anl433.uucp@Germany.EU.net (Sven Werner)	dg1hqo92-12-11@
frieder@roxanne.stgt.sub.org (Frieder Loeffler)	dg1sek92-7-31@
kneip@scoop.ims.uni-hannover.DE (Johannes [Hans] Kneip)	dg3rbu92-10-22@
br@walhalla.Germany.EU.net (Bodo Rueskamp)	dg3ygd92-8-7@
bodo@juqi.ruhr.de (Bodo Rueskamp)	dg3ygd92-8-7@
orscholz@immd4.informatik.uni-erlangen.de (Oliver Scholz)	dg4nem92-10-10
dg4scv@dg4scv.UUCP (Rolf Rose)	dg4scv 91-10
IFF118@DJUKFA11.BITNET (Piotr)	dh0kps 92-8-
8@	
brunner@vax1.informatik.fh-regensburg.dbp.de (Juergen Brunner, Carl Heinz Bink Jun in CB)	dh0rak 92-12-1?
tremmel@ira.uka.de (Wolfgang Tremmel)	dh2paf 92-11-
29@	
tremmel@iraul1.ira.uka.de (Wolfgang Tremmel)	dh2paf93-1-7@
ry09@rz.uni-karlsruhe.de (Andreas Arnold)	dh3iax92-12-30@
ry09@DKAUNI2.bitnet (Andreas Arnold)	dh3iax 92-12-
30@	
jaervinen@bhajee.enet.dec.com (Ora Jaervinen)	dj0mar92-12-20@
jaervinen@nntpdbhajee.enet.dec.com (Ora Jaervinen)	dj0mar92-12-20@
claudio@bauv106.bauv.unibw-muenchen.de (Claude Frantz)	dj0ot 92-9-11
claudio@bauv.unibw-muenchen.de (Claude Frantz)	dj0ot 92-12-28
claudio@netwman.rz.unibw-muenchen.de (Claude Frantz)	dj0ot 92-9-11
2:246/47.20@<Fido> (Claude Frantz)	dj0ot 92-9-11
PLONG@ESOC.BITNET (Peter D Long)	dj0tv/g3wiz 92-2-5

hega@hpbbird.bbn.hp.com (Henning Gamlich)	dj3eg 92-11-16
hega@bbn.hp.com (Henning Gamlich)	dj3eg 92-11-16
eg@ikp.Uni-Koeln.DE (Eckhard Grah)	dj5jq 91-10?
EG@haegar.ikp.Uni-Koeln.DE (Eckhard Grah)	dj5jq 91-10?
D1PGLA@DUESVM1.VNET.IBM.COM (Peter Glasmacher)	dk5dc/aa6hm 92-3-
18	
RZ76@IBM3090.RZ.UNI-KARLSRUHE.DBP.DE (Juergen Oberbeck, Heinz Helbing in CB)	
dk5ic 92-12-24?	
RZ76@IBM3090.rz.uni-karlsruhe.de (Juergen Oberbeck, Heinz Helbing in CB)	
dk5ic 92-12-24?	
ajk@eicmfg.enet.dec.com (Anton J Kuchelmeister)	dk5tl 92-12-30
bleher@mikro.ee.tu-berlin.de (Rolf Bleher)	dk7in 92-5-16
sys_hjk@lifra.lif.de (Hans-Joachim Koch)	dk9om 93-1-14
koch@lifra.lif.de (Hans-Joachim Koch)	dk9om 93-1-14
dk9om@lifra.lif.de (Hans-Joachim Koch)	dk9om 93-1-14
macher@atmkn.UUCP (Klaus Eimermacher)	dl1gek 92-12-
24	
Hans.Gruenthal@PrakInf.TU-Ilmenau.DE (Hans-Joerg Gruenthal)	dl1jde92-12-3@
gruenth@prakinf.tu-ilmenau.de (Hans-Joerg Gruenthal)	dl1jde92-12-3@
gross@ifswsl.sozialforschung.uni-stuttgart.de (Frank Grossmann)	dl1sbr
92-9-24	
Thomas.Pagel@unnet.w.open.DE (Thomas Pagel)	dl2eck92-9-20
karl@khk.ghia.rhein-main.de (Karl-Heinz Kuehlborn)	dl2fag92-12-19
dl2kp@lifra.lif.de (Georg Prinz)	dl2kp 93-1-14
s_eckart@lis.e-technik.tu-muenchen.de (Stefan Eckart)	dl2mdl92-9-17@
ae@ws06.pc.chemie.th-darmstadt.de (Andreas Elbert)	dl3fce92-1-13@
dl3no@infoac.rmi.de (Rupert Mohr)	dl3no 92-1-7
t2262cg@cd1.lrz-muenchen.de (Martin Rast)	dl3rdr92-12-1@
Martin.Rast@cd1.lrz-muenchen.de (Martin Rast)	dl3rdr92-12-1@
WKOEHLER@ESOC.BITNET (Hans Wolf Koehler)	dl3zbj/ab6el/vk6bgv 92-9-
19	
WTPZ@RUSVM1.RUS.UNI-STUTTGART.DE (Ralf Dieter Kloth)	dl4ta 92-9-16
wtpz@DSORUS1I.BITNET (Ralf Dieter Kloth)	dl4ta 92-9-16
Planke@Systemtechnik.TU-Ilmenau.DE (Thomas Planke)	dl5atp93-1-5
manfred@isi5.ssl.berkeley.edu (Manfred Bester)	dl5kr 92-2-4
stingl@gate.fzi.de (Thomas Stingl)	dl5sbs91-10
jan@nasobem.stgt.SUB.ORG (Jan Schiefer)	dl5ue 91-12-22@
schroeder.pad@nixbur.UUCP (Django Schroeder)	dl5yec91-12-18
schroeder.pad@sni-usa.com (Django Schroeder)	dl5yec92-5-12
schroeder.pad@sni.de (Django Schroeder)	dl5yec 92-5-
12	
buettneb@guug.de (Bernhard Buettner)	dl6rai 92-10-
6	
uschndr@ksmx2.kst.fu-berlin.de (Udo Schneider)	dl7ol 92-5-28
ralph@netmbx.netmbx.de (Ralph Christopher)	dl7zn 92-2-4
assfalg@inf-wiss.ivp.uni-konstanz.de (Rolf Assfalg)	dl8gba93-1-14
SPE_PA@physik.uni-paderborn.de (Peter Alteheld)	dl8yco92-10-1
faltel@pbhrzs0.uni-paderborn.de (Peter Alteheld)	dl8yco92-10-1
dowjones@jattmp.nbg.sub.org (Joachim Astel)	dl9ncq/dg2nbn/dh4nan 91-10
c52514@fhlip.ee.fh-lippe.de (Ralf Begemann)	dl9yen92-11-27@
## SPAIN EA	
MAGM@dwarf1.quimica.uniovi.ES (Miguel)	ea1evu 92-8-
20@	
femenia@graf.ci.uv.es (Jose Miguel Femenia Herrero)	ea5dfv92-3-4
## IRELAND EI	
tocherd@ul.ie (David B A Tocher)	ei2amb91-10
eeicmy@eeiud.ericsson.SE (Cyril Moriarty)	ei4agb92-6-11

CHESTER%IRTCCARL@uicvm.uic.edu (Joe Chester)	ei5dyb91-11-7?
walshr@ul.ie (Roderick Walsh)	ei7df 92-6-11
8909296@ul.IE (John Barry)	ei7dnb 92-5-
11@	
9210466@ul.ie (John J Quinn Jr)	ei8hq/n4uxp/kb2fpu
92-12-4	
phealy@swift.cs.tcd.ie (Paul Healy)	ei9gl 92-1-13@
phealy@cs.tcd.IE (Paul Healy)	ei9gl 93-1-18@
## Estonia ES	
pihl@aai.ee (Arvo Pihl)	es5mc 92-10-29@
juhan@chem.ut.ee (Juhan Poeldvere)	es5qx 93-1-8
juhan@tuc.chem.ut.ee (Juhan Poeldvere)	es5qx 92-10-29
juhan@tuc (Juhan Poeldvere)	es5qx 93-1-8
## FRANCE F	
f1nwk%f1nwk%pi8eae.bbs@pi8eae.ampr.ORG (Tom)	f1nwk 91-10@
granger@stna7.stna.dgac.FR (Frederic Granger)	fc1jso92-7-26
granger@stna.dgac.fr (Frederic Granger)	fc1jso 92-11-
27	
fc1jso@stna7.stna.dgac.fr (Frederic Granger)	fc1jso92-12-4
fc1jso@stna7.stna7.stna.dgac.FR (Frederic Granger)	fc1jso92-12-24
montaigne_pascal@tandem.com (Pascal Montaigne)	fc1poe91-11-20?
parnoul@chouette.saclay.cea.fr (Patrick Arnoul)	felhnk/f1hnk92-9-
28	
hutin@asl.slb.com (Remi Hutin)	fe6cnb 92-2-
20	
71750.420@compuserve.com (Remi Hutin)	fe6cnb 91-11-
20	
HUTIN@ASL@PSI%ASLVX6@MRGATE@PRSRTR (Remi Hutin)	fe6cnb92-2-20
## ENGLAND G	
hdavies@rx.xerox.com (Hugh J E Davies)	g0cnr 93-1-5
hugh_davies.wgcl@rx.xerox.COM (Hugh J E Davies)	g0cnr 91-10
esrlb@cvs.warwick.ac.uk (Simon Browne)	g0gwa 92-11-5@
david@comms.ee.man.ac.uk (David Tait)	g0jvy 92-7-3@
lw91sdk@brunel.ac.uk (Stephen D Kennedy)	g0lri 92-2-24@
M.Willis@ee.surrey.ac.uk (Mike Willis)	g0mjw 92-3-3@
ees1mw@EE.Surrey.Ac.UK (Mike Willis)	g0mjw 92-8-8@
nigel@sa.co.umist.ac.UK (Nigel Watkinson)	g0ngl 91-10@
JHL14@phx.CAm.ac.UK (J H L)	g0nsi 92-5-19@
Nick_Reddish@DG_UK.MCEO.DG.COM (Nick Reddish)	g0ore 92-1-8@
prs@oasis.icl.co.uk (Peter R Swynford)	g0pub 92-9-4@
G0RDI.UXB1@rxuk.xerox.COM (Iain Philipps)	g0rdi/g8sjpg/c30dla92-10-27
G0RDI.BRidge_House@rxuk.xerox.COM (Iain Philipps)	g0rdi/g8sjpg/c30dla
93-1-7	
Iain_Philipps.BRidge_House@rxuk.xerox.COM (Iain Philipps)	g0rdi/g8sjpg/c30dla
92-10-27	
kelvin@thed.uk22.bull.com (Kelvin J Hill)	g1emm 92-5-6
I.G.Batten@fulcrum.bt.co.uk (Ian G Batten)	g1fvc 91-12-31
BRACKEN@VAX.LSE.AC.UK (Dave Bracken)	g1lxc 92-9-4
nbb@crossfield.co.uk (Nick B Bristow)	g1lyx 91-10
blloyd@axion.bt.co.uk (Brian D Lloyd)	g1nna 91-10
dirkjan@cix.compulink.com.uk (Dirk)	g1tlh 93-1-9@
andyw@aspen32.cray.com (Andy Warner)	g1xrl/n0ren 92-6-
3@	
zzatsjh@uts.mcc.ac.uk (John Heaton)	g1yyh 91-10@
john@goshawk.mcc.ac.uk (John Heaton)	g1yyh 92-11-15@
john@nessie.mcc.ac.uk (John Heaton)	g1yyh 92-9-29@
john@dir.mcc.ac.uk (John Heaton)	g1yyh 92-10-8@

g3nrw%gb7bil%pi8eae.bbs@pi8eae.ampr.ORG (A I H Wade)		g3nrw 92-2-4
sid.boyce@amail.amdahl.COM (Sid O T E A Boyce)		g3vbw 91-12-10
szb50@juts.ccc.amdahl.com (Sid O T E A Boyce)		g3vbw 91-10
Dave_Aldridge@DG_UK.MCEO.DG.COM (Dave J Aldridge)		g3vgr 92-2-29
smith@oakhill.sps.mot.com (Trevor G Smith)		g3wqo/ab5eu 91-12-
1		
tgs@genrad.com (Trevor G Smith)		g3wqo/ab5eu 92-7-
14		
tgs@quasar.genrad.com (Trevor G Smith)		g3wqo/ab5eu 92-12-
11		
ali@ukc.ac.uk (A L Ibbetson)		g3xaq 92-2-25
JKASSER@STDADS.LAS.LORAL.COM (Joe E Kasser)	g3zcz/w3	92-11-22
whiting@eucad.co.uk (Neil J Whiting)		g4brk 92-7-8
whiting@cadence.com (Neil J Whiting)		g4brk 92-6-11
paulr@syma.sussex.ac.uk (Paul T Russell)		g4bwq 92-6-11
tony@microware.co.uk (Tony Mountifield)		g4cjo 92-5-6
uab1017@dircon.co.uk (Charles H Brain)		g4guo 93-1-9
g4guo@dircon.co.uk (Charles H Brain)		g4guo 93-1-9
chrisc@moron.vware.mn.org (Chris G Cox)		g4jec/w0 92-9-
17		
chrisc@ramrod.lmt.mn.org (Chris G Cox)		g4jec/w0 92-9-
17		
chrisc@biggus.g4jec.tcman.ampr.org (Chris G Cox)		g4jec/w0 92-12-
24		
chrisc@biggus.moron.vware.mn.org (Chris G Cox)		g4jec/w0 92-12-
24		
Geoffrey_C._Williams.Wbst207V@xerox.COM (Geoffrey C Williams)		g4jjo/n2bdt
92-11-20		
G4JJO.Wbst207V@xerox.com (Geoffrey C Williams)		g4jjo/n2bdt 92-11-
20		
dearnsha@wizard.worldbank.org (Darrell Earnshaw)		g4mzf 92-8-14
rpt@edscom.demon.co.uk (Richard P Tomlinson)		g4tgj 92-8-20
DAVEW@D.SSS.CO.UK (Dave Wade)		g4ugm 92-11-23
d.wade@c.salf.ac.uk (Dave Wade)		g4ugm 92-11-23
liam@ste.dyn.bae.co.uk (Liam J Flynn)		g4uwp 91-10
ssuhouns@csug3.cs.reading.ac.uk (Paul Marshall Hounslow)		g4yfe 92-11-3
ssuhouns@csug.cs.reading.ac.uk (Paul Marshall Hounslow)		g4yfe 92-11-3
ssuhouns@sussys1.rdg.ac.uk (Paul Marshall Hounslow)		g4yfe 92-11-3
IKENDALL@UNIVERSITY-OF-HUMBERSIDE.AC.UK (Iain J Kendall)		g6aro 92-12-1
ikendall@uk.ac.humber (Iain J Kendall)		g6aro 92-12-1
gary@minster.york.ac.uk (Gary Morgan)		g6ddh 92-1-2
mikec@praxis.co.uk (Michael H Chace)		g6dhu 92-3-12
dave@fusk.demon.co.uk (David A Brooke)		g6gzh 92-12-21
dbrooke@cix.compulink.co.uk (David A Brooke)		g6gzh 92-12-21
shenson@camborne-school-of-mines.ac.UK (Stephen N Henson)		g6ixs 92-12-25
shenson@csm.ac.uk (Stephen N Henson)		g6ixs 92-12-25
uunet!g6phf.ampr.org!g6phf (Mike C Dent)		g6phf 92-2-12
g6phf@kelvin.uk22.bull.com (Mike C Dent)		g6phf 92-2-12
mdent@nyx.cs.du.edu (Mike C Dent)		g6phf 92-9-18
g6phf@wg7j.ece.orst.edu (Mike C Dent)		g6phf 92-9-18
esx070@cch.cov.ac.uk (Brevan L Miles)		g6vdu 91-10
100015.2657@CompuServe.COM (Ron A Collins)		g6vug 91-12-7
pjml@unixa.nerc-swindon.ac.UK (Pete J M Lucas)		g6wbj 92-3-29
pjml@swmis.nerc-swindon.ac.UK (Pete J M Lucas)		g6wbj 92-8-7
frenchs@forsan.enet.dec.com (Simon P French)		g6ztz 92-12-3
frenchs@suburb.enet.dec.com (Simon P French)		g6ztz 92-12-3
kam@cs.bham.ac.uk (Keith A Marlow)		g7afq 92-5-10@



K.D.Hatcher@technology.THames.ac.UK (Darren Hatcher)	g7bko 92-3-5@
kquinlan@cvedg.Prime.COM (Kevin Quinlan)	g7dzd 92-5-3@
esuyw@csv.warwick.ac.uk (Robert Garth)	g7elk 92-12-1@
suyw@lily.warwick.ac.uk (Robert Garth)	g7elk 92-12-1@
cs90nrs@brunel.ac.uk (Nicholas R Swift)	g7ens 92-11-27@
df@eyrie.demon.co.uk (Derek Fawcus)	g7fvs 93-1-21@
ig@siesoft.co.uk (Ignatius Tan)	g7gbq 92-3-30@
eeyimkn@unicorn.nott.ac.uk (Mike Knell)	g7gpa 92-12-15@
agodwin@acorn.co.uk (Adrian Godwin)	g7hwn 92-2-12@
u2d92@seq1.keele.ac.uk (Matt J Gumbley)	g7jffj 92-12-18@
dplumb@cix.compulink.co.uk (Dave Plumb)	g7mil 92-12-20@
li95001@ox.ac.uk (Paul Hirst)	g7ndc 93-1-12@
mnoble@cbnewsf.cb.att.com (Martin J Noble)	g8bpv 92-3-5
lee@tosspot.UUCP (Lee Reynolds)	g8lck/w1 92-3-2
lee@tosspot.sv.com (Lee Reynolds)	g8lck/w1 92-3-5
lee@pranny.UUCP (Lee Reynolds)	g8lck/w1 92-8-
14	
I.P.Beeby@bnr.co.uk (Ian P Beeby)	g8ogj 92-1-25
cobleyp@pphub.aston.ac.uk (Phil Copley/University of Ashton	in CB) g8pgm
92-5-9?	
phil@muppet.bt.co.uk (Phil H J Houseago)	g8sgb 92-6-11
davek@mph.sm.ucl.ac.UK (Dave R Kirkby)	g8wrb 92-5-14
## ISLE OF MAN GD	
## NORTHERN IRELAND (ULSTER) GI	
markw@icsbelf.co.uk (Mark Willis)	gi0pez92-10-29@
smckinty@sunicnc.France.Sun.COM (Steve J McKinty)	gi8oya92-11-5
smckinty@france.sun.com (Steve J McKinty)	gi8oya92-11-5
## JERSEY GJ	
## SCOTLAND GM	
bruce@hpqtdla.sqf.hp.com (Bruce Borrows)	gm01lj92-3-18@
jmorris@spider.co.uk (John Morris)	gm4anb92-8-1
pjb@castle.ed.ac.uk (Peter J Bates)	gm4byf91-10
jdg@hpqtdla.sqf.hp.com (James D Gentles)	gm4wzp91-10
ralexander@irnbru.enet.dec.com (Robin A Alexander)	gm4yed93-1-9
dstock@hpgmola.sqf.hp.com (David Stockton)	gm4znx92-11-6
dstock@hpgmoca.sqf.hp.com (David Stockton)	gm4znx92-11-20
potter@movies.enet.dec.com (Alan T Potter)	gm7glj92-6-29@
dit@maths.aberdeen.ac.UK (David Tock)	gm7kgf 92-2-
11@	
martin.briscoe@almac.co.uk (J Martin Briscoe)	gm8aob92-7-3
johns@hpgmola.sqf.hp.com (John W Struthers)	gm8cvn92-5-15
## GUERNSEY & CHANNEL ISLANDS GU	
## WALES GW	
auj@aber.ac.uk (Alun U Jones)	gw1urf 92-11-
6@	
A.M.Cooper@daresbury.ac.uk (Tony Cooper)	gw3tkd92-12-4@
fd@daresbury.ac.uk (Tony Cooper)	gw3tkd92-12-4@
lewis@pender.ee.upenn.edu (Nic Lewis)	gw4wfx 91-10@
## HA Hungary	
H17BAT@ELLA2.SZTAKI.HU (Andras Bato)	ha6nn 92-6-2
sztaki.hu!h17bat (Bato Andras)	ha6nn 92-6-11
## SWITZERLAND H[BE]	
hufschmi@isibee9 (Markus Hufschmid)	hb9bt192-5-9
hb9zz@bernina.ethz.ch (Marco Zollinger)	hb9cat 91-10
frode@dxcern.cern.ch (Frode Weierud)	hb9chl/la2r1
92-7-8	
weierud@cernvm.cern.ch (Frode Weierud)	hb9chl/la2r1

92-7-8

INFLIBMOD%CSGHSG5A.BITNET@CEARN.cern.ch (Urs Baer)		hb9dil92-10-6@
inflibmod@alpha.unisg.ch (Urs Baer)		hb9dil92-10-6@
inflibmod@csgsg5a.bitnet (Urs Baer)		hb9dil 92-10-
6@		
mwm@hasler.ascom.ch (Mike W McGann)		hb9gau/aa2ay92-3-2
rrb@priam.cern.ch (Richard R Baud)		hb9mah91-10
ganter@ifi.unibas.ch (Robert Ganter)		hb9nby/he9qai
92-12-15		
wiget@switch.ch (Marcel Wiget)		hb9rwm 92-3-
28		
hb9zz@uhm.ampr.org ()		hb9zz 91-10@
cbaechle@iic.ethz.ch (Cedric Didier Baechler)		he9cun92-12-11
he9cun@uska.spn.com (Cedric Didier Baechler)		he9cun92-12-11
cedric@spn.com (Cedric Didier Baechler)		he9cun 92-12-
11		
## KOREA HL		
park@umnstat.stat.umn.edu (Chongsun Park)	h11abt/h11awg/kb0fme	92-12-
18		
park@stat.umn.edu (Chongsun Park)	h11abt/h11awg/kb0fme	92-12-
18		
stat261@staff.tc.umn.edu (Chongsun Park)	h11abt/h11awg/kb0fme	92-12-
18		
ned@kaerigw.kaeri.re.KR (Surgwon Sohn)		h13anf 92-1-
13@		
ssohn@kaerigw.kaeri.re.KR (Surgwon Sohn)		h13anf92-2-17@
## THAILAND HS		
sahachai@uhunix.uhcc.Hawaii.Edu (Nopadon Sahachaisaeree)		hs0brs/wh6jb93-1-
5@		
Suwanna@Uhunix.Uhcc.Hawaii.Edu (Suwanna Chotisukan)		hs0mkg93-1-5@
kunchit@chulkn.chula.ac.th (Kunchit Charmaraman)		hs1jc/n5ptf 92-9-
25		
## ITALIAN I[KW]		
IRPET5@vm.cnuce.cnr.it (Massimo Cartoni)		i5uns 92-8-18
irpet5@icnucevm.cnuce.cnr.it (Massimo Cartoni)		i5uns 92-8-18
ik3huk@sabrina.dei.unipd.it (Diego Serafin)		ik3huk92-10-13@
ASA0@ICINECA.BITNET (Alessandro Asson)		ik4ibw 91-10@
FIRE@FI.INFN.IT (Pierfrancesco Caci)		ik5pvx 91-12-
7@		
sax@hpuircz.italy.HP.COM (Saverio Saggese)		iw2eyn92-12-30@
76106.1764@compuserve.com (Saverio Saggese)		iw2eyn92-12-30@
sax@hpietcs.italy.hp.com (Saverio Saggese)		iw2eyn92-12-30@
Saverio_Saggese@hp8200.desk.hp.com (Saverio Saggese)		iw2eyn92-12-30@
guercile@ghost.dsi.unimi.it (Federico Guercilena)		iw2giq92-11-27@
yoda@sabrina.dei.unipd.it (Mauro Furin)		iw3fwk 92-11-
6@		
lunazzi@boifcc.cineca.it (Mauro Andrea Cremonini)		iw4box92-6-11@
DAMICO@IPMEL1.POLIMI.IT (Michele D'Amico)		ik7gdp92-7-26@
## JAPAN J, 7J, 7K		
asqp-nbf@zama-emh1.army.mil (Roland Cowan)	7j1aki/wf4p/ke4lz/ka2rc	92-11-
20		
otsuka@hypsolv.tky.hp.com (Atsushi Otsuka)		7k2coj92-12-20@
harada@aspen.mis.hiroshima-u.ac.jp (Koichi Harada)		ja4mci91-11-25?
jf11zq@jhlynw.prug.or.jp (Yutaka Sakurai)		jf11zq93-1-8
ab4zs@iinus1.ibm.com (Takuji Matsushiba)	jf3gfh/ab4zs	92-11-20
ab4zs@vnet.ibm.com (Takuji Matsushiba)		jf3gfh/ab4zs92-11-
20		

kanekawa@oahu.cs.ucla.edu (Nobuyasu Kanekawa)	jgltqi92-8-1@
tanaka@osklns.kek.JP (Junichi Tanaka)	jh4rhf/kh2s 92-8-8
tanaka@osklns.UCSD.EDU (Junichi Tanaka)	jh4rhf/kh2s 92-10-
11	
tanaka@osklns.kek.ac.jp (Junichi Tanaka)	jh4rhf/kh2s 92-10-11
kondou@neptune.bsd.mt.nec.co.jp ([Don] Katsuhiko Kondou)	jh5ghm92-5-16
kondou@d1.bs2.mt.nec.co.jp ([Don] Katsuhiko Kondou)	jh5ghm92-5-16
kenji@rcac.astem.or.jp (Kenji Rikitake)	jj1bdx 93-1-5
kenji@rd.macrofield.or.jp (Kenji Rikitake)	jj1bdx93-1-5
kohjin@marina.prug.or.jp (Kohjin Yamada)	jr1ede93-1-8
76662.111@CompuServe.COM (Kohjin Yamada)	jr1ede93-1-8
jr3hed@dcc.osaka-tech.ac.jp (Junichi Nishihara)	jr3hed92-6-2@
## NORWAY LA	
Magne.Maehre@swing.data.st.statoil.no (Magne Maehre)	la1bfa92-12-24
magne@pvv.unit.no (Magne Maehre)	la1bfa92-10-31
magne@ddml.ddm.st.statoil.no (Magne Maehre)	la1bfa92-12-24
Magne.Mahre@Statoil.TelemaX.NO (Magne Maehre)	la1bfa92-10-31
kob@hsr.NO (Karl Olav Bergesen)	la3tha 91-10@
espen@itekiris.kjemi.unit.no (Espen Olsen)	la6mga92-12-19@
oivindh@stud.cs.uit.no (Oeyvind Hanssen)	la7eca91-10
la8ak%la9k%pi8eae.bbs@pi8eae.ampr.org (Jan Martin Noding)	la8ak 91-11-12
jona@Lise.Unit.NO (Jon Sletvold)	la9nga92-4-24@
RETTEDAL@hauk.hsr.no (Arne Rettedal)	la9nm 93-1-5
Rettedal@hsr.no (Arne Rettedal)	la9nm 93-1-5
harrys@hsr.no (Harry R Skalleberg)	lb7pd 92-3-13@
## Latvia LT	
## ARGENTINA LU	
COLLA@MARVM1.VNET.IBM.COM (Pedro E Colla)	lu1bu92-7-8
eduardo@psg.com (Eduardo J Salom to contact Son Diego)	lu8adx92-3-11@
## Lithuania LY	
## US 0 District	
wvogel@MtHolyoke.edu (William Vogel)	aj0ae 93-1-25@
wvogel@mhc.mtholyoke.edu (Bill Vogel)	aj0ae 92-12-24@
steve@matt.ksu.ksu.edu (Steve Schallehn)	kb0agd92-9-16
cbetz@radioman.cray.com (Charles M Betz)	n0akc 92-11-21
cbetz@romulus.cray.com (Charles M Betz)	n0akc 92-11-21
grossman@kuhub.cc.ukans.edu (Micheal R Grossman)	kb0alc91-12-6
dickw@iastate.edu (Dick M Wallingford)	wd0anb 92-3-2
bob@hal.com (Bob E Arasmith)	n0ary 92-12-15
bob@arasmith.com (Bob E Arasmith)	n0ary 92-12-15
manfredi+@pitt.edu (Juan J Manfredi)	na0b 92-1-10
enders@plains.NoDak.edu (Todd R Enders)	wd0bci 91-10
enders@bolshoi.cc.misu.NoDak.edu (Todd R Enders)	wd0bci92-10-19
enders@bolshoi.uucp (Todd R Enders)	wd0bci92-10-19
braun@phad.hsc.usc.edu (Mark H Braun)	kb0bcy 92-5-
10	
ELLIS%KANGA@vx.acs.umn.edu (Bruce W Ellis)	w0bf 92-3-30
ellis@kanga.stcloud.msus.edu (Bruce W Ellis)	w0bf 92-3-30
shoppa@erin.caltech.edu (Tim D Shoppa)	ka0btd 91-10
UD186372@NDSUVM1.BITNET (Harry W Patchin)	kb0buq91-12-6
bryan@edgar.mn.org (Bryan J Halvorson)	n0buu 93-1-5
bryan@n0buu.ampr.org (Bryan J Halvorson)	n0buu 93-1-5
sims@avdms8.msfc.nasa.GOV (William Herb Sims III)	ku0c 92-2-24
sims@sauron.msfc.nasa.GOV (William Herb Sims III)	ku0c 92-3-26
jeffs@matt.ksu.ksu.edu (Jeff D Smith)	kb0cab 92-7-
14	
kohlstd@seas.gwu.edu (David A Kohls)	n0clt/ka0czs92-12-

6

goris@conan.HP.COM (Andy C Goris) aa0cm 91-12-5  
goris@hpfcsso.FC.HP.COM (Andy C Goris) aa0cm 92-8-11  
goris@fc.hp.com (Andy C Goris) aa0cm 92-8-11  
estey@skylar.mavd.honeywell.com (Carl [Wayne] A Estey) wa0cqq93-1-18  
marky@moron.vware.mn.org (Mark D Oeltjenbruns) n0ccq 92-2-4  
kessler@cbnews.cb.att.com (William K Kessler) wb0cst92-5-12  
bobw@col.hp.com (Bob A Witte) kb0cy 92-5-28  
jrc@brainiac.mn.org (Jeffrey R Comstock) nr0d 93-1-21  
randy@adaptex.uucp (Randy G Berger) wa0d/n0fuj 92-12-5  
5  
bills@hplvec.LVLD.HP.COM (Bill E Standerfer) kf0dj 92-11-6  
bills@lvld.hp.com (Bill E Standerfer) kf0dj 92-11-6  
ken@cherokee.uswest.com (Kenny A Chaffin) wb0e 91-12-6  
wayne@hpfcsso.FC.HP.COM (Wayne F Covington) kd0ea 92-7-20  
gbuffer@physics.umr.edu (Gavin D Buffington) n0ecq/ka0obx93-1-9  
s100547@umrvma.umr.edu (Gavin D Buffington) n0ecq/ka0obx93-1-9  
tbruseha@kafka.ems.cdc.com (Tom G Brusehaver) wd0eib92-8-20  
tom@intran.UUCP (Tom G Brusehaver) wd0eib91-10  
mark@lenti.med.umn.edu (Mark Olson) wd0ejt92-5-12@  
jrt@mbunix.mitre.org (Jim R Torley) kc0el 91-10  
perry@hpfcmgw.FC.HP.COM (Perry E Scott) aa0et 92-5-16  
myers@fc.hp.com (Bob L Myers) kc0ew 92-9-11  
myers@hpfcsso.FC.HP.COM (Bob L Myers) kc0ew 92-9-11  
72060.2377@CompuServe.COM (Donald D Ferguson) wb0eyk91-11-10  
jubjub@diac.3m.com (Mark J Giebler) ko0f 92-1-26  
aaronm@boy.com (Aaron D McClure) wd0faa92-3-26  
Steve\_M\_Kile@cup.portal.com (Steve M Kile) n0fbl 92-2-4  
bellairs@cs.umn.edu (Keith K Bellairs) aa0fd 92-5-9  
IANR003%UNLVM.BITNET@cunyvm.cuny.edu (Michael P Ruhrdanz) n0fer 91-10  
IANR001@UNLVM.UNL.EDU (Michael P Ruhrdanz) n0fer 92-12-25  
aa0fm@vexcel.com (Zach D Bergen) aa0fm/kf0ro 93-1-8  
jcouncil@UMRVMB.umr.edu (Joseph A Council) kb0fpd91-12-30  
baxter@kuhub.cc.ukans.edu (Kirk G Baxter) n0fpz 92-7-20  
KB06810@UKANVM.BITNET (Kirk G Baxter) n0fpz 91-10  
jle@hpfcsso.FC.HP.COM (Jer L Eberhard) n0fzd 91-10  
dfeldman@lookout.it.uswc.uswest.com (David G Feldman) wb0gaz92-12-1  
don%sol.dnet@sirius.cira.colostate.edu (Dr Don W Hillger) wd0gck92-7-8  
keith@hpfclm.fc.hp.com (John C Keith) kd0gd 92-7-8  
keith@fc.hp.com (John C Keith) kd0gd 92-7-8  
Claton.Cadmus@f100.n282.z1.tdkt.kksys.com (Claton C Cadmus) ka0gkc92-6-29  
S02337%FLC@vaxf.colorado.edu (Mitch J McCann) kb0gny92-4-8  
barker@wd0gol.WD0GOL.MN.ORG (Bob W Barker) wd0gol92-3-18  
jmn@hpfcsso.FC.HP.COM (John M Newman) kb0gow 91-10  
grima@iphase.com (Gary L Rima) n0gr 92-3-10  
jayk@hpfcsso.FC.HP.COM (Jay A Kesterson) k0gu 92-10-23  
jayk@hpxxx.fc.hp.com (Jay A Kesterson) k0gu 92-10-26  
jayk@fc.hp.com (Jay A Kesterson) k0gu 92-10-26  
tnhs6@isuvax.iastate.edu (Pat J Rundall) wz0h 91-12-6  
cowdin@pogo.DEn.mmc.COM (Dave H Cowdin) wd0hhu 92-12-5  
1  
wd0hhu@amsat.org (Dave H Cowdin) wd0hhu92-12-1  
scotbri@flower.samsung.com (Scott Brigham) aa0hu 92-12-11@  
scotbri@rosemount.com (Scott Brigham) aa0hu 92-12-11@  
ROsman%ASS%SwRI05@D26VS046A.CCF.SwRI.EDU (Rich J Osman) wb0huq92-1-10  
nlmjr@isuvax.iastate.edu (Mike J Reilly) kb0hvr92-5-26  
capskb@alliant.backbone.uoknor.edu (Keith A Brewster) n0iaw 92-2-13

kbrews@geohub.gcn.uoknor.edu (Keith A Brewster)	n0iaw 92-2-3
SOLDAN@eece.ksu.edu (David L Soldan)	n0in 92-12-1
soldan@ksuvm.bitnet (David L Soldan)	n0in 92-12-1
abed@saturn.wustl.edu (Abdulkarim [Abed] M Hammoud)	kb0inx91-10
jpedley@ria-emh2.army.mil (John R Pedley)	n0ipo 91-12-6
davea@minc.com (David A Allen)	n0ipq 92-5-16
kd4nc.ampr.org!hp-col!davea (David A Allen)	n0ipq 92-5-16
jrd@duke.cdc.com (John R Douglas)	n0isl 91-12-6
kthomпсо@donald.wichitaks.NCR.COM (Ken J Thompson)	n0itl 92-12-24
Ken.Thompson@wichitaks.ncr.com (Ken J Thompson)	n0itl 92-12-24
elmquist@nachos.SSESCO.com (Chris J Elmquist)	n0jcf 91-12-26
elmquist@pez.ssesco.com (Chris J Elmquist)	n0jcf 92-10-27
elmquist@SSESCO.com (Chris J Elmquist)	n0jcf 92-10-27
73267.2711@Compuserve.com (Chris J Elmquist)	n0jcf 92-10-27
Gary.Box@f510.n5000.z200.METRONET.ORG (Gary W Box)	n0jcg 91-12-6
jseboldt@pnet51.orb.mn.org (John D Seboldt)	k0jd 92-10-10
kelly@femto.cs.umn.edu (Shaun P Kelly)	n0jdt 92-9-12
jeff@amikoj.rn.com (Jeff J Kunce)	n0juh 92-2-13
bartsch@pnet51.orb.mn.org (Eric A Bartsch)	n0jvp 92-5-26
bame@hpfcbig.SDE.HP.COM (Paul D Bame)	n0kcl 92-5-19
rambler@pnet51.cts.com (Dan R Meyer)	n0kfb 92-2-11
rambler@pnet51.orb.mn.org (Dan R Meyer)	n0kfb 92-12-6
bjrineha@iastate.edu (Brian J Rinehart)	ka0khe 92-9-
13	
wqmeeker@iastate.edu (William Q Meeker Jr)	k0kt 92-12-1
roger@email.sp.paramax.com (Roger Lebakken)	aa0ku 93-1-15@
whester@isis.cs.du.edu (William R Hester)	n0laj 92-5-19
whester@nyx.cs.du.edu (William R Hester)	n0laj 92-8-14
wells@hpfcs0.FC.HP.COM (John S Wells)	wa0lhb 92-5-
10	
coelho@hplvec.LVLD.HP.COM (John M Coelho III)	n0lhw/afa5kc92-2-6
hicks@omdemo.enet.dec.com (Charles K Hicks III)	wb0ljp92-1-4
lupine@lamar.colostate.edu (Kevin L Moore)	n0lsw 93-1-14
twt@hpfcbig.SDE.HP.COM (Tim W Tillson)	n0lzl 92-2-3
cnfrancis@lub001.lamar.edu (Cliff N Francis Jr)	w0mbp 92-10-13
rogerm@hpfcs0.FC.HP.COM (Roger W Mitchell)	n0mcr 91-12-6
ajs@hpfcdc.HP.COM (Alan J Silverstein)	n0mfw 91-12-6
ajs@hpfcs0.FC.HP.COM (Alan J Silverstein)	n0mfw 92-10-31
ajs@hpfcajs.fc.hp.com (Alan J Silverstein)	n0mfw 92-10-31
oxenreid@chaos.cs.umn.edu (Christopher G Oxenreider)	n0mld 92-8-19
wb0mpq@cats.njit.edu (Al E Shjarback)	wb0mpq 92-10-
15	
BRADLEY@marcvm.marc.USda.GOV (Randy R Bradley)	n0msg 92-8-2
mckee@hpfcdc.HP.COM (Bret A McKee)	n0mta 91-10
rerickso@cwis.unomaha.edu (Ronald D Erickson)	ak0n 92-10-22
painter@enoki.zso.dec.com (John A Painter)	n0ndo 91-12-12
L.TACKE@<Genie> (Les C Tacke Jr)	n0nej 92-9-5
John.Hlivjak@f100.n282.z1.tdkt.kksys.com (John P Hlivjak)	ka0ngo92-7-20
hughes@hughes.network.com (Jim P Hughes)	n0nkj 92-5-2
james.hughes@network.com (Jim P Hughes)	n0nkj 92-5-2
JOE@bvc.edu (Joe G Traylor)	n0now 91-11-6
jeffries@iastate.edu (Anthony Glen Jeffries)	n0nro 92-8-14
tabl4@isuvax.iastate.edu (Anthony Glen Jeffries)	n0nro 92-8-14
kressig@mcopn3.dseg.ti.com (Bob G Kressig II)	wb0nsa92-5-11
tpoind@eatdust (Tom Poindexter)	n0nuj 91-10
tpoind@skipy (Tom Poindexter)	n0nuj 91-10
tpoindex@nyx.cs.du.edu (Tom Poindexter)	n0nuj 91-12-31

tpoind@corona.uswest.com (Tom Poindexter)	n0nuj 91-12-31
tpoind@uswest.com (Tom Poindexter)	n0nuj 91-12-31
tewheele@iastate.edu (Todd E Wheeler)	n0num 92-5-6
gcain@hpfco.FC.HP.COM (Gary W Cain)	n0nxh 91-10
brandt@inlatlas.den.mmc.com (Joe J Brandt)	n0nyo 91-10
jbrandt@isis (Joe J Brandt)	n0nyo 91-10
rcanders@nyx.cs.du.edu (Rod C Anderson)	n0nzo 92-10-19
heacock@kuhub.cc.ukans.edu (Doug A Heacock)	n0nzq 92-5-26
UD173191@NDSUVM1.BITNET (Greg S Moore)	n0odq 92-2-3
tipping@phys.ksu.edu (Tracy N Tipping)	n0oey 92-10-29
tipping@ksuvm.bitnet (Tracy N Tipping)	n0oey 92-10-29
kucharsk@solbourne.com (William J Kucharski)	n0okq 91-10
spexet@ux.acs.umn.edu (Dennis Robert Spexet II)	n0okr 91-10
terry@col.hp.com (Terry W Thero)	wb0omm92-9-29
awinterb@diana.cair.du.edu (Art E Winterbauer)	n0oqs 93-1-19
awinterb@du.edu (Art E Winterbauer)	n0oqs 93-1-19
mccormac@pooh.usafa.af.mil (Chris J McCormack)	n0oqt 92-12-2
mccormac@ee.usafa.af.mil (Chris J McCormack)	n0oqt 92-12-2
William.Fischer@f100.n282.z1.tdkt.kksys.com (William C Fischer)	n0otl 92-4-25
neutron@patchnos.fc.hp.com (Jack R Applin)	n0oty 92-2-12
Jeepster@cup.portal.com (John Lee Ferguson)	kf0ou 91-10
jlfergus@isis.cs.du.edu (John Lee Ferguson)	kf0ou 91-10
J.L.FERGUSON@<GEnie> (John Lee Ferguson)	kf0ou 92-9-5
Chris.Schmelzer@f100.n282.z1.tdkt.kksys.com (Chris R Schmelzer)	n0ovf 92-3-30
grande@cbnewsd.cb.att.com (Brad L Grande)	wb0oyx92-10-10
grande@iwtl.att.com (Brad L Grande)	wb0oyx 92-10-10
djl@vax1.mankato.msus.edu (Sean Stepanek)	n0pba 92-3-19
mac@cis.ksu.edu (Myron A Calhoun)	w0pbv 92-9-27
rutgers!depot!mac (Myron A Calhoun)	w0pbv 92-9-27
David.Berg@f100.n282.z1.tdkt.kksys.com (David A Berg)	n0pcb 92-11-23
C.FONGHEISER@<GEnie> (Carl M Fongheiser)	n0pfu 92-9-5
M.ROBERTS7@<GEnie> (Mark A Roberts)	n0pfy 92-9-5
jvp@vlsi1.ee.iastate.edu (James E Van Peurse)	ke0ph 92-3-12
jvp@vlsi4.ee.iastate.edu (James E Van Peurse)	ke0ph 92-8-11
jvp@cprel.ee.iastate.edu (James E Van Peurse)	ke0ph 92-8-11
UD180274@NDSUVM1.BITNET (Roger A Huggins)	n0ple 91-10
jwhite@c2s.mn.org (Jeffrey J White)	n0poy 92-2-3
clint@hare.udev.cdc.com (Clint J Coppicus)	n0ppe 92-2-9
lrshourb@wsuiar.wsu.ukans.edu (Larry R Shourbaji)	n0pxa 91-11-26
hale@hpfco.FC.HP.COM (Bill L Hale)	k0qa 92-12-23
hale@hpfclm.FC.HP.COM (Bill L Hale)	k0qa 92-12-23
kessler@schof.colorado.edu (Andrew Kessler)	n0qcy 91-12-6@
ken@swbatl.sbc.com (Ken M Gianino)	wb0qna92-8-5
wjturner@iastate.edu (William J Turner)	n0rdv 92-7-26@
foster@hpfco.FC.HP.COM (Brad Foster)	n0rft/aa 92-12-11@
kk419544@longs.LANCE.ColoState.EDU (Kevin C Keaney)	n0rhd 92-6-3@
jrsargeant@lescse.jsc.nasa.gov (Jack R Sargeant)	w0rij 91-10
hanko@mentorg.com (Hank N Oredson)	w0rli 91-10
ted_cline@hpsla.lvld.hp.com (Ted Cline)	n0rqv 92-9-25@
tcline@hpslx.lvld.hp.com (Ted Cline)	n0rqv 92-9-25@
tcline@hplvec.LVLD.HP.COM (Ted Cline)	n0rqv 92-9-6@
bert@s5000.RSVL.UNISYS.COM (Bert A Hyman)	w0rsb 91-12-18
bert@unirsvl.RSVL.UNISYS.COM (Bert A Hyman)	w0rsb 92-11-1

bert@rsvl.unisys.com (Bert A Hyman)	w0rsb 92-11-1
scotbri@flower.rosemount.com (Scott E Brigham)	wb0rvk91-11-13
jdwhite@iastate.edu (Jason D White)	n0rwu 92-5-1@
hughes@cs.unc.edu (John Hughes)	n0rxk 92-10-22@
corey@cbnewsm.cb.att.com (William Cory Brown)	wb0rxq92-9-25
att!alphlk!wcb (William Cory Brown)	wb0rxq92-9-25
attmail!wcbrown (William Cory Brown)	wb0rxq 92-9-
25	
neal%nhh2sd@loft386 (Neal H Hodges II)	ka0sez 91-11-
15	
neal@nhh2sd.UUCP (Neal H Hodges II)	ka0sez91-12-24
Steve_Fraasch@GATEWAY1.ATK.COM (Steve J Fraasch)	k0sf 92-7-8
bryanw@IASTATE.EDU (Bryan J Welch)	n0sfg 92-8-14@
electro@interceptor.ksu.ksu.edu (Eric L Patterson)	n0sjw 92-9-23@
electro@matt.ksu.ksu.edu (Eric L Patterson)	n0sjw 92-9-23@
electro@maico.ksu.ksu.edu (Eric L Patterson)	n0sjw 92-10-13@
Erik.Jacobson@tdkt.kksys.com (Erik Jacobson)	n0svx 92-9-5@
Erik@tdkt.kksys.com (Erik Jacobson)	n0svx 92-9-11@
davea@col.hp.com (David E Allen)	wb0taq91-11-20
davea@mail.boi.hp.com (Dave E Allen)	wb0taq 92-11-
27	
davea@hpdmmft.boi.hp.com (Dave E Allen)	wb0taq 92-11-
27	
jdesmon@tdkt.kksys.com (John T Desmond)	k0tg 92-9-14
pascal@leland.Stanford.EDU (Freeman P Pascal)	ka0tgn92-1-2
vlack@spot.Colorado.EDU (Jay Robert Vlack)	n0tib 92-12-1@
hemstree@lamar.ColoState.EDU (Charles H Hemstreet IV)	n0tqj 92-10-30@
hemstree@cs.colostate.edu (Charles H Hemstreet IV)	n0tqj 92-10-30@
hemstree@handel.cs.Colostate.Edu (Charles H Hemstreet IV)	n0tqj 92-10-30@
whitten@kuhub.cc.ukans.edu (Chris Whittenburg)	n0twa 92-11-28@
jdww@wucs1.wustl.edu (J D Wilson)	n0tyz 92-9-29@
ron@hpfco.FC.HP.COM (Ron G Miller)	nw0u 92-9-24
UD116446@vml.nodak.edu (Brad Lindseth)	n0uag 93-1-5@
agrans@vlsi4.d.umn.edu (Dave Kohn)	n0ucf 93-1-5@
dkohn@ub.d.umn.edu (Dave Kohn)	n0ucf 92-10-26@
srbechte@nyx.cs.du.edu (Scott Bechtel)	n0ujy 92-11-5@
gt4503e@prism.gatech.EDU (Tracy K Wood)	kd0up 92-12-24
VMORGAN@VAX2.CSTP.UMKC.EDU (Vance S Morgan)	ka0urh91-10
HQSACSCMN@sacemnet.af.mil (Doug G Wigley Sr)	kf0us 92-1-7
1ACOMMGSCOD@strathost.stratcom.af.mil (Doug G Wigley Sr)	kf0us 93-1-5
rwp@fc.hp.com (Bob W Proulx)	kf0uw 92-11-9
rwp@hpfco.FC.HP.COM (Bob W Proulx)	kf0uw 92-6-3
UD021132@NDSUVM1.BITNET (Dave L Poppke)	wa0vfy 92-1-2
charles.rissmeyer@StPaul.NCR.COM (Charles S Rissmeyer)	ke0vg 92-10-11
chuck@npdiss1.StPaul.NCR.COM (Charles S Rissmeyer)	ke0vg 92-10-11
mikef@ernie.rosemount.com (Michael L Foerster)	wa0vnh91-12-20
mikef@bigbird.rosemount.com (Michael L Foerster)	wa0vnh92-9-15
mikef@rosemount.com (Michael L Foerster)	wa0vnh92-9-15
stevej@pilloock.moron.vware.mn.org (Steven E Jarosh)	ka0vyb92-6-4
sekell@bb1t.monsanto.com (Scott E Keller)	ka0wch93-1-9
gcarino@ub.d.umn.edu (Gary S Carino)	wa0wov 92-2-
18	
britton@proton.llumc.edu (Barrie G Britton)	k0wwg 93-1-7
dave@hpfcdjh.fc.hp.com (Dave J Hodge)	kf0xd 92-6-3@
dave@hpfco.FC.HP.COM (Dave J Hodge)	kf0xd 92-6-3@
check@dbsun.uucp (Dave G Checkett)	wg0y 92-11-5
check%dbsun.uucp@wupost.wustl.edu (Dave G Checkett)	wg0y 92-11-5

gw214790@longs.lance.colostate.edu (Galen Watts)	kf0yj 92-10-29@
gw214790@LANCE.ColoState.Edu (Galen Watts)	kf0yj 92-11-16@
fholson@pnet51.orb.mn.org (Fred H Olson)	wb0yqm91-11-27
fholson@pnet51.cts.com (Fred H Olson)	wb0yqm 92-1-
26	
paul@drutx.ATT.COM (Paul E Anderson)	wb0zrd 92-4-
24	
holmgren@cs.unc.edu (Douglas E Holmgren)	wa0zrz92-1-17
derekt@col.hp.com (Derek E Toeppen)	wa0zti91-10
## US 1 District	
RLM@MAINE.MAINE.EDU (Robert L Metcalf)	nv1a 92-10-23
giasij@rpi.edu (John L Luigi Giasi)	aalaa 92-7-31
jlgiasi@umassmed.ummed.edu (John L Luigi Giasi)	aalaa 92-7-31
jlgiasi@hcx5.UMMED.EDU (John L Luigi Giasi)	aalaa 92-7-31
regnad@hal.gnu.ai.mit.edu (Paul Prescott)	nlaac 92-9-26
regnad@gnu.ai.mit.edu (Paul Prescott)	nlaac 92-9-26
djenkins@wang.com (Dave Jenkins)	kb1aau92-5-19@
epacyna@auratek.UUCP (Edward A Pacyna Jr)	wlaaz 92-11-15
ed@auratek.com (Ed A Pacyna Jr)	wlaaz 92-11-15
alanb@hpnmdla.hp.com (Alan R Bloom)	nlal 91-10
alanb@hpnmdla.sr.hp.com (Alan R Bloom)	nlal 93-1-7
Pete_Simpson@DGC.ceo.dg.COM (Peter Z Simpson)	kalaxy91-10
Peter_Simpson@3mail.3com.COM (Peter Z Simpson)	kalaxy93-1-8
Peter_Simpson@3com.com (Peter Z Simpson)	kalaxy93-1-8
awoodhull@hamp.hampshire.edu (Al S Woodhull)	nlaw 92-11-20
76067.3724@compuserve.com (ARRL HQ)	wlaw 92-5-26
thorburn@sceng.UB.COM (Gary Thorburn)	kb1aif 92-9-
25@	
jimv@hienergy.East.Sun.COM (Jim C Vienneau)	wb1b 92-10-22
jimv@hienergy.Eng.Sun.COM (Jim C Vienneau)	wb1b 92-9-21
jvienneau@east.sun.com (Jim C Vienneau)	wb1b 92-10-22
lwolfgan@arrl.org (Larry D Wolfgang)	wr1b 92-6-29
b_egan@levers.enet.dec.com (Bob J Egan Jr)	nlbaq 91-12-6
clements@bbn.com (Bob C Clements)	k1bc 91-10
mikebw@idsvax.ids.com (Mike S Bilow)	nlbee 91-10
Mike.Bilow@anomaly.sbs.com (Mike S Bilow)	nlbee 91-10
MIKEBW@ids.net (Mike S Bilow)	nlbee 93-1-18
jkleinma@arrl.org (Joel P Kleinman)	nlbke 92-6-29
gettys@regent.enet.dec.com (Bob B Gettys III)	nlbrm 91-12-29
tsmith@sparta.spartacus.COM (Tim R Smith)	nlbtq 91-12-26
wade@gazers.enet.dec.com (Paul C Wade)	nlbwt 91-12-6
wade@nlbwt.enet.dec.com (Paul C Wade)	nlbwt 92-8-1
reisert@sttng.mlo.dec.com (Jim J Reisert)	ad1c 92-6-29
reisert@mast.enet.dec.com (Jim J Reisert)	ad1c 93-1-20
wslc.UUCP%rocky.dnet@wslc.UUCP (Andrea S Preciado)	ws1c 92-9-29
WS1C%WS1C.uucp@rocky.gte.com (Andrea S Preciado)	ws1c 92-9-29
Preciadoa@aspen.ulowell.edu (Andrea S Preciado)	ws1c 92-9-29
wslc@rocky.ndhm.gtegsc.com (Andrea S Preciado)	ws1c 93-1-20
RJA@utrc.utc.com (Richard J Assarobowski)	k1cc 92-9-19
RJA%UTRC@utrcgw.utc.com (Richard J Assarobowski)	k1cc 91-10
rpalm@arrl.org (Rick K Palm)	k1ce 92-6-29
wjc@ll.mit.edu (Bill J Chiarchiaro III)	nlcpk 92-2-14
MAGUIRE@SPPVM1.UCSD.EDU (Jon P Maguire)	nlcqe 92-8-1
maguire@sppvm1.vnet.ibm.com (Jon P Maguire)	nlcqe 92-8-1
ward@rhqvm14.vnet.ibm.com (Ward Carpenter)	nlcui 91-10
ehare@arrl.org (Ed F Hare Jr)	kalcv 92-12-24
gallaghe@gdc.com (Robert T Gallagher)	nlcxh 92-12-11



rovero@oc.nps.navy.mil (Peter Josh Rovero)	kkld	92-11-22
rovero@skye.oc.nps.navy.mil (Peter Josh Rovero)	kkld	92-11-22
5346p@cc.nps.navy.mil (Peter Josh Rovero)	kkld	92-11-22
koning@koning.enet.dec.com (Paul Koning)	ni1d	92-9-26
rbono@necis.UUCP (Rich J Bono)	nm1d	92-8-17
rbono@necis.ma.nec.com (Rich J Bono)	nm1d	92-12-24
necis!rbono@transfer.stratus.com (Rich J Bono)	nm1d	92-11-4
ntksun1!necis.ma.nec.com!rbono@harvard.harvard.edu (Rich Bono)	nm1d	92-12-24
dtheriau@wellfleet.COM (Doug H Theriault)	nold	91-12-6
HICKS.ALAN@epamail.epa.gov (Alan J Hicks)	kdldj/nlipd	92-12-18
hicks.alan@epamail.epa.gov (Alan J Hicks)	kdldj/nlipd	92-12-18
72337.1372@compuserve.com (Alan J Hicks)	kdldj/nlipd	92-12-18
f_riskph@ccsvax.sfasu.edu (Paul H Risk)	n1djd	92-7-31
hitz@tsar.enet.dec.com (George E Hitz Jr)	w1da	92-1-20
gkd@wpi.WPI.EDU (Gregory K Doerschler)	n1dem	92-5-26
mikew@hpsad.HP.COM (Mike J Weihman)	nldje	91-10
apple@nprdc.navy.mil (James M Apple)	wbldog	91-10
jma@ebt-inc.UUCP (Jim M Apple)	wbldog	92-12-15
jma@ebt.com (Jim M Apple)	wbldog	92-12-15
uunet!ebt-inc!jma (Jim M Apple)	wbldog	92-12-15
vail@tegra.COM (Johnathan O Vail)	n1dxg	92-8-14
jv@n1dxg.ampr.org (Johnathan O Vail)	n1dxg	92-8-14
ijbutler@sander.lockheed.com (Irv J Butler)	kble	92-10-10
fmilos@quirp.Sun.COM (Frank M Milos)	nole	91-12-6
mark@gandalf.umcs.maine.edu (Mark A MacKinnon)	wble	92-3-2
esj@harvee.billerica.ma.us (Eric S Johansson)	kaleec	92-8-20
johansson@athena.polaroid.com (Eric S Johansson)	kaleec	92-8-20
esj@harvee.UUCP (Eric S Johansson)	kaleec	91-10
DOANE%CTSTATEU.BITNET@YALEVM.YCC.Yale.Edu (Betsey L Doane)	kleic	91-10
pryack@mhc.mtholyoke.edu (Paul R Ryack)	wleth	93-1-9
larryt@wal.hp.com (Larry E Telford)	wlevu	91-12-31
B.ELDRIDGE1@<GENie> (Burt F Eldridge)	nylf	92-9-5
bob@may18.lkg.dec.com (Bob J Souza)	welf/walmxv	92-12-6
gdavis@griffin.uvm.edu (Gary E Davis)	wq1f	92-8-7
magid@esis.enet.dec.com (Joel M Magid)	wulf	91-12-6
ppagel@arrl.org (Paul K Pagel)	n1fb	92-6-29
brosen@bbn.com (Bruce L Rosen)	k1ffx	92-2-12
fredrik@tpl.Prime.COM (Bruce R Frederick)	kalfgy	92-2-4
puglieli@phoenix.Princeton.EDU (Jeffrey W Puglielli)	kd1fj	92-6-11
bourque@sceng.UB.COM (David W Bourque)	wb1fld	92-4-24
cerys@bbn.com (Dan L Cerys)	n1fmk	91-12-6
VIDGAMES@biotechnet.COM (Andy E Eddy)	wb1fnv	92-5-7
70007.3554@Compuserve.Com (Andy E Eddy)	wb1fnv	92-6-12
VIDGAMES@delphi.COM (Andy E Eddy)	wb1fnv	92-8-5
Andy_Luke@DGC.ceo.dg.com (Andy W Luke)	n1fod	92-5-16
slimer.webo.dg.com!aluke (Andy W Luke)	n1fod	92-5-16
lrj@fibercom.COM (Larry R Johnson)	wb1fof	91-10

parr@bhbvax.enet.dec.com (Brian T Parr)	n1ftj 92-11-5
candee@vnet.ibm.com (Rob A Candee)	n1ftw 92-6-3
mike@athena.mit.edu (Michael T Decerbo)	n1fy0 93-1-21
FLEM%HYDRA@sdi.polaroid.COM (Laurits Skip Flem)	ntl1g 91-12-6
FLEM%athena@leia.polaroid.COM (Laurits Skip Flem)	ntl1g 93-1-6
sas@chevold1 (Scott A Sminkey)	wol1g 92-10-23
sasminkey@eng.xyplex.com (Scott A Sminkey)	wol1g 92-11-5
sas@opus.xyplex.COM (Scott A Sminkey)	wol1g 92-11-5
n1gak@netcom.com (Scott L Statton)	n1gak 92-8-14
az@i5120h.nrl.navy.MIL (Andrew R Zwirko)	kal1gd 91-10
gjk@hogpa.ho.att.com (Gerald J Kersus)	wl1gd 92-12-24
gjk@homxa.att.com (Garry J Kersus)	wl1gd 92-6-3
sra@idx.com (Steve R Alpert)	wl1ggn 92-10-11
garyf@wiis.wang.com (Gary A Field)	wal1grc 92-9-25
garyf@wang.com (Gary A Field)	wal1grc 92-9-
25	
evans@testmax.zk3.enet.dec.com (Marc N Evans)	wbl1grh 91-10
mevans@wsl.enet.dec.com (Marc N Evans)	wbl1grh 91-12-
6	
evans@decvax.enet.dec.com (Marc N Evans)	wbl1grh 91-10
evans@zk3.enet.dec.com (Marc N Evans)	wbl1grh 91-10
evans@zk3.dec.com (Marc N Evans)	wbl1grh 92-3-12
wl1gsl@athena.mit.edu (Steven L Finberg)	wl1gsl 93-1-19
kal1gt@cbnewsm.cb.att.com (Robert M Atkins)	kal1gt 92-7-8
sbaker@umassmed.UMMED.EDU (Stephen P Baker)	n1gtq 92-10-16
sbaker@umassmed.bitnet (Stephen P Baker)	n1gtq 92-10-16
gswanson@cabell.vcu.edu (Glenn P Swanson)	kb1gw/n1cmb 92-12-
15	
darcy@tallis.enet.dec.com (George A Darcy III)	n1gz0 91-12-6
sclvr@gf-wan.af.mil (Bob M Smith Jr)	nd1lh 92-9-1
cal@admiral.uucp (Cal F Phillips)	n1hal 92-9-24
cal%admiral.uucp@yale.edu (Cal F Phillips)	n1hal 92-9-24
eac@world.std.com (Eric A Cottrell)	wbl1hbu 91-10
mallick@crd.ge.com (John A Mallick)	wal1hnl 92-8-7
coolidge@guru.enet.dec.com (Bayard R Coolidge)	n1ho 91-12-6
coolidge@zko.dec.com (Bayard R Coolidge)	n1ho 92-12-23
coolidge@coolidge@guru.enet.dec.com (Bayard R Coolidge)	n1ho 93-1-11
tmurphy@athena.mit.edu (Thomas Christopher Murphy)	n1hql 91-12-6
GOODWIN%SMCVAX.BITNET@mitvma.mit.edu (Dave A Goodwin)	n1hro 92-3-5
mwesner@heartland.bradley.edu (Michael D Wesner)	wl1hta 92-11-27
koku@kuhub.cc.ukans.edu (Bill G Ruben)	n1hwc 92-7-8
kdl1hz@anomaly.sbs.risc.net (Michael P Deignan)	kdl1hz 92-11-6@
root@anomaly.sbs.risc.net (Michael P Deignan)	kdl1hz 92-11-6@
kdl1hz@anomaly.sbs.com (Michael P Deignan)	kdl1hz 93-1-5@
netmail!kdl1hz@anomaly.sbs.com (Michael P Deignan)	kdl1hz 93-1-23@
scott@ecs.umass.edu (Donald E Scott)	kl1idf 91-10
John_Loos@DGC.ceo.dg.COM (John S Loos)	n1lifb 91-12-6
John_Loos@IMG018.CEO.DG.COM (John S Loos)	n1lifb 92-9-19
sche0459@hgc.edu (William H Scheremeta)	n1ihm 92-2-3
michel@bbn.com (Tony Michel)	kd1lik 92-7-31@
acm129@dworkin.ccs.northeastern.edu (Jeffrey F Perry)	n1lily 91-11-27
jmccombi@bbn.com (Jon W McCombie)	n1lilz 92-5-10
jmccombi@testament.bbn.com (Jon W McCombie)	n1lilz 92-8-21
goldstein@carafe.enet.dec.com (Fred R Goldstein)	kl1io 92-5-10
jkeyes@boat.East.Sun.COM (John P Keyes)	n1lipe 92-7-31
mcleman@asia.enet.dec.com (Jeff McLeman)	n1lipn 92-2-13
mcleman@decwet.enet.dec.com (Jeff McLeman)	n1lipn 92-5-29

mcleman@zso.dec.com (Jeff McLeman)	nlipn 92-5-29
Al_Brackett@DGC.ceo.dg.COM (Al L Brackett)	nliqq 92-3-7
ardai@maven.dnet.teradyne.com (Michael L Ardai)	nlist 92-8-8
ardai@zax.eda.teradyne.com (Michael L Ardai)	nlist 92-8-8
mcleman@nthead.zso.dec.com (Jeff McLeman)	kdlit/7 92-8-
8@	
mcleman@zso.dec.com (Jeff McLeman)	kdlit/7 92-8-
8@	
kfs@locus.com (Kim F Smith)	nlius 92-5-1
kfs@lear.bos.locus.com (Kim F Smith)	nlius 92-5-1
discipiw@woods.ulowell.edu (Bill R Discipio Jr)	wclj 92-11-23
discipiw@willow.ulowell.edu (Bill R Discipio Jr)	wclj 92-11-23
steve@gandalf.UMCS.Maine.EDU (Steve E Goldsmith)	nljad/ka2rxo92-1-7
wpns@miki.pictel.com (Willie P N Smith)	nljbj 92-7-31
DOW@MAINE.MAINE.EDU (Michael R Dow)	nljcx 91-10
dts@banyan.com (Daniel Senie)	nljeb 92-9-12
Dan=Senie%Eng%Banyan@Thing.banyan.COM (Daniel Senie)	nljeb 92-9-12
edc@wcsn.csms.com (Ed H Cockburn)	waljgo91-10
E.PARADIS@<Genie> (Edward L Paradis)	nljha 92-9-5
paradis@gandalf.umcs.maine.edu (Edward L Paradis)	nljha 92-6-3
IO20222@MAINE.MAINE.EDU (Edward L Paradis)	nljha 92-12-1
ed@gandalf.umcs.maine.edu (Ed L Paradis)	nljha 92-12-1
aviator@athena.mit.edu (Joakim Karlsson)	nljhw 91-12-18
theo@WALT.CAPS.MAINE.EDU (Theo M Alpert)	nljid 92-10-26
fms@sw.stratus.com (Faith M Senie)	nljit 92-10-11
fms@vos.stratus.com (Faith M Senie)	nljit 92-10-11
fms@hoop.sw.stratus.com (Faith M Senie)	nljit 92-10-11
ATKINS_K%athena@leia.polaroid.COM (Kenneth E Atkins)	kljkr 92-7-14
IO11053@MAINE.MAINE.EDU (Kris L Rice)	nljlx 91-11-25
deej@thrush.umesve.maine.edu (Darrell J Merrill Jr)	nljov 91-12-24
MJK@PBN45.PRime.COM (Mike J Karp)	kljzp 91-12-6
wiehn@gdc.com (John F Weih)	nljvp 91-10
dpt@ri.cadre.com (Dan P Trainor)	klbjx 92-11-18
dpt@cadre.com (Dan P Trainor)	klbjx 92-11-18
ELLSWORTH%COSMO@utrcgw.utc.com (Brian D Ellsworth)	kaljy 91-11-13
RBWEINSTOCK@gallua.gallaudet.edu (Robert B Weinstock)	knlk 92-7-3
RBWEINSTOCK@GALLUA.BITNET (Robert B Weinstock)	knlk 92-7-3
swart@curry.enet.dec.com (Mark W Swartwout)	nxlk 91-12-6
tom@xn.ll.mit.edu (Tom R Moore)	klkay 92-4-1
RON.REDER@OFFICE.WANG.COM (Ron E Reder)	??/kalkcu 92-7-
26	
j_otterson@otters.enet.dec.com (Jeff B Otterson)	nlkdo 92-10-11
j_otterson@decwin.enet.dec.com (Jeff B Otterson)	nlkdo 92-10-11
rambler@pnet51.orb.mn.org (Dan Meyer/Gary W Serfass in CB)	nlkfb 92-9-23?
moisan@silver.lcs.mit.edu (David C Moisan)	nlkgh 92-8-20
dmoisan@pro-angmar.alfalfa.com (David C Moisan)	nlkgh 92-8-20
2349723@mcimail.com (Tom W Frenaye)	klki 92-8-8
klimasewski@fccvde.enet.dec.com (Ken Klimasewski)	nlkk 92-6-29
kurdzo@gdc.com (James P Kurdzo)	nlkka 92-4-8
bolsen@mmni.com (Bob P Olsen)	walksy 92-6-3
fortmiller@danger.enet.dec.com (Edward G Fortmiller Jr)	nlktz 92-5-12
zonker@silver.lcs.mit.edu (Regis)	nlkxe 92-1-25@
Paul_Adler.NER-OSM@xerox.COM (Paul S Adler)	kwll 91-10
jess@swlabs.uucp (Jess Girard)	ndll 91-10
jess@admiral.uucp (Jess Girard)	ndll 92-12-4
jess%admiral.uucp@yale.edu (Jess Girard)	ndll 92-12-4
aardvark@ntll.krl.com (Don Koch)	ntll 92-5-6

aardvark@primerd.prime.com (Don Koch)	nt11 92-5-6
mellob@cary103.its.rpi.edu (Brett A Mellor)	nllag 92-12-15@
mellob@rpi.edu (Brett A Mellor)	nllag 92-12-15@
pvr@wang.com (Peter V Reilley)	kallat 92-6-3
pvr@wiis.wang.com (Peter V Reilley)	kallat92-6-3
wallbp@n3dmc.svr.md.us (David F Cowhig Jr)	wallbp91-10
robinson@porter.geo.brown.edu (Darrin E Robinson)	n11lv 92-11-27@
robinson@stout.geo.brown.edu (Darrin E Robinson)	n11lv 92-6-11@
robinson@imbrium.geo.brown.edu (Darrin E Robinson)	n11lv 92-7-3@
darrin@athena.mit.edu (Darrin E Robinson)	n11lv 92-9-23@
darrin@mit.edu (Darrin E Robinson)	n11lv 92-11-27@
tjm@jester.hw.stratus.com (Tim J McNamara)	kc11m/n1fwq 92-12-
24	
mpd@anomaly.sbs.com (Michael P Deignan)	n11mb 92-4-25@
allen@eagle.wesleyan.edu (Allen D Alonzo)	n1lob 92-3-31@
horzepa@evax.gdc.com (Stan J Horzepa)	wallou 92-7-
31	
horzepa@gdc.com (Stan J Horzepa)	wallou92-11-27
welchb@woods.ulowell.edu (Brendan J Welch)	wllpg 93-1-5
kean@b61512.im.battelle.org (Vic A Kean Jr)	k11t 91-10
kean@bc1c11.im.battelle.org (Vic A Kean Jr)	k11t 91-10
bruce@merlin.think.com (Bruce J Walker)	wt1m 92-5-10
bruce@contingency.think.com (Bruce J Walker)	wt1m 92-1-7
bruce@Think.COM (Bruce J Walker)	wt1m 92-12-30
marcoh@locus.com (Mark Heroux)	n1mae 92-5-1@
marcoh@lear.bos.locus.com (Mark Heroux)	n1mae 92-5-28@
potter@think.com (Dave Potter)	k1mbo 91-10
hkagan@sentry.foxboro.COM (Hesh Kagan)	n1mdx 92-12-19@
greg@thoreau.nsc.com (Greg L Dean)	klme 92-12-1
greg@spcfs2.nsc.com (Greg L Dean)	klme 92-12-1
jkeller@pica.army.mil (Jerome Keller Jr)	klmer 92-8-1
johnp@silver.lcs.mit.edu (John Palaima)	n1mig 92-12-11@
johnp@pro.angmar.uucp (John Palaima)	n1mig 92-12-11@
bl298@cleveland.freenet.edu (John Palaima)	n1mig 92-12-11@
n1mj@isuvax.iastate.edu (Mike Reilly)	n1mj@ 91-12-26@
grossman@bbn.com (Martin Grossman)	n1mkg 92-12-11@
levin@BBN.COM (Joel B Levin)	n1mnf 92-6-3@
ptrei@bistromath.mitre.org (Peter Trei)	n1mnv 92-6-4@
ptrei@mitre.org (Peter Trei)	n1mnv 92-10-18@
X24S%SLUMUS.BITNET@cunyv.cuny.edu (Dan Y Reuben)	kalmod91-11-18
n1mpq@anomaly.sbs.risc.net (Tony S Pelliccio)	n1mpq/ag 93-1-
21@	
n1mpq@anomaly.sbs.com (Tony S Pelliccio)	n1mpq/ag 93-1-
21@	
n1mpq@anomaly.sbs.com (Anthony S Pelliccio)	n1mpq/ag 93-1-
23@	
Burchfie@bbn.com (Jerry Burchfiel)	n1mwn 92-8-14@
smtplink%Hayssen_Carl_at_708__ANDOVER@sceng.UB.COM (Carl Hayssen)	n1mwy
92-8-14@	
hayssen@sceng.ub.com (Carl Hayssen)	n1mwy 92-8-14@
djenkins@wang.com (Dave Jenkins)	n1mxv 92-7-14@
rossjr%cadmgr.dnet@gte.COM (Charlie H Ross Jr)	ncln 92-3-3
ncln@jjmhome.m2c.org (Charlie H Ross Jr)	ncln 92-3-3
crossjr%gtec3.dnet@gte.com (Charlie H Ross Jr)	ncln 92-7-8
jjmhome!ncln@m2c.m2c.org (Charlie H Ross Jr)	ncln 92-7-8
johnp@silver.lcs.mit.edu (John Palaima)	n1nig 92-1-15@
jolt@hal.gnu.ai.mit.edu (John Palaima)	n1nig 93-1-15@

jolt@gnu.ai.mit.edu (John Palaima)  
bl298@cleveland.freenet.edu (John Palaima)  
N1NIG@amsat.org (John Palaima)  
npalomba@uu2.psi.COM (Nicholas J Palomba)  
npalomba@ccsi.COM (Nicholas J Palomba)  
15  
nick@ccsi.com (Nicholas J Palomba)  
npalomba@crystal.ccsi.COM (Nicholas J Palomba)  
USERID@bunny.gte.com (Alan R Bugos)  
arb2@gte.com (Alan R Bugos)  
jerryg@apple.com (Jerry Godes)  
coulson@rwc.vax.enet.dec.com (Roger W Coulson)  
cranston@smurf.enet.dec.com (Scott W Cranston)  
dbushong@wang.com (Dave B Bushong)  
franzis@evax.gdc.com (Patrick T Franzis)  
W1OJ@KA1SRD (Dean R Perkins)  
paul@walomm.UUCP (Paul F MacDonald)  
gbb@watson.ibm.com (Gary B Bronner)  
GBB@YKTVMZ.pa.enet.dec.com (Gary B Bronner)  
GBB%YKTVMZ@uunet.UU.NET (Gary B Bronner)  
pmaciel@draper.com (Paul A Maciel)  
vincek@sail.LABS.TEK.COM (Vincent E Kurpan)  
kinzelman@ecadsr.enet.dec.com (Paul M Kinzelman)  
jpolcari@cvbnet.prime.com (Joe A Polcari Jr)  
jpolcari@galaxy.rutgers.edu (Joe A Polcari Jr)  
jff@kepler.unh.edu (Jay T Francis Jr)  
6  
BUSH@enb.Prime.COM (David I Bush)  
glickj@rpi.edu (Joel Harris Glickman)  
mrk@spretus.jax.ORG (Michael R Kosowsky)  
abb0@bunny.gte.com (Arthur Bo Budinger)  
30  
DEWEINST@COLBY.EDU (David E Weinstock)  
rinderbi@arrl.org (Bob J Inderbitzen)  
0002268558@mcimail.com (Marc J Stern)  
13  
jack@swlabs.uucp (John [Jack] R Bonn)  
H08QC@cunyv.cuny.edu (Ronald E Birnbaum)  
kerskine@astro.East.Sun.COM (Keith H Erskine)  
tcs@spenserll.mit.edu (Tom C Sefranek)  
tcs@ll.mit.edu (Tom C Sefranek)  
16  
jordan@ll.mit.edu (Mike P Jordan)  
70324.64@CompuServe.COM (Ed B Kalin)  
halbort@crl.dec.com (Dan C Halbert)  
jkearman@arrl.org (Jim E Kearman III)  
BAD1679@ritvax.Isc.rit.EDU (Bernard A Doehner)  
bad@wpi.wpi.edu (Bernard A Doehner)  
bad1679@ultb.rit.edu (Bernard A Doehner)  
25  
bad1679@ultb.isc.rit.edu (Bernard A Doehner)  
28  
grier@bnr.ca (Brian J Grier)  
bjgrier@bnr.ca (Brian J Grier)  
jchappel@sander.lockheed.com (Joel B Chappell)  
jay@sw.stratus.com (Jay Appell)  
25

nlnig 93-1-15@  
nlnig 93-1-15@  
nlnig 93-1-15@  
kalnip92-12-1  
kalnip 92-10-  
  
kalnip92-10-15  
kalnip92-11-18  
nlnqi 92-12-20@  
nlnqi 92-12-20@  
nlnqp 92-10-31@  
walnvc92-7-20  
kblnw 91-12-6  
kz1o 92-5-7  
nlocj 93-1-18\*  
wloj 91-10  
walomm91-10  
nloo 92-2-3  
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klpk 91-12-6  
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walpqe91-10  
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kalprt 92-7-3  
kclqx 91-12-6  
walqym 91-12-  
  
wglr 92-7-3  
nqlr 92-11-15  
walr/n1blh 92-12-  
  
wqlr 91-12-3  
wylr 91-12-29  
kalrho91-12-6  
walrhp 92-2-3  
walrhp 92-9-  
  
kclrp/g4asq 92-9-4  
klrt 92-2-5  
kblrt 92-12-29  
krls 92-8-5  
nuls/ok8eas 91-10  
nuls/ok8eas 91-10  
nuls/ok8eas 91-11-  
  
nuls/ok8eas 92-9-  
  
ws1s 92-10-13  
ws1s 92-12-11  
kclsg 92-10-10  
kalsna 92-1-

jay@zen.CAc.stratus.COM (Jay Appell) 25	kalsna 92-5-
ptb@bistromath.mitre.ORG (Peter T Baldwin)	walsnh91-12-3
dls@genrad.com (Diana L Carlson)	kc1sp 92-12-29
rwhite@arrrl.org (Rosalie A White)	walsto92-6-29
jimf@motbos.sps.mot.com (Jim E Fowler)	kalsu 92-9-28
RVHN70@WACCVM.sps.mot.com (Jim E Fowler)	kalsu 92-9-28
mgruber@arrrl.org (Mike E Gruber)	walsvf92-6-29
aelt@oz.plymouth.edu (Peter G Drexel)	aelt 91-10
haney@ddif.enet.dec.com (Ralph Don Haney)	kalt 92-7-8
76666.425@compuserve.com (James W Archer)	kflt 91-10
lhurder@arrrl.org (Luck Hurder)	kylt 92-6-29
galen@gandalf.umcs.maine.edu (Galen M Barnaby)	nylt 91-12-6
BARNABY_GALE@DNEAST.ENET.DEC.COM (Galen M Barnaby)	nylt 91-12-6
jhall@arrrl.org (Jerry L Hall)	kltd 92-6-29
taber@ultnix.met.enet.dec.com (Patrick St Joseph Teahan Taber) 6	kc1td 91-12-6
taber@ultnix.mro1.dec.com (Patrick St Joseph Teahan Taber)	kc1td 92-4-25
taber@cimfie.enet.dec.com (Patrick St Joseph Teahan Taber)	kc1td 92-11-27
chilton@emc.COM (Kendell A Chilton)	kaltih92-12-15
leonard@thales.tmc.edu (Michael Dave Leonard)	waltlm92-10-15
leonard@thales.math.umass.edu (Michael Dave Leonard)	waltlm92-10-15
mdl@probe.geo.umass.edu (Michael Dave Leonard)	waltlm92-10-15
raisbeck_m@apollo.hp.com (Michael N Raisbeck)	kltwf 92-10-22
2242662@mcimail.com (Perry F Williams)	wlued 92-6-29
kaluev@torrey.umm.maine.EDU (Tom F Reynolds)	kaluev91-12-6
brent@network.ucsd.edu (James Brent Jones)	kb1uk 91-12-4
hsi!a3bee2!nlgva!randy (Randy C Floberg)	kalunw93-1-19
eichej@rpi.edu (Jason M Eichenholz)	kalutm92-7-3
ewb@swlvx2.msd.ray.com (Eugene W Balinski)	waluxa91-12-5
ewb@raybed2.msd.ray.com (Eugene W Balinski)	waluxa91-10
chowe@bbn.com (Carl D Howe)	wglv 92-7-26
babb@k2.sanders.lockheed.com (Scott L Babb)	walvht92-12-2
babb@rapnet.sanders.lockheed.com (Scott L Babb)	walvht92-12-5
babb@k2 (Scott L Babb) 5	walvht 92-12-
AMARGERI@sd-vax.bbn.COM (Arthur J Margerison)	walvjj92-2-13
szarekw@lonexc.rl.af.mil (William J Szarek)	wmlw 91-12-6
wells@cs.swarthmore.edu (Daniel B Wells)	kalwnh92-12-2
tzimmer@arrrl.org (Tammy-Beth Zimmerman) 29	kalwvp 92-6-
paveld@northstar107.Dartmouth.EDU (Pavel Dudek)	nqlx 92-10-29
paveld@Dartmouth.Edu (Pavel Dudek)	nqlx 92-10-29
v027197@stortek.com (George I Noyes Jr)	wlxe 92-9-17
V027197@stcvax (George I Noyes Jr)	wlxe 92-9-17
zateslo@geomag.gly.fsu.edu (Ted Zateslo)	wlxo 92-2-24
TERRY@XANADU.XYPLEX.COM (Steve F Terry) 2	nnly/walklg 92-12-
Jeffery.A.Schneider@dartmouth.edu (Jeffery A Schneider)	wmly 92-4-24
fcr@ll.mit.edu (Frank C Robey) 15	kalylb 92-12-
pqj4331@acf5.nyu.edu (Bob W Wachunas) 18	kalylt 91-12-
pgh@cs.brown.edu (Paul G Howard)	kalyne91-10
rll@frieda.mitre.org (Roberto L Landrau Jr)	kc1yp 92-8-18
landrau@mitre.org (Roberto L Landrau Jr)	kc1yp 92-8-18
rll@linus.mitre.org (Roberto L Landrau Jr)	kc1yp 92-8-18

sharon@world.std.com (Sharon Machlis Gartenberg)	kclyr 93-1-14
sharon@unixland.natick.ma.us (Sharon Machlis Gartenberg)	kclyr 92-8-5
sharon@unixland.uucp (Sharon Machlis Gartenberg)	kclyr 91-12-6
P.KEMP3@<GENIE> (Pete W Kemp)	kz1z 92-9-5
weare@bostech.COM (Gerald W Weare)	nflz 92-7-8
dnewkirk@arrl.org (Dave Newkirk)	wj1z 92-6-29
Dave.Newkirk@f256.n620.z3.vk1kcm.ampr.org (Dave Newkirk)	wj1z 92-3-9
sehrlich@helios.northeastern.edu (Scott R Ehrlich)	wylz/kalwnu/kdlew
91-11-25	
acm139@damon (Scott R Ehrlich)	wylz/kalwnu/kdlew
91-12-10	
acm139@dworin.CCS.Northeastern.EDU (Scott R Ehrlich)	wylz/kalwnu/kdlew
92-3-31	
acm139@ccs.northeastern.edu (Scott R Ehrlich)	wylz/kalwnu/kdlew
92-12-28	
wylz@splinter.coe.northeastern.edu (Scott Ehrlich)	wylz/kalwnu/kdlew
92-12-28	
jdelancy@tecnet1.jcte.jcs.mil (Jean A Delancy)	k1zat 92-5-9
delancy@chesapeake.ads.com (Jean A Delancy)	k1zat 93-1-5
95_pierosnj@gar.union.edu (Jim A Pierson Jr)	kclzn 92-7-3
dsumner@arrl.org (Dave G Sumner)	k1zz 92-6-29
sumner@bigbird.csd.scarolina.edu (David G Sumner)	k1zz 91-10
## US 2 District	
n2aam@overlf.UUCP (Dave L Marthouse)	n2aam 91-10
frey@dspuv2.crd.ge.com (Richard L Frey)	wa2aau 92-7-3
mdc@vixen.uucp (David C Marden Sr)	ke2ag 92-5-6
randyh@gold.gvg.tek.com (Randy K Hall)	wa2age 92-3-2
randyh@gvgadg.gvg.tek.com (Randy K Hall)	wa2age92-6-29
K2ANC.Wbst128@xerox.com (Louis J Kohnen Jr)	k2anc 92-5-19
Louis_J_Kohnen.WBST128@xerox.COM (Louis J Kohnen Jr)	k2anc 92-1-10
saltzman@ISOVAX (Bob B Saltzman)	wb2ark92-10-15
saltzman@crd.ge.com (Bob B Saltzman)	wb2ark 92-10-
15	
jtb@philabs.Philips.Com (Joseph T Burke)	kb2aue92-10-31
jtb@philabs.philabs.com (Joeseph T Burke)	kb2aue92-10-31
cep4478@ultb.rit.edu (Christopher E Piggott)	wz2b 92-1-10
cep4478@ultb.isc.rit.edu (Christopher E Piggott)	wz2b 93-1-9
kd2bd@ka2qhd.UUCP (John A Magliacane)	kd2bd 92-9-11
kd2bd@ka2qhd.de.com (John A Magliacane)	kd2bd 92-7-8
pumplun@amazon.llnl.gov (Don R Pomplun)	k2bio 92-4-8
jackb@cbnewsi.cb.att.com (Jack S Bogdanowicz)	kf2bj 92-5-10
EGOHC@CUNYVM.BITNET (Elliot Gordon)	kb2bqf93-1-23*
MJK2660%RITVM.BITNET@cunyvm.cuny.edu (Mike J Koziol)	wa2brx92-3-31
nucci@microwave.gsfc.nasa.gov (Jeffrey J Nucciarone)	n2bss 92-12-15
nicci@climate (Jeffrey J Nucciarone)	n2bss 92-12-15
zmjnn@charney.gsfc.nasa.gov (Jeffrey J Nucciarone)	n2bss 92-12-15
zmjnn@dirac (Jeffrey J Nucciarone)	n2bss 92-12-15
j9n@psuvm.psu.edu (Jeffrey J Nucciarone)	n2bss 92-12-15
feg@cbnewsb.cb.att.com (Forrest E Gehrke)	k2bt 92-5-23
stevep@magneto.ee.cornell.edu (Steven P Powell)	n2bu 91-10
GRB100@psuvm.psu.edu (Allen W Capsuto)	kb2byj 91-12-
6	
rick@cs.sunysb.edu (Rick J Spanbauer)	wb2cfv 92-7-
14	
sterling@cbmvax.commodore.com (William Rick Sterling)	n2cgi 91-10
ginsburg@wellfleet.COM (Scott A Ginsburg)	wa2cjt92-6-2
xile@hardy.u.washington.edu (Roberto N Camama Jr)	kb2c11/7 92-12-

29	xile@u.washington.edu (Roberto N Camama Jr)	kb2c11/7	92-12-
29	LJI@MAINE.MAINE.EDU (Lee J Imber)	kb2clq/1	92-8-
12	wb2cmn@ka2qhd.de.com (Dean B McDermott)	wb2cmn	91-10
	dbm@cats.njit.edu (Dean B McDermott)	wb2cmn	92-9-
17	siegela@deshaw.com (Andrew B Siegel)	n2cn	92-11-28
	abs@deshaw.com (Andrew B Siegel)	n2cn	92-11-28
	gopstein@bms.com (Richard B Gopstein)	kd2cq	92-5-8
	ka2czu@cbnewsh.cb.att.com (Robert Switzer)	ka2czu	92-3-29
	tadd@cheetah.ece.clarkson.edu (Tadd C Torborg)	ka2dew	92-7-3
	adam@daytona.sbi.com (Adam S Epstein)	n2dhh	91-12-20
	adam@panix.com (Adam S Epstein)	n2dhh	92-5-21
	adam@vermont.nynexst.com (Adam S Epstein)	n2dhh	92-9-26
	adam@nynexst.com (Adam S Epstein)	n2dhh	92-9-26
	adam@kuala.nynexst.com (Adam S Epstein)	n2dhh	92-11-6
	wmb@ulysses.att.com (William M Brelsford)	k2di	92-6-17
	n2dsy@cbnewsh.cb.att.com (J Gordon Beattie)	n2dsy	92-10-15
	n2dsy@mtuxj.att.com (J Gordon Beattie)	n2dsy	92-10-15
	spoon@kodak.com (John P Spoonhower)	kc2du	91-12-1
	H.JESSEN@<GENie> (Harry M Jessen)	n2duz	92-9-5
	meyer@calspan.com (Bob M Meyer)	n2dxn	91-12-31
	tonyp@convex.com (Tony J Podrasky)	wa2eaa	92-8-7
	tonyp@cnvsla.COM (Tony J Podrasky)	wa2eaa	92-8-7
	kb2ear@kb2ear.ampr.org (Scott R Weis)	kb2ear	92-11-
16	mgknn@cbnewsk.cb.att.com (Michael G Kossor)	wa2eby	92-11-7
	baum@remus.rutgers.edu (Allan J Baum Jr)	kf2ee	91-11-9
	baum@romulus.rutgers.edu (Allan J Baum Jr)	kf2ee	92-7-8
	steuer@lobster.rutgers.edu (Robert M Steuer)	kf2ek/n2jrz	92-12-
2	steuer@clam.rutgers.edu (Robert M Steuer)	kf2ek/n2jrz	92-12-
2	pescatore_jt%ncsd.dnet@gte.COM (John T Pescatore)	wb2ekk	91-11-7
	uunet!super.super.org!pcolsen (Peter C Olsen)	n2ell	92-1-5
	uunet!super.org!pcolsen (Peter C Olsen)	n2ell	92-11-1
	kfeeney@helios.TN.CORNELL.EDU (Francis Kevin Feeney)	wb2ems	92-9-25
	kfeeney@KLONDIKE.CIT.CORNELL.EDU (Francis Kevin Feeney)	wb2ems	92-11-24
	val@kodak.com (Val Christian)	n2epo	92-2-17
	Ed_Kessler.wbst845@xerox.COM (Sherin Ed Kessler)	w2eqw	92-2-9
	bmehlman@trirex.COM (Ben Z Mehlman)	kb2erp	92-12-6
	fcf@cbnewsg.cb.att.com (Peter F Floro)	wa2fcf	92-6-5
	att!homxc!pff (Peter F Floro)	wa2fcf	92-6-5
	drmsr@unix.cis.pitt.edu (Marc S Rosenthal)	wb2fgv	92-2-13
	drmsr+@pitt.edu (Marc S Rosenthal)	wb2fgv	93-1-6
	chalup@presto.ig.com (Michael S Chalup)	wa2fhf	92-5-
16	clay@drone.hazeltine.COM (Clayton A DeCosterd)	kb2fur	93-1-15
	71754.447@CompuServe.COM (Clayton A DeCosterd)	kb2fur	93-1-15
	jvan@cbnewsj.cb.att.com (James H Van Ornum)	kb2fvv	91-12-6
	jerrys@captain.sbi.com (Jerry Simonowits)	kb2gcg/afalcm	
	93-1-18		
	jerrys@canada.sbi.com (Jerry Simonowits)	kb2gcg/afalcm	
	93-1-18		
	71121.1007@CompuServe.COM (Bob A Hansen)	n2gde	93-1-5



n2gde@tapr.ampr.org (Bob A Hansen)	n2gde 93-1-5
G.JURRENS@<GENIE> (Gerry J Jurrens)	n2gj 92-9-5
n2gj@phsbbs.princeton.nj.us (Gerry J Jurrens)	n2gj 92-9-5
70550.2020@Compuserve.COM (Gerry J Jurrens)	n2gj 92-9-5
kb2glo@cbnewsj.cb.att.com (Thomas E Kenny)	kb2glo92-10-15
lzuspl!tek@lzuspl.att.com (Thomas E Kenny)	kb2glo92-10-15
furr@pilot.njin.net (Grover C Furr III)	aa2gp 92-8-5
masny@b56vxg.kodak.com (George S Masny)	ka2gpj 92-6-2
gmw1@cunixa.cc.columbia.edu (Gabe M Wiener)	n2gpz 92-6-11
62355.1226@Compuserve.Com (Gabe M Wiener)	n2gpz 92-6-11
agp@cci632.cci.com (Allen G Pellnat)	kx2h 91-10
955208@n1.usna.navy.mil (John E Roe)	n2haq 91-12-6
kbj@jupiter.risc.rockwell.COM (Ken B Johnson)	ka2hcl91-10
taz@momad.uucp (Jon S Nowak)	kb2hdh 92-12-
1	
Taz%Momad@Infoserv.Com (Jon S Nowak)	kb2hdh 92-12-
1	
mg@asylum.UUCP (Mike A Gallaher)	wa2hee92-8-8
mg@BDS.BDS.COM (Mike A Gallaher)	wa2hee93-1-26
mark@kodak.kodak.com (James Mark Hilliard)	n2hhr 91-12-26
cb@cci632.cci.com (Curtis J Braun)	n2hkd 91-12-6
braun@kadsma.kodak.com (Curtis J Braun)	n2hkd 92-11-15
curtis@computronics.com (Curtis J Braun)	n2hkd 93-1-12
braun@isctssl.NoSubdomain.NoDomain (Curtis Braun)	n2hkd 93-1-12
athanasiou@mts.rpi.edu (Robert B Athanasiou)	w2hkm 92-7-3
sream@pica.army.mil (Scott Caden Ream)	kb2hkr 92-12-
2	
jsh@nynexst.com (John S Hirth)	wb2hmf 92-12-
15	
grumpy@jpradley.jpr.com (Jeff G Markel)	kd2hn 92-3-3
71036.1044@CompuServe.Com (Micheal A Djirdjirian)	n2hpa 92-7-3
bobk@fir.lle.rochester.edu (Bob L Kremens)	wb2hwi91-11-25
SYSPT@ADMIN1.NJIT.EDU (Pete A Teklinski)	ww2i 92-1-7
CENG51@maccvm.corp.mot.com (Craig A Witkowski)	ka2ibv93-1-21
steven@ulysses.atmos.colostate.edu (Steven M London)	n2ic 91-11-11
Sproul@sproul.sproul.com (Mark L Sproul)	kb2ici92-10-22
ctwittwer@msscc.med.utah.edu (Josh Cherry)	n2ifb 91-10
connolly@livy.cs.umass.edu (Christopher I Connolly)	wa2ifi91-10
kinne@oswego.Oswego.edu (Richard [Doc] C Kinne)	n2ikr 93-1-9
kinnerc@snymorva.BITNET (Richard [Doc] C Kinne)	n2ikr 93-1-9
sadowg@rpi.edu (Gregory A Sadowy)	n2ikz 91-12-6
abrahp@nason108.its.rpi.edu (Peter Cherian Abraham)	kb2ino92-2-24
bill@andante.att.com (Bill M Schell)	n2iog 91-12-6
rcmcc@hera.uucp (Ron C McConnell)	w2iol 92-5-26
rcmcc@vela.bellcore.com (Ron C McConnell)	w2iol 92-12-1
rcmcc@vela.UUCP (Ron C McConnell)	w2iol 92-12-1
acmbgb@gsusgi2.gsu.edu (Ben G Bailey Jr)	n2ira/kb2fcr92-11-
29	
acmbgb@gsusgi2.edu (Ben G Bailey Jr)	n2ira/kb2fcr
92-11-29	
wa2ise@cbnewsb.cb.att.com (Robert F Casey)	wa2ise92-8-7
rfc@allegra.att.com (Robert F Casey)	wa2ise 92-10-
26	
LEAVITDG@SNYPLAVA.BITNET (Darrell G Leavitt)	n2ixl 91-12-12
LEAVITDG@splava.cc.PLattsburgh.EDU (Darrell G Leavitt)	n2ixl 92-12-19
jmr@ruth.ece.psu.edu (Joe M Reinhardt)	af2j 92-3-28
rharel@fab8.INTel.COM (Richard B Harel)	wb2jbs/4xlda/4x6ua

92-10-22

Rharel%fab8@sc.intel.com (Richard B Harel)	wb2jbs/4x1da/4x6ua	92-10-22
gary@ektools.kodak.com (Gary M Diana, Sr)	n2jgu	91-12-6
mig@cunibx.cc.columbia.edu (Meir I Green)	n2jpg	91-12-6
skora@bnlux1.bnl.gov (John G Skora)	kc2jt	91-10
RGS%LIUVAX.BITNET@cunyv.cuny.edu (Robert G Schaffrath)	n2jtx	92-6-2
yee@mipgsun.mipg.upenn.edu (Conway Yee)	n2jwq	92-12-24
yee@ming.mipg.upenn.edu (Conway Yee)	n2jwq	92-12-24
cy5@cunixa.cc.columbia.edu (Conway Yee)	n2jwq	92-12-24
yee@mipg.upenn.edu (Conway Yee)	n2jwq	92-11-22
nd2k@cbnewsh.cb.att.com (Alfred A Schwarz Jr)	nd2k	92-2-13
davet@tsdiag.ocpt.ccur.com (Dave E Tiller)	n2kau	91-12-6
thayes@romulus.rutgers.edu (Tim E Hayes)	n2kbg	91-12-6
thayes@bach.rutgers.edu (Tim E Hayes)	n2kbg	92-8-7
thayes@caip.rutgers.edu (Tim E Hayes)	n2kbg	92-8-7
thayes@pion.rutgers.edu (Tim E Hayes)	n2kbg	92-11-7
thayes@physics.rutgers.edu (Tim E Hayes)	n2kbg	92-11-7
ROCH%SLUMUS.BITNET@cunyv.cuny.edu (Russ A Ochsner)	ka2kfh	92-5-16
trsnnyder@mcs.drexel.edu (Bob A Snyder)	n2kgo	92-12-30
pete@strata.bellcore.com (Peter B Glenn)	kc2ki	91-10
kronenpj@craft.camp.clarkson.edu (Paul J Kronenwetter)	n2kiq	91-12-12
gomer@spiff.soe.clarkson.edu (Paul J Kronenwetter)	n2kiq	91-12-6
kronenpj@cheetah.ece.clarkson.edu (Paul J Kronenwetter)	n2kiq	92-7-3
DSHARP@lecs.ericsson.se (Doug A Sharp)	wb2kmy	92-7-8
lrj@cs.cornell.edu (Lewis R Jansen)	n2knv	92-5-21
jpoutre@shearson.com (Joe A Poutre)	n2kow/kb2abo	92-12-15
15		
crs@vax5.cit.cornell.edu (Martin A Jaspan)	n2krv	91-12-6
dls@sunsrvr2 (Darren L Swartzendruber)	n2ktj	91-12-6
bongik@rpi.edu (Kevin P Bongiovanni)	kb2kto	92-7-3
oppedahl@panix.com (Carl Oppedahl)	aa2kw	92-12-21@
E.BYINGTON@<GENie> (Elton L Byington)	n2kxt	92-9-5
kc2ky@groucho.kc2ky.ampr.org (Neil M Heft)	kc2ky	92-5-28
abelsm@aix.rpi.edu (Mike L Abelson)	kb2kyz	92-2-3
abelsm@rpi.edu (Mike L Abelson)	kb2kyz	92-12-24
24		
abelson@isaac.its.rpi.edu (Mike L Abelson)	kb2kyz	92-11-27
ABELSON@RPI.EDU (Mike L Abelson)	kb2kyz	92-11-27
GZNO@RPITSMTS (Mike L Abelson)	kb2kyz	92-11-27
27		
abelson@operators.its.rpi.edu (Mike L Abelson)	kb2kyz	92-12-24
rlt@gummo.att.com (Roberta L Taylor)	aa2kz	92-9-11@
harding@b56vvg.kodak.com (Jon B Harding)	n2kzj	92-7-14
rhealy@arrl.org (James W [Rus] Healy)	nj21	92-6-29
ron@pilot.njin.net (Ron B Natalie Jr)	wo21	92-8-5
ron@topaz.bds.com (Ron B Natalie Jr)	wo21	92-9-28
ajk@garnet.berkeley.edu (Adam Jacobs)	n2law	91-11-10
lewis@Kodak.COM (Ken A Lewis)	n2lci	91-12-6
hyx1@cunixa.cc.columbia.edu (Harry Y Xu)	kb2lha/ag	92-11-20
20		
hyx1@cunibx.cc.columbia.edu (Harry Y Xu)	kb2lha/ag	92-12-6
6		
night@acm.rpi.edu (Arthur [Trip] L Martin III)	ka2liv	92-7-3
bat@gdstech.grumman.com (Patrick T Masterson)	ke2lj	92-6-29
Jose J. Soler.Wbst207V@xerox.COM (Jose J Soler)	n2lpj	92-2-4
cliff@oswego.Oswego.EDU (Clifford J Conklin)	wa2lmc	92-10-29
bray@cheetah.ece.clarkson.edu (David W Bray)	k2lmg	92-7-3

S.CIAPPETTA@<Genie> (Salvatore A Ciappetta)	n2lsa	92-9-5
beers@cs.buffalo.edu (Andrew [Bud] C Beers)	n2luh	92-5-21
beers@acsu.buffalo.edu (Andrew [Bud] C Beers)	n2luh	91-10
lvy@cbnewsb.cb.att.com (Ray A Ihly)	wa2lvy	91-12-14
MANFRESR@snyptv.bitnet (Susan R Manfred)	n2lww	92-8-5
babani@acsu.buffalo.edu (Rusty H Babani)	n2lyc	92-12-24
an173@cleveland.freenet.edu (Rusty H Babani)	n2lyc	92-12-24
V078LNGT@ubvms.BITNET (Rusty H Babani)	n2lyc	92-12-24
rutgers!ub!babani (Rusty H Babani)	n2lyc	92-12-24
DS1437%BROCK1P.BITNET@cornell.cit.cornell.edu (Donald L Schleede)	kb2lzf	
92-2-9		
swirsky@mv.us.adobe.com (Robert A Swirsky)	af2m	93-1-14
swirsky@adobe.com (Robert A Swirsky)	af2m	93-1-14
hwd@pyuxa.cc.bellcore.com (Harold Winard)	kb2m	92-10-18
hwd@pyuxa.uucp (Harold Winard)	kb2m	92-10-18
D.rodman@f16.n120.z1.fidonet.org (David J Rodman)	kn2m	91-10
oopdavid@ubvmsb.cc.buffalo.edu (David J Rodman)	kn2m	92-9-15
rabassa_ao%ncsd.dnet@gte.COM (Albert O Rabassa III)	nw2m	92-8-6
namerow@pokvmcr3.vnet.ibm.COM (Wayne G Namerow)	n2mcm	91-10
riawelch@ubvmcsc.cc.buffalo.edu (Kevin W Welch)	n2med	91-10
roman@tix.UUCP (Daniel P Roman)	n2mfc	92-3-29
roman_d@timeplex.com (Daniel P Roman)	n2mfc	91-12-5
D.ROMAIN1@<Genie> (Daniel P Roman)	n2mfc	92-3-29
roman@tix.timeplex.COM (Daniel P Roman)	n2mfc	92-10-10
gregw@pivot-sts.sbi.com (Greg E Wodynski)	n2mfg	92-7-8
laz@cheetah.ece.clarkson.edu (Matt Parker)	n2mgi	92-7-3
rmb3@IASTATE.EDU (Richard M Bassett III)	wa0khf/n2mix	92-7-31
31		
latzko@hardees.rutgers.edu (Alex B Latzko)	n2mlq	91-11-9
B.BOCCARDI1@<Genie> (Brian F Boccardi)	n2mpm	92-9-5
boccardi@deephthought.Princeton.EDU (Brian F Boccardi)	n2mpm	92-6-5
n2mpm@kb2ear.ampr.org (Brian F Boccardi)	n2mpm	92-6-5
jds@emclab.ATt.COM (Jim Dorian Sandoz)	n2mpt	92-12-15
prmx@vax5.cit.cornell.edu (Peter A Morenus Jr)	n2mpv	92-5-26
snh1@crux1.cit.cornell.edu (Sanjay Hiranandani)	n2mrz	92-10-6
snh1@cornell.edu (Sanjay Hiranandani)	n2mrz	92-10-6
jpp@tornado (Joseph P Piazza)	n2msg	93-1-5
uunet.UU.NET!meaddata!devil!dem (David E Myers)	kd2mt	92-5-6
dem@meaddata.com (David E Myers)	kd2mt	92-5-6
fab4536@hertz.njit.edu (Freddy A Balady)	n2mta	91-12-15
scr2275@hertz.njit.edu (Samuel C Ramac)	n2mxy	92-2-7
PRENTICE%SNYCANVA.BITNET@cunyv.cuny.edu (James J Prentice)	wa2mzf	92-12-11
thomas@HERMES.CHEME.CORNELL.EDU (Thomas J Hirasuna)	kb2mzq	92-8-30
root@june.cmp.rpi.edu (Jeff R Ordon)	wv2n	92-9-17
ordon@june.cmp.rpi.edu (Jeff R Ordon)	wv2n	92-9-17
ordon@bambi.cmp.rpi.edu (Jeff R Ordon)	wv2n	92-9-17
dnlgtld@uhura.cc.rochester.edu (Dan R Gravatt)	kb2ndc	91-12-12
maessm@rpi.edu (Mathieu J Maessen)	n2njz	93-1-21
v111qheg@ubvmsd.cc.buffalo.edu (Peter P Vasilion)	kb2nmv	92-12-4
v111qheg@ubvms.cc.buffalo.edu (Peter P Vasilion)	kb2nmv	93-1-7
v111qheg@ubvmsb.cc.buffalo.edu (Peter P Vasilion)	kb2nmv	93-1-18
vasilion@acsu.buffalo.edu (Peter P Vasilion)	kb2nmv	92-12-4
mancic@crockett1a.its.rpi.edu (Cesare Mancini)	kb2now	92-11-6
DEVO@GDLVM7.VNET.IBM.COM (Dave A Eaton)	n2noq	92-2-11
bowen@cs.Buffalo.EDU (Devon E Bowen)	ka2nrc	92-5-
21		
bowen@acsu.buffalo.edu (Devon E Bowen)	ka2nrc	92-9-1

M.CHAPPLE@<GENie> (Mike J Chapple) n2nsf 92-9-5  
JEMMONS.1@<GENie> (Melanie R F Emmons) n2nsn 92-9-5  
K.HERRON@<GENie> (Kevin W Herron) kb2nsx92-9-5  
reedvl@cheetah.ece.clarkson.edu (Virginia L Reed) n2nvf 92-7-3  
jtn0445@tesla.njit.edu (Jason T Ng) n2nyu 92-3-9  
htree@gdstech.grumman.com (Hong-Yi Ip) n2oef 92-3-7  
net@viper.UUCP (George M Heraghty) n2oeo 92-4-25  
gregt@col.hp.com (Greg A Tarcza) wa2ood92-12-24  
afy@cbnewsh.cb.att.com (Alan F Yorinks) wb2opa 92-10-  
22  
pjd@cadillac.siemens.com (Paul J Drongowski) n2oqt 92-5-10  
pjd@siemens.com (Paul J Drongowski) n2oqt 92-10-28  
pjd@siemens.siemens.com (Paul J Drongowski) n2oqt 92-10-28  
RGLEASON@<GENie> (Bob O Gleason) wa2oqv92-9-5  
johnl@avs.com (John W Langner) wb2osz 92-5-  
29  
grantd@LONEX.RL.AF.MIL (Dean W Grant) kb2ovn 92-12-  
15@  
mgsail@prefect.cc.bellcore.com (Marvin Goldstein) n2owl 92-12-19@  
karayan@nvuxr.uucp (George Karayannopoulos) n2owo 92-5-16@  
karayan@blitzen.cc.bellcore.com (George Karayannopoulos) n2owo 93-1-11@  
karayan@cc.bellcore.com (George Karayannopoulos) n2owo 93-1-11@  
karayan@rigel.uucp (George Karayannopoulos) n2owo 92-8-18@  
CANOUGH%BINGVAXA.BITNET@cunyvms.cuny.edu (Gay Canough) kb2oxa92-6-29@  
canough@bingvaxa.cc.binghamton.edu (Gay Canough) kb2oxa92-6-29@  
christianson@usc.pppl.gov (George B Christianson) nj2p 92-12-20  
v108qhu6@ubvmsb.cc.buffalo.edu (David N Smernoff) wy2p 92-2-12  
codella@codella.watson.ibm.com (Chris F Codella) w2pa 92-10-10  
codella@watson.ibm.com (Chris F Codella) w2pa 92-10-10  
k2ph@dxis.att.com (Bob A Schreiber) k2ph 92-5-25  
k2ph@cbnewsj.cb.att.com (Bob A Schreiber) k2ph 93-1-7  
k2ph@mtdcr.att.com (Bob A Schreiber) k2ph 93-1-7  
att!mtdcr!k2ph (Bob A Schreiber) k2ph 93-1-7  
dcc.wbst129@xerox.COM (Dan) n2pke 92-3-18@  
David\_Mensing.Roch817@xerox.COM (David Mensing) n2psh 92-7-20@  
chucks@banana.ithaca.ny.us (Chuck Schultz) n2pua 92-6-17@  
5rtrtrt@cbnewsf.cb.att.com (Richard E Stealey) kt2q 93-1-12  
kdk@radio.nusc.navy.MIL (Keith D Kanoun) wa2q 92-3-18  
KANOUN%VSDEC.DECnet@nl.nusc.navy.mil (Keith D Kanoun) wa2q 92-5-8  
keith@radio.nusc.navy.mil (Keith D Kanoun) wa2q 92-6-29  
rob@sun.soe.clarkson.edu (Rob Logan) n2qcn 92-7-3@  
rob@phoenix.erc.clarkson.edu (Rob Logan) n2qcn 92-7-3@  
lee@LONEX.RL.AF.MIL (Lee A Ritter) wa2qea92-1-10  
decaturn@ocpt.ccur.com (John E Decatur Jr) ka2qhd92-2-4  
johnd@ocpt.ccur.com (John E Decatur Jr) ka2qhd 92-2-4  
ka2qhd@ka2qhd.de.com (John E Decatur Jr) ka2qhd92-2-4  
rja@zeppo.att.com (Rick J Anderson) wb2qoq92-12-8  
jschwartz@bailly.rutgers.edu (Jeff Schwartz) ka2quo91-10@  
phr@telebit.com (Paul H Rubin) wa2qyn 92-12-  
24  
LKAY@NORTHEASTERN.EDU (Dr Leonard E Kay) kb2r 91-11-25  
len@ARIEL.BERKELEY.EDU (Dr Leonard E Kay) kb2r 91-12-20  
lkay@lynx.dac.northeastern.edu (Dr Leonard E Kay) kb2r 92-11-27  
ka2raf@ka2qhd.UUCP (Chris J Crosby) ka2raf91-10  
pechter@ocpt.ccur.com (Bill Pechter) n2rdi 93-1-5@  
dmk@theaetetus.rutgers.edu (David M Katinsky) n2rdt 92-7-31@  
dmk@noc.rutgers.edu (David M Katinsky) n2rdt 92-7-31@

dmk@hardees.rutgers.edu (David M Katinsky)	n2rdt 92-7-31@
hrand@pica.army.mil (Henry T Rand)	k2rf 92-7-26
jdl@lena.cc.columbia.edu (John Louie)	n2rje 92-7-8@
owens@acsu.buffalo.edu (Bill Owens)	n2rkl 92-9-29@
rdg@alta.uucp (Randy D Gutentag)	wa2rmz92-11-4
rdg@bae.bellcore.com (Randy D Gutentag)	wa2rmz 92-11-
4	
kwmc@cbnewsj.cb.att.com (Ken Cochran)	n2rpn 92-7-20@
kwmc@usl.com (Ken Cochran)	n2rpn 92-8-11@
kwmc@sodium.att.com (Ken Cochran)	n2rpn 92-10-6@
dnh.wbst129@xerox.com (Dave M Havens)	n2rtu 93-1-12@
David_Havens.wbst129@xerox.COM (Dave M Havens)	n2rtu 93-1-12@
BURDOGJ@splava.cc.PLattsburgh.EDU (Gordy J Burdo Jr)	wa2rup92-1-10
edjcb@ariel.lerc.nasa.gov (Jeff C Brown)	wb2ruz92-9-30
edjcb@scivax.lerc.nasa.gov (Jeff C Brown)	wb2ruz92-9-30
chhibber@andromeda.rutgers.edu (chhibber)	n2rvj 92-8-1@
chhibber@draco.rutgers.edu (chhibber)	n2rvj 92-8-1@
parish@think.com (Edward C Parish)	wa2sca91-10
net@wb2sjz.UUCP (George B Church Jr)	wb2sjz 91-12-
1	
J.BALLENTIN1@<Genie> (John D Ballentine Jr)	wb2snb/7 92-9-5
rgm@is.morgan.com (Robert G Maire)	wa2snq92-7-31
eyg@hpnjld.HP.COM (Ed Y Gilbert)	wa2srq91-10
xyzy@mertwig.UUCP (Daniel Max P Drucker)	n2sxx 92-12-13@
daniel@mertwig.UUCP (Daniel Max P Drucker)	n2sxx 93-1-8@
xyzy@mertwig@uunet.uu.net (Daniel Max P Drucker)	n2sxx 92-12-13@
daniel@mertwig@uunet.UU.NET (Daniel Max P Drucker)	n2sxx 93-1-8@
uunet!daniel@mertwig@uunet.UU.NET (Daniel Max P Drucker)	n2sxx 93-1-8@
abm@mbunix.mitre.org (Alex B Murphy)	wd2t 91-12-7
hatzakis@fovea.stanford.edu (Mike Hatzakis Jr)	wb2tbq92-5-12
dml@esl.com (Denis M Lynch)	n2ti 91-11-5
J.STARK4@<Genie> (John H Stark Jr)	kc2tj 92-9-5
rdg@world.std.com (Richard D Goldstein)	ka2tmt 93-1-
14	
rickh@wb3ffv.ampr.org (Rick M Hambly)	wb2tnl 91-11-
3	
sidb@PICA.ARMY.MIL (Sid B Bernstein)	wb2tno 92-12-
24	
perley@crd.ge.com (Donald P Perley)	ke2tp 91-12-7
baw2@cunixb.cc.columbia.edu (Bruce A Weisberg)	ka2tyx92-11-20
tom@ksr.COM (Tom Varga)	n2ua 91-10
Tom.Vicinanza@f123.n363.z1.fidonet.org (Tom M Vicinanza)	wa2uch92-3-26
bob@green.cooper.edu (Robert P Hopkins)	wb2udc 92-6-
17	
tbrown@lehi3b15.csee.lehigh.edu (Thomas W Brown)	ka2ugq91-12-29
TWB0@NS.CC.LEHIGH.EDU (Thomas W Brown)	ka2ugq 91-10
twb0@ns1.cc.lehigh.edu (Thomas W Brown)	ka2ugq 92-9-
11	
lewine@cheshirecat.webo.dg.com (Donald A Lewine)	wb2umf91-12-5
uunet!dg!lewine (Donald A Lewine)	wb2umf91-12-5
whs70@dancer.uucp (William H Sohl)	k2unk 92-2-12
whs70@dancer.cc.bellcore.com (William H Sohl)	k2unk 92-12-29
whs70@cc.bellcore.com (William H Sohl)	k2unk 92-12-29
whs70@taichi.uucp (William H Sohl)	k2unk 91-10
cfishman@pica.army.mil (Clark A Fishman)	wa2unn92-2-7
popyackl@lonex.rl.af.mil (Leonard J Popyack Jr)	wf2v 92-1-13
w2vy@whamt.att.com (Thomas A Moulton)	w2vy 91-11-20

cdp@hertz.njit.edu (Chris D Peckham)	wg2w 92-6-11
taylor@tix.UUCP (Seth L Taylor)	kc2we 91-10
taylor@tix.timeplex.COM (Seth L Taylor)	kc2we 92-9-19
dm8981@eeecs1.EECS.USMA.EDU (Mark F Morgida)	ke2wf/ae/walssw
92-12-4	
dm8981@trotter.usma.edu (Mark F Morgida)	ke2wf/ae/walssw
92-12-4	
rodel@netcom.com (Robert W Odell)	wa2wlh/7 93-1-
26*	
gerwitz@kodak.com (Paul F Gerwitz)	wa2wpi92-3-12
bob@kc2wz.bubble.org (Bob E Billson)	kc2wz 92-12-24
NELSON_M%athena@leia.polaroid.COM (Mark R Nelson)	aj2x 92-7-26
jennings@abb.COM (Tom J Jennings)	kv2x 92-1-25
rwilgus@pica.army.mil (Robert A Wilgus)	kz2x 92-5-16
durham@w2xo.pgh.pa.us (Jim C Durham)	w2xo 92-3-11
jcd@vax.cs.pitt.edu (Jim C Durham)	w2xo 91-10
0002446376@mcimail.com (Thomas R Sundstrom)	w2xq 92-11-11
tom.sundstrom@pics.com (Thomas R Sundstrom)	w2xq 93-1-21
CELLIS%BROCKVMA.BITNET@cunyv.cuny.edu (Carlton A Ellis)	ka2y 92-5-19
cellis@acspr1.acs.brockport.edu (Carlton A Ellis)	ka2y 92-8-7
CELLIS@BROCK1P.BITNET (Carlton A Ellis)	ka2y 92-10-16
joseph@panix.com (Joseph R Skoler)	kc2yu 92-2-18
mwilson@arrl.org (Mark J Wilson)	aa2z 92-6-29
nn2z@unix.nn2z.AMPR.ORG (David J Trulli)	nn2z/n3abt 93-1-
18	
nn2z@nn2z.ampr.org (Dave J Trulli)	nn2z/n3abt 93-1-
18	
david.trulli@att.com (Dave J Trulli)	nn2z/n3abt 93-1-
18	
manfred@cheetah.ece.clarkson.edu (Thomas W Manfred)	ns2z 92-7-3
MANFRETW@snyptvx.bitnet (Thomas W Manfred)	ns2z 92-7-8
saaf@joker.optics.rochester.edu (Lennart A Saaf)	nv2z 91-12-7
astein@eniac.seas.upenn.edu (Alan D Stein)	ka2zba91-10
STEIN_A@mascf.med.upenn.edu (Alan D Stein)	ka2zba92-12-22
ted@alleggra.att.com (Ted J Roycraft)	wa2zko 92-10-
15	
mac20@cunixf.cc.columbia.edu (Michael A Cecere)	wb2zlw92-9-1
jewell@athena.mit.edu (Darrin B Jewell)	ka2zlw 91-10
mikef@hpsadle.sad.hp.com (Mike R Ferrara)	wa2zpq92-11-15
mikef@sr.hp.com (Mike R Ferrara)	wa2zpq92-11-18
mikef%hpsadle@relay.hp.com (Mike R Ferrara)	wa2zpq92-11-18
mikef@hpsadle.sad.hp.com (Mike R Ferrara)	wa2zpq92-11-18
nat@kpc.com (Natarajan Gurumoorthy)	kd2zs 92-1-17
## US 3 District	
depolo@eniac.seas.upenn.edu (Jeff J DePolo)	wn3a 93-1-18
larry@wb3anq.uucp (Larry A Putman)	wb3anq91-10
lap@wb3ffv.ampr.org (Larry A Putman)	wb3anq 91-10
augie@aplcomm.jhuapl.edu (Augie Mattheiss)	ke3as 92-3-30@
jka@ece.cmu.edu (Jay Adams)	ke3at 92-10-26@
bt01+@andrew.cmu.edu (Bruce L Taylor IV)	wb3aya92-7-8
km@speedy.cs.pitt.edu (Ken L Mitchum)	ky3b 92-5-21
km@cs.pitt.edu (Ken L Mitchum)	ky3b 92-10-11
gdo@dasher.att.com (Glenn D O'Donnell)	n3bda 92-11-1
gdo@aloft.att.com (Glenn D O'Donnell)	n3bda 92-11-22
hugh@ivy.unisys.com (Hugh M Pepper)	ke3bi 92-10-15@
hugh@ipc11.VFL.Paramax.COM (Hugh M Pepper)	ke3bi 92-10-15@
laubach@aspn.NSA.HP.COM (Mark E Laubach)	n3bmn 92-6-29

laubach@hpl.hp.com (Mark E Laubach)	n3bmn 92-8-5
ean@gvls2.VFL.Paramax.COM (Ed A Naratil)	w3bnr 93-1-20
ean@VFL.Paramax.COM (Ed A Naratil)	w3bnr 93-1-20
brian@umbc3.umbc.edu (Brian D Cuthie)	ka3brz 91-10
brian@beerwolf.umd.edu (Brian D Cuthie)	ka3brz 91-10
brian@umbc4.umbc.edu (Brian D Cuthie)	ka3brz 92-12-
25	
brian@systemix.com (Brian D Cuthie)	ka3brz92-12-25
roakley@guvax.georgetown.edu (Bob L Oakley)	wk3c 92-6-29
roakley@guvax.acc.georgetown.edu (Bob L Oakley)	wk3c 92-12-11
ROAKLEY@GUVAX.GEORGETOWN.EDU (Bob L Oakley)	wk3c 92-12-11
senk2@unix.cis.pitt.edu (Mark Senk)	wb3cai91-10
WA3CAQ@WA3CAQ.#SOCA.CA.U.SA.NA.AMPR.ORG (Joe J Schwoebel)	wa3caq91-10
alw@ncrbeth.BethlehemPA.NCR.COM (Al W Wiemann)	w3ce 92-12-11
Al.Wiemann@BethlehemPA.NCR.COM (Al W Wiemann)	w3ce 92-12-11
jav@icf.hrb.com (James A Vuccolo)	n3clc 92-6-29
headrick@radar.nrl.navy.mil (James M Headrick)	w3cpb 93-1-9
dpalace@sunland.gsfc.nasa.gov (Dick J Palace)	wb3csi92-2-20
artg@wb3ffv.ampr.org (Art E Goldman)	wa3cvg 91-11-
3	
hoffman@cs.pitt.edu (Bob B Hoffman)	n3cvl 91-10
hoffman@speedy.cs.pitt.edu (Bob B Hoffman)	n3cvl 91-10
jimg@wb3ffv.ampr.org (Jim M Green)	wb3dju91-11-3
johnl@n3dmc.svr.md.us (John A Limpert)	n3dmc 91-11-6
bobl@wb3ffv.ampr.org (Bob J Lang)	wa3dur91-11-3
scott@grip.cis.upenn.edu (Scott M Silverstein)	ku3e 92-4-2
degood@hpavla.avo.hp.com (John S DeGood)	nu3e 91-12-7
NAGURNEY%HARTFORD.BITNET@YALEVM.YCC.Yale.EDU (Lad S Nagurney)	wa3eec
91-12-4	
harcke@hawkeye.synthesis.cornell.EDU (Leif J Harcke)	n3een 92-8-1
ljhl@crux3.cit.cornell.edu (Leif J Harcke)	n3een 93-1-20
Leif-Harcke@cornell.edu (Leif J Harcke)	n3een 93-1-20
richardl@wb3ffv.ampr.org (Richard H Lovegrove)	wb3efg91-11-3
D.SUTER@<GENie> (Donald F Suter)	wb3egs92-9-5
ronl@wb3ffv.ampr.org (Ron E Long)	n3eko 91-11-3
rwb@vi.ri.cmu.edu (Robert W Berger)	n3emo 91-10
rwb+@cs.cmu.edu (Robert W Berger)	n3emo 91-10
rwb@alexander.VI.RI.CMU.EDU (Robert W Berger)	n3emo 92-9-19
daley@cs.pitt.edu (Robert P Daley)	n3eno 91-10
paul@n3eop.pgh.pa.us (Paul J Christenson)	n3eop 92-9-16
jpcstl@unix.cis.pitt.edu (Joseph P Condle Jr)	n3eoq 91-10
uunet!col.hp.com!bdale (Bdale Garbee)	n3eua 92-12-8
bdale@col.hp.com (Bdale Garbee)	n3eua 92-12-8
bdale@n3eua.ampr.org (Bdale Garbee)	n3eua 91-10
bdale@gag.com (Bdale Garbee)	n3eua 92-11-23
nb04+@andrew.cmu.edu (Norm F Brososky)	wb3eut 92-7-8
miked@wb3ffv.ampr.org (Joseph Mike Dees III)	n3ezd 91-11-3
M_HAYDEN@GBURG.BITNET (Michael B Hayden)	ak3f 91-10
mp4e+@andrew.cmu.edu (Matthew A Parker)	ny3f 91-12-7
davebaby@ziggys.cts.com 619/262-6384 (Dave D Oleynik)	n3fdq 92-5-7
jims@wb3ffv.ampr.org (Jim Q Schmidt Jr)	n3ffb 91-12-7
howardl@wb3ffv.ampr.org (Howard D Leadmon)	wb3ffv91-10
martyk@wb3ffv.ampr.org (Marty O King)	n3fhd 91-12-7
feliccia@rodan.acs.syr.edu (Nicholas J Feliccia Jr)	n3fks 91-12-21
n3fkv@tomcat.gsfc.nasa.gov (Richard W Campbell)	n3fkv 92-7-8
donj@wb3ffv.ampr.org (Don A Jennings)	n3fqc 91-12-7
chuckr@wb3ffv.ampr.org (Chuck O Reville III)	k3ft 91-11-3

beyo@beyonet.UUCP (Steve R Urich)	wb3ftp92-10-10
steve@zero.com (Steve R Urich)	wb3ftp 93-1-
26	
cs.widener.edu!beyonet!steve@decwrl.uucp (Steve R Urich)	wb3ftp93-1-27
uunet!beyonet!steve (Stephen R Urich)	wb3ftp 93-1-
26	
ba271@cleveland.Freenet.Edu (Paul W Schleck)	kd3fu 91-12-29
pschleck@cwis.unomaha.edu (Paul W Schleck)	kd3fu 92-12-17
pschleck@unomaha.edu (Paul W Schleck)	kd3fu 92-12-2
markd@asdg.UUCP (Mark C DiVecchio)	k3fwt 92-1-25
markd@silogic.uucp (Mark C DiVecchio)	k3fwt 92-8-9
ws1f@andrew.cmu.edu (William [Tom] H Sands IV)	ka3fxx91-10
ws1f@norman.VI.RI.CMU.EDU (William [Tom] H Sands IV)	ka3fxx92-5-10
eab@voa3.VOA.GOV (E Allen Brown)	wa3fyz/zf21y91-10
kenneth@wam.umd.edu (Kenneth J McCaughey)	n3fzx 92-5-28
willie@wj3g.AMPR.ORG (Wilson G Hein)	wj3g/ka3mvm 93-1-
18	
gklein@cattell.psych.upenn.edu (Garrett C Klein)	wz3g/ka5uhk 92-6-3
billy@tredysvr.tredydev.unisys.com (William G Davies)	n3gbz 92-7-8
bruce@tehanu.wa.com (Bruce L Bevelheimer)	w3gdz/7 92-4-
25	
6367jeutterd@vms.csd.mu.edu (Dr Dean C Jeutter)	k3ggn 92-10-10
robert.keown@pics.com (Robert Keown)	wa3gju 93-1-
14@	
uunet!wa3wbu!k3glk!larry (Earl Larry Winemiller)	k3glk 91-11-10
MOSIER@iris.uncg.EDU (Steve R Mosier)	w3grg 93-1-14
mosier@uncg.bitnet (Steve R Mosier)	w3grg 93-1-14
walt@diusys (Walt M Dabell)	kd3gs 92-8-14
walt@diusys.cms.udel.edu (Walt M Dabell)	kd3gs 92-8-14
tener@cs.widener.edu (Stuart B Tener)	n3gwg/ka3tnh
92-12-21	
tener@lucy.cs.widener.edu (Stuart B Tener)	n3gwg/ka3tnh92-12-
21	
chideste@nmr1.UUCP (Dale H Chidester)	n3hal 92-1-25
tedwards@wam.umd.edu (Thomas Grant Edwards)	n3hau 92-7-8
tedwards@src.umd.edu (Thomas Grant Edwards)	n3hau 92-8-8
tedwards@eng.umd.edu (Thomas Grant Edwards)	n3hau 92-10-26
cwilkins@irscscm.UUCP (Charlie E Wilkinsons)	n3haz 92-5-16
abfhhb@stdvax.DNET.NASA.GOV (Frank H Bauer)	ka3hdo92-9-14
thadc@wb3ffv.ampr.org (Thad O Cooper)	ka3hfs 91-11-
3	
sro@media-lab.media.mit.edu (Shawn R O'Donnell)	k3hi 92-6-2
ham@wam.umd.edu (Scott Richard Rosenfeld)	nf3i/ka3nji 92-12-
30	
n3hnr@hpb.cis.pitt.edu (Jason Galanter)	n3hnr 92-6-3
stewart@vm2.cis.pitt.edu (Glen Alec Stewart)	w3hrk 91-10
bertt@wb3ffv.ampr.org (Bert J Thornhill)	k3ht 91-11-3
rbarth@ka3ovk (Dick Barth)	w3hwn 91-10
carrollv@wb3ffv.ampr.org (Carroll Van Ness III)	k3hzu 91-11-3
ham@wam.umd.edu (Scott Richard Rosenfeld)	nf3i 92-2-20
popovich@cs.columbia.edu (Steve Popovich)	wb3i 92-12-29
popovich@morningside.cs.columbia.edu (Steve Popovich)	wb3i 92-12-29
edw@wells.UUCP (Ed E Wells Jr)	n3ias 92-10-26
edw@wells.wells.com (Ed E Wells Jr)	n3ias 91-12-26
techpubs@PRC.Unisys.COM (Joseph M Fedoch)	n3ie 91-10
dxandy@cs.widener.edu (Andrew J Greenshields)	n3igs 92-10-22
andy@mercury.cs.clemson.edu (Andrew J Greenshields)	n3igs 92-10-22



andy@cs.clemson.edu (Andrew J Greenshields)	n3igs 92-10-22
sprouse@n3igw.pgh.pa.us (Ken R Sprouse)	n3igw 92-1-25
regent@cup.portal.com (Dick L Rubinstein)	k3iia 91-12-12
gaus@alydar.crd.ge.com (Rick C Gaus Jr)	wa3inc 91-10
landru@cis.udel.edu (Paul S Masters)	n3iru 91-12-7
landru@daffy.cis.udel.edu (Paul S Masters)	n3iru 92-8-17
lott@k3ive.pgh.pa.us (Jim E Lott)	k3ive 91-10
clark@tomcat.gsfc.nasa.gov (Tom A Clark)	w3iwi 93-1-5
w3iwi@tapr.ampr.org (Tom A Clark)	w3iwi 93-1-5
jph@astro.UMD.EDU (James Patrick Harrington)	n3izv 92-7-3
jc@i5120h.nrl.navy.mil (John W Clark)	na3j 92-11-21
rjhst8@vm2.cis.pitt.edu (Becky Jo Hennon)	nq3j 91-12-7
furuta@cs.umd.edu (Richard K Furuta)	n3jgf 92-10-10
furuta@mimsy.umd.edu (Richard K Furuta)	n3jgf 91-10
furuta@crayola.cs.umd.edu (Richard K Furuta)	n3jgf 92-8-30
mikea@wb3ffv.ampr.org (Mike J Agner)	ka3jjz 91-11-
3	
mark@COGSCI.COG.JHU.EDU (Mark E Bouver)	n3jlp 91-10
wejones@crdec7.apgea.army.mil (Bill E Jones III)	n3jllq 92-7-20
wejones@cbda7.apgea.army.mil (Bill E Jones III)	n3jllq 92-11-6
tml+@cis.pitt.edu (Thomas M Link)	n3jnn 91-10
turner@ics.uci.edu (Clark Savage Turner)	wa3jpg 92-5-23
mgb@tecnet1.jcte.jcs.mil (Mark G Bitterlich)	wa3jpy 93-1-5
THE-BULL@<GEnie> (Herman W Schugard)	k3jsz 92-9-5
kg19+@andrew.cmu.edu (Kurt A Geisel)	n3jtw 91-10
fireman@wam.umd.edu (Aaron Joseph Peterson)	n3jvp 92-5-19
geb@speedy.cs.pitt.edu (Gordon E Banks)	n3jxp 91-10
geb@dsl.pitt.edu (Gordon E Banks)	n3jxp 91-10
geb@cs.pitt.edu (Gordon E Banks)	n3jxp 92-10-22
geb@cadre.dsl.pitt.edu (Gordon E Banks)	n3jxp 92-10-22
cmurcko@topsail.Topsail.ORG (Chuck D Murcko)	n3jzv 91-12-6
cmurcko@topsail.UUCP (Chuck D Murcko)	n3jzv 91-11-8
penneys@freezer.cns.udel.edu (Robert Penneys)	wn3k 92-5-6
penneys@pecan.cns.udel.edu (Robert Penneys)	wn3k 92-7-8
penneys@pecan.udel.edu (Robert Penneys)	wn3k 92-5-16
weh@metropolis.super.org (Bill E Holmes)	n3kbd 91-10
anderson@sdd.COMsat.COM (Gary N Anderson)	n3kcd 93-1-9
n3kfy@N3KFY.AMPR.ORG (Fred L Hess)	n3kfy/ka3yld 93-1-
18	
ebe@unix.cis.pitt.edu (Elmer T Beachley)	n3kil 92-3-17
sirius@cup.portal.com (Mike R Stilson)	n3kjg 91-12-30
CXF107@psuvm.psu.edu (Chris M Fisher)	n3ksa 92-9-6
daniel@usna.navy.mil (Walter K Daniel)	n3kvq 92-2-29
jlf@achilles.mitre.org (James L Fisher)	wb3lfb 91-12-
24	
aw0g+@andrew.cmu.edu (Aaron Wohl)	n3liw 92-2-25@
pjstopa@crdec8.apgea.army.mil (Peter J Stopa)	ka3lkq 92-2-7
seanp@undr.org (Sean Petty)	n3lqn 92-3-17@
georg@iis.ethz.ch (Georg A Zur Bonsen)	ka3lzi/dh3eax
91-10	
arm@helix.nih.gov (Andrew R Mitz)	wa3ltj 92-6-29
nr3m@unix.cis.pitt.edu (Matthew A Henry)	nr3m 91-12-7
phillips@pennsy.med.jhu.edu (Mark D Phillips)	wo3m 93-1-27
okas_rp%ncsd.dnet@gte.COM (Bob)	n3mby 92-10-24@
k3mc@tandem.com (Mike A Chepponis)	k3mc 91-10
smarc@mas.UUCP (Marc Siegel)	n3mcr 92-7-31@
smarc@mas.wb3ffv.ampr.org (Mark Siegel)	n3mcr 92-7-31@

hart@wb3ffv.ampr.org (Rod W Hart Sr)	wa3mez	91-11-
3		
bob@olwejo.UUCP (Bob Kupiec)	n3mml	92-6-11@
kupiec@hp800.lasalle.edu (Bob Kupiec)	n3mml	92-6-11@
gdrew@cs.umd.edu (Greg Drew)	n3mxx	92-7-20@
strong+@cmu.edu (Thomas W Strong Jr)	n3nbb	92-12-24@
ts49@andrew.cmu.edu (Thomas W Strong Jr)	n3nbb	92-11-3@
ts49+@andrew.cmu.edu (Thomas W Strong Jr)	n3nbb	92-12-24@
nc@acm.rpi.edu (David S Page)	kd3nc	92-7-3
mrosen@isis.cs.du.edu (Michael S Rosen)	ka3nec	92-5-
11		
bruces@mpd.tandem.com (Bruce R Sawtelle)	w3nj	92-1-3
adam@wam.umd.edu (Adam L Greenberg)	n3nki	92-9-29@
rossi@VFL.Paramax.COM (Pete J Rossi)	wa3nna	93-1-
21		
rossi@gvlf9.VFL.Paramax.COM (Pete J Rossi)	wa3nna	93-1-21
nk30@alux2.att.com (Jeffrey L Zell)	nk3o	92-5-6
nk30@cbnewsm.cb.att.com (Jeffrey L Zell)	nk3o	92-9-19
sibley@math.psu.edu (David A Sibley)	nt3o/kd3js	92-11-
29		
lamanna@n3igw.pgh.pa.us (Mike D Lamanna)	wa3o	92-9-13
rc@cmr.ncsl.nist.gov (Robert J Carpenter)	w3otc	92-9-22
albers@ka3ovk (Jon P Albers)	ka3ovk	91-12-
20		
albers@nogatel.ISm.irs.GOV (Jon P Albers)	ka3ovk	92-10-22
ka3oyi@hpb.cis.pitt.edu (Jason A Mueller)	ka3oyi	91-10
swm@cbnewsm.cb.att.com (Scott W McLellan)	nd3p/nb1j	93-1-
15		
ddabay@ruacad.ac.runet.edu (Dave M Dabay)	kd3pc	92-8-7
dabay@thor.corp.sgi.com (David M Dabay)	kd3pc	91-12-7
Paul.Heller@p391.f716.n109.z1.FidoNet.Org (Paul R Heller III)		
w3ph/k3wfz/ka3pkh		91-10
ka3pgn@ka3ovk (Dave M Norment)	ka3pgn	91-10
billk@wb3ffv.ampr.org (Bill V Kirby)	wa3pqn	91-11-
3		
harryl@wb3ffv.ampr.org (Harry D Leadmon)	ka3puo	91-11-3
ericr@access.digex.com (Eric Rosenberg)	wd3q/ei4vps/zl0adq/j20by	93-1-
14		
73307.110@Compuserve.Com (Eric Rosenberg)	wd3q/ei4vps/zl0adq/j20by	92-10-
24		
wd3q@amsat.org (Eric Rosenberg)	wd3q/ei4vps/zl0adq/j20by	93-1-
14		
drumhell@n5160a.nrl.navy.mil (David M Drumheller)	ka3qbq	92-6-2
L.CARMELLE@<GENie> (Lisa Carmelle)	nb3r	92-9-5
70703.1161@compuserve.com (Roger M Cooper)	n3rc	92-3-10
cooper@mail-gw.ncsl.nist.gov (Roger M Cooper)	n3rc	92-3-10
mln+@andrew.cmu.edu (Mark L Nagurka)	wa3rmv	92-10-
15		
nagurka@andrew.cmu.edu (Mark L Nagurka)	wa3rmv	92-10-
15		
welsh@dsl.cis.upenn.edu (Robert H Welsh)	n3rw	92-6-17
ceham@wam.umd.edu (Maurice Edward DeVidts Ureta)	ne3s/ce3hwz	91-10
robinson@cs.psu.edu (Andrew Robinson)	wq3s	92-3-3
robinson@sml.cs.psu.edu (Andrew Robinson)	wq3s	92-3-2
S.LARSON7@<GENie> (Steve A Larson)	n3s1/092-9-5	
stevek@wb3ffv.ampr.org (Steve B Kennick)	wa3sor	91-11-3
upchuck@unix.cis.pitt.edu (Charles L Mills)	ka3sqc	91-12-6

km3t@jjmhome.UUCP (Dave H Pascoe)	km3t 93-1-12
km3t%jjmhome@stratus.com (Dave H Pascoe)	km3t 93-1-12
dhp1@gte.com (Dave H Pascoe)	km3t 92-9-15
dhp1@harvey.gte.com (Dave H Pascoe)	km3t 91-10
pascoe%scsd.dnet@gte.COM (Dave H Pascoe)	km3t 91-10
pascoe@scsd.gte.com (Dave H Pascoe)	km3t 91-10
pascoe@rocky.gte.com (Dave H Pascoe)	km3t 92-9-15
pascoe@rocky.ndhm.gtegs.com (Dave H Pascoe)	km3t 92-12-31
whmiv@wb3ffv.ampr.org (William [Bingy] H Moore IV)	w3tal 91-11-3
hpb@hpb.cis.pitt.edu (Harry P Bloomberg)	wa3tbl92-8-7
hpb@vms.cis.pitt.edu (Harry P Bloomberg)	wa3tbl92-8-7
gilly@gilly.East.Sun.COM (Bob D Gilliland Jr)	k3tct 93-1-5
batchler@pica.army.mil (Laing T Batcheler)	kb3ts 92-11-21
paul+@andrew.cmu.edu (Paul J Dujmich)	wa3tld 92-6-
29	
bobg@wb3ffv.ampr.org (Bob D Gilliland Jr)	k3tct 91-11-3
wells!k3tx@dsinc.dsi.com (Dave L Heller)	k3tx 91-10
k3tx@wells.UUCP (Dave L Heller)	k3tx 91-10
dave@diusys.cms.udel.edu (Stanley Dave Dabell)	wa3u 92-8-14
carl@Cayman.COM (Carl G Heinzl)	wa3uen 91-12-
14	
ebeser@wb3ffv.ampr.org (Eric L Beser)	k3uhf 91-11-3
chuck@eng.umd.edu (Chuck F Harris)	wa3uqv92-8-14
frank%xcntrk@relay.sgi.com (Frank W Holden Jr)	ka3uww92-10-24
daveh@compnect.UUCP (Dave B Hultberg)	ka3uzr 92-1-8
daveh@ka3uzr.UUCP (Dave B Hultberg)	ka3uzr92-12-24
jas8@Lehigh.EDU (Jeff A Spirko)	wd3v 92-5-6
rolfe@w3vh.UUCP (Rolfe S Tessem)	w3vh 92-8-5
rolfe@ldp.com (Rolfe S Tessem)	n3vh 92-8-5
john@pscsys.com (John S Kingdon Jr)	ka3vjh91-12-6
kingdon@cs.columbia.edu (John S Kingdon Jr)	ka3vjh92-9-23
jpw@lorelei.ece.drexel.edu (Joseph P Wetstein)	ka3vjy92-10-31
jpw@coe.drexel.edu (Joseph P Wetstein)	ka3vjy 92-10-
31	
alv3192@cuphub.cup.edu (Anthony C Alviar)	ka3vor92-1-26
mjj@stda.jhuapl.edu (Marshall J Jose)	wa3vpz 91-10
wood@unix.cis.pitt.edu (Terry J Wood)	wa3vqj 91-10
0003801143@mcimail.com (Scott J Loftesness)	w3vs 91-10
sjl@glenbrook.com (Scott J Loftesness)	w3vs 91-10
kstuart@oasys.dt.navy.mil (Kenneth L Stuart)	w3vvn 92-4-24
HANNA.J.R%WESTINGHOUSE@intermail.isi.edu (J Dick Hanna)	k3vyy 91-10
f1jtl@carina.unm.edu (Laurent D Thomin)	wx3w/f1jtl 92-9-
4@	
john@wa3wbu.UUCP (John M Gayman)	wa3wbu92-3-5
john@wb3ffv.ampr.org (John M Gayman)	wa3wbu 91-10
bcccix!jfish@dsinc.uucp (John T Fish)	ka3wdy 92-12-
13	
wells!bcccix!jfish (John T Fish)	ka3wdy92-12-13
cdiekman@ftsmhstn-hsc.army.mil (Clarke L Diekmann)	k3wgf 92-10-11
uunet!alux2.att.com!hank (Hank S Pustarfi Jr)	k3wgv 92-2-17
grimes@capsrv.jhuapl.edu (John E Grimes Jr)	kd3wy 92-6-17
jeg@ddsd2.jhuapl.edu (John E Grimes Jr)	kd3wy 92-6-17
rachiele@NADC.NADC.NAVY.MIL (Jim Rachiele)	ne3x 91-12-7
Michele Ann Cimbala@cup.portal.com (Michele Ann Cimbala)	wk3x 92-3-28
cole%tomcat@tomcat.rd.ray.COM (J Brad Cole)	k3xl 92-7-26
phred@well.sf.ca.us (Fred A Heutte)	w3xy 91-10
dearnsha@wizard.worldbank.org (Darrell A Earnshaw)	nr3y 92-8-14

dearnshaw@worldbank.org (Darrell A Earnshaw)	nr3y 92-10-6
seb9551@cuphub.cup.edu (Mark A Sebeck)	ka3yggj 92-11-
3	
ket@homxb.att.com (Keller E Taylor Jr)	wa3ysu 92-10-
1	
att!keller.taylor (Keller E Taylor Jr)	wa3ysu 92-10-
1	
ket@cbnews.att.com (Keller E Taylor Jr)	wa3ysu 92-10-
1	
davide+@cs.cmu.edu (David A Eckhardt)	ka3yai 91-12-
6	
jpp@ecl.psu.edu (Joe P Portelli)	wa3ydc91-12-31
brill@unagi.cis.upenn.edu (Eric D Brill)	ka3yko92-2-16
louie@sayshell.umd.edu (Louis A Mamakos)	wa3ymh92-12-24
ms@space.mit.edu (Mark J Shelhamer)	wa3yno91-11-18
dehart@darth.pgh.pa.us (Edward C DeHart)	wa3yoa92-12-24
dehart@vader.cert.sei.cmu.edu (Edward C DeHart)	wa3yoa91-10
russellf@wb3ffv.ampr.org (Russell S Finn)	wa3ysw91-11-3
bill@platypus.uofs.edu (Bill F Gunshannon)	kb3yv 92-9-13
bill@tuatara.uofs.edu (Bill F Gunshannon)	kb3yv 92-9-13
bill@prijat.cs.uofs.edu (Bill F Gunshannon)	kb3yv 92-8-7
bill@uofs.uofs.edu (Bill F Gunshannon)	kb3yv 92-9-13
bill@triangle.cs.uofs.edu (Bill F Gunshannon)	kb3yv 92-10-18
bill@cs.uofs.edu (Bill F Gunshannon)	kb3yv 92-10-18
TPDugan@dockmaster.ncsc.mil (Tim P Dugan Jr)	ka3yyp91-12-20
jbloom@arrl.org (Jon R Bloom)	ke3z 92-6-29
skitch@nadc.navy.mil (Marty Squicciarini)	nr3z 92-8-6
zben@ni.umd.edu (Charles B Cranston)	ka3zdf 92-8-7
acc@ecl.psu.edu (Tony Canike)	ka3zph 92-1-
5@	
mrbl@cbnewsh.cb.att.com (Maurice R Baker)	wa3zxo92-6-17
og@access.digex.com (Gary Goldberg)	ka3zyw92-6-11@
## US 4 District	
geiger@na.NOvell.COM (James Ed Geiger Jr)	kd4ab 91-10
##34000@p0.f1.n310.z199.nacjack.gen.nz (Bobby Lee Bennett Jr)	n4abu 92-2-
24	
andy@access.digex.com (Andrew M Cohn)	k4adl 92-6-2
BRITTINGHAM.RICHARD_A@FORUM.VA.GOV (Richard A Brittingham)	wd4aef92-12-19
bh@eng.auburn.edu (Brian K Hartsfield)	kd4aej 92-3-3
clark@brahms.AMD.COM (Brad D Clark)	np4ai 91-10
rex@lgp.b23b.ingr.com (Rex A Simmons)	kd4alu 92-2-4
mjmccorm@eos.ncsu.edu (Michael J McCormick)	ac4an 91-12-6
gt6749c@prism.gatech.EDU (Thomas B James)	kd4apz92-5-12
mjung@coplex.com (Mike G Jung)	wd4arm 92-3-3
zawodny@arbd0.larc.nasa.gov (Dr Joseph M Zawodny)	kd4asv91-10@
CURTIN@NKUVAX.BITNET (Daniel J Curtin)	kf4av 92-6-11
doc@garfield.catt.ncsu.edu (Jeffrey M Smith)	kd4ayh92-7-8
allen@km4ba (Allen A Barrow)	km4ba 92-6-3
alan@km4ba.uucp (Alan A Barrow)	km4ba 92-9-23
jab@hpuerca.atl.hp.com (Alan A Barrow)	km4ba 92-9-23
jlmbrt@hubcap.clemson.edu (Jerry R Lambert)	n4bao 91-10
root@yatespc.jobsoft.com (Scott S Yates)	n4bbb 92-12-1
root@yatespc.raider.net (Scott S Yates)	n4bbb 92-12-21
70272.2522@CompuServe.Com (Scott S Yates)	n4bbb 92-12-21
jmcoving@mosaic.uncc.edu (John M C Covington III)	wn4bbj92-9-20
jmcoving@unccsun.uncc.edu (John M C Covington III)	wn4bbj92-9-20
3426957@mcimail.com (John M C Covington III)	wn4bbj92-9-20

pncsbrh@ccvax1.ncsu.edu (Brian R Hammill)	kd4bfj92-6-4
brhammil@eos03a-16pa.eos.ncsu.edu (Brian R Hammill)	kd4bfj92-5-16
brhammil@eos.ncsu.edu (Brian R Hammill)	kd4bfj 92-6-4
mark@dinsdale.ARMstrong.EDU (Mark S Eversol)	kd4bnf91-10
markars@ti1500.tss.peachnet.EDU (Mark S Eversol)	kd4bnf91-10
root@dinsdale.ARMstrong.EDU (Mark S Eversol)	kd4bnf91-10
PCJ3053%TNTECH.BITNET@cunyv.cuny.edu (Chris C Jolly)	kd4bns91-12-8
kak@CygX3.USno.navy.MIL (Kerry A Kingham)	wa4bqm92-2-13
uka068@ukcc.uky.edu (Sam T Newcomb)	kc4bqr92-5-6
gingell@aurw90.UUCP (Mike J Gingell)	kn4bs 91-12-18
gingell@aurw19.UUCP (Mike J Gingell)	kn4bs 91-10
djb@mailier.cc.fsu.edu (David J Brightbill)	kd4btc91-10
jrr@scamp.concert.net (Joe R Ragland)	w4bz1 92-8-5
ragee@vdoe386.vak12ed.edu (Randy T Agee)	wb4bzx93-1-6
single@bnr.ca (John Rob Singleton Sr)	wb4cdw 92-2-6
bcobb@wkuvx1.bitnet (Bill A Cobb)	ka4c1192-2-13
rdbrow01@ulkyvx.louisville.edu (Rick D Brown)	kd4clq93-1-21
larryu@n4vu.UUCP (Theophilus [Larry] B Underwood III)	n4ciw 92-5-10
plymale@groupw.cns.vt.edu (Bill O Plymale)	kd4ciy92-6-3
white@gizmo.rti.org (Mary [Liz] E White)	ko4ck 92-10-1
M.MURPHREE@<GENie> (Mike A Murphree)	n4cnw 92-9-5
nick@sunpix.East.Sun.COM (Nick N England)	kd4cpl91-12-12
hernandez@odixie.enet.dec.com (Manny Hernandez)	kd4cpr91-12-6
jon@Turing.ORG (Jon Gefaell)	kd4cqy 92-8-8
mebly@eng.umd.edu (Mark E Bailey)	kd4d 92-6-2
ce202a2@prism.gatech.EDU (Peter L Thomas)	kd4dau91-10
acourt@lunatix.uucp (Allan L Courtney)	kd4dbn 91-10
A.COURTNEY@<GENie> (Allan L Courtney)	kd4dbn 92-9-5
ksj@turing.acs.virginia.edu (Kennith Scott Johnson)	kd4dcy91-10
freyr!pakers@netcom.com (Phillip L Akers)	wa4dde92-12-24
pakers@netcom.com (Phillip L Akers)	wa4dde92-12-24
freyr!pakers@netcomsv.netcom.com (Phillip L Akers)	wa4dde92-12-24
jfs@beno.CSS.GOV (Jim F Scheimer)	kd4dez92-2-29
trapps@hpcc01.corp.hp.com (Stephen M Trapp)	n4dg 92-12-11
steve@hpoemb.sj.hp.com (Steve M Trapp)	n4dg 92-12-11
ROBERTT@ukcc.uky.edu (Robert T Williamson)	w4dhk 92-2-14
fred-mckenzie@ksc.nasa.gov (Fred M McKenzie)	k4dii 92-9-1
der@hpuerca.atl.hp.com (Dave E Ritchie III)	n4djs 92-12-11
biby@seas.gwu.edu (Rich P Biby)	kd4dsx 92-12-
26	
jcw@kd4dts.dixie.com (John Chris Wren)	kd4dts 92-9-
11	
TSDIMO%GOR1@leav-emh.army.mil (Larry H Carr)	aa4du 91-10
pazar@hpnmdla.sr.hp.com (Steve Pazar)	wa4dut 92-8-
15	
fred@coplex.com (Fred A Farmer)	kd4dyl 92-2-4
ggjns@knuth.MTSU.EDU (John N Schmidt Jr)	kd4eai92-12-1
jns@mjbtn.jobsoft.com (John N Schmidt Jr)	kd4eai92-5-16
bobscott@access.digex.com (George Bob Scott)	kd4ebm92-8-9
bobscott@digex.com (George Bob Scott)	kd4ebm 92-8-9
73125.1437@Compuserve.COM (George Bob Scott)	kd4ebm92-8-9
jdt@kd4edw.uucp (James D Taylor)	kd4edw92-9-4
jdt@kd4edw.dixie.com (James D Taylor)	kd4edw 92-9-4
hoffmanmk@stat.appstate.edu (Marvin K Hoffman)	kd4egv92-1-8
blombardi@x102c.ess.harris.com (Bob Lombardi)	wb4ehs91-10
72356.441@CompuServe.COM (Jack E Davis)	wa4ejr 93-1-5
wa4ejr@tapr.ampr.org (Jack E Davis)	wa4ejr93-1-5

nmodena@unity.ncsu.edu (Stephen A Modena)	ab4e1 91-12-20
andrews@andrews.salem.ge.com (Peter F Andrews)	wa4eog92-12-4
andrewspf@salem.ge.com (Peter F Andrews)	wa4eog92-12-4
dwilson@s850.mwc.EDU (David L Wilson)	ko4eq 91-10@
dstone@bnr.ca (Danny Stone)	wb4ety 92-3-
26	
dmacdona@mizar.usc.edu (Douglas M MacDonald)	w4fh 91-10
aroeth@usasoc.soc.mil (Andy J Roth Jr)	kd4fhf 92-1-3
jackb@mdd.comm.mot.com (Jack S Brindle)	wa4fib 91-11-
3	
GwRepRandy@AOL.COM (Justin Randall Padawer)	wa4fjf92-11-16
rpadawer@utkvx2.utk.edu (Justin Randall Padawer)	wa4fjf92-10-10
rpadawer@utkvx3.utk.edu (Justin Randall Padawer)	wa4fjf92-11-16
GWREPRANDY@UTKVX.UTK.EDU (Justin Randall Padawer)	wa4fjf92-8-12
RPADAWER@UTKVX.UTK.EDU (Justin Randall Padawer)	wa4fjf92-11-16
regmad@gsusgi2.gsu.edu (Michael A de Kraker)	kd4fk92-6-3
hgpeach@ca.uky.edu (Harold G Peach Jr)	n4flz 92-5-6
hgpeach@ms.uky.edu (Harold G Peach Jr)	n4flz 92-5-10
buchanan@bme8.utmem.EDU (Jack W Buchanan Jr)	k4frs 92-10-27
buchanan@cable.utmem.EDU (Jack W Buchanan Jr)	k4frs 92-12-18
buchanan@bme1.utmem.edu (Jack W Buchanan Jr)	k4frs 92-12-18
adair@msa3b.UUCP (Owen J Adair Jr)	wd4fsu92-5-11
adair@dbs.com (Owen J Adair Jr)	wd4fsu 92-8-
20	
jts@bselab.bls.com (Jere T Sandidge)	k4fum 92-11-1
gb@cs.unc.edu (Thomas Gary Bishop)	wa4fut91-10
gb@dixie.cs.unc.edu (Thomas Gary Bishop)	wa4fut92-11-2
jlnance@eos.ncsu.edu (James Lewis Nance)	kb4fxd92-5-10
benjy@benjy.cc.vt.edu (Ben E Cline)	kd4foi92-7-20
att!cbtsp!ars (Allen R Shuff)	ai4g 92-6-11
rdkeys@ccvrl.cc.ncsu.edu (Robert D Keys)	na4g 91-10
jrs2p@amsun26.apma.Virginia.EDU (Jonathan R Senning)	kd4gag91-11-21
jrs2p@amsun.apma.Virginia.EDU (Jonathan R Senning)	kd4gag92-9-17
jrs2p@virginia.edu (Jonathan R Senning)	kd4gag 92-9-
17	
turini@gdls.UUCP (William L Turini)	ka4gav92-5-16
turini@gdls@ilium.troy.msen.com (Bill Turini)	ka4gav92-5-16
D.DEICHER@<GENIE> (Dave A Deicher)	kd4gax92-9-5
KENDALLG@vtvml.cc.vt.edu (Gary F Kendall)	kb4gcf92-1-10
mtbb133@ms.uky.edu (Darrell E Epperson)	kd4gdn 91-12-
10	
JHW@gizmo@rti.rti.org (Joe White)	wa4gir92-10-1
jhw@rti.rti.org (Joe H White)	wa4gir 92-12-
30	
jhw@gizmo.rti.org (Joe H White)	wa4gir 92-12-
30	
nchambers@hayes.uucp (Norman T Chambers)	n4gjjg 91-11-15
stuart@ee.fit.edu (William M Stuart)	kd4gkk 92-10-
6	
sampson@ivy.cs.unca.edu (Daryl E Sampson)	km4go/kb4fwu92-12-
13	
sampson@hominy.cs.unca.edu (Daryl E Sampson)	km4go/kb4fwu92-12-
15	
sampson@oteen.cs.unca.edu (Daryl E Sampson)	km4go/kb4fwu92-12-
15	
sampson@cs.unca.edu (Daryl E Sampson)	km4go/kb4fwu
92-12-15	

ccoprfrm@prism.gatech.EDU (Monte C Freeman)	kc4gpw92-5-16
D.WILLIAMS119@<GENIE> (Don L Williams Jr)	ab4gr 92-9-5
pturner@eng.auburn.edu (Patton M Turner)	kb4grz92-6-2
jwl@cray.com (Jim W Lynch)	k4gvo 92-1-7
jwl@sedist.cray.com (Jim W Lynch)	k4gvo 92-12-19
jwl@eastrg1.cray.com (Jim W Lynch)	k4gvo 92-7-8
jwl@ferrari.cray.com (Jim W Lynch)	k4gvo 92-12-19
ertem@acc.fau.edu (Mehmet Can Ertem)	kd4gwk 92-2-6
cfs@hodgkin.mc.duke.edu (Charles Frank Starmer Jr)	kb4gz 93-1-5
cfs@rodney.mc.duke.edu (Charles Frank Starmer Jr)	kb4gz 93-1-5
ag821@yfn.ysu.edu (Jeff M Gold)	ac4hf 92-10-15
JMG@TNTECH.BITNET (Jeff M Gold)	ac4hf 92-12-8
JMG@TNTECH.EDU (Jeff M Gold)	ac4hf 92-12-8
wht@n4hgf.Mt-Park.GA.US (Warren H Tucker III)	n4hgf 92-9-16
dannie@coplex.com (Dannie J Gregoire Jr)	kd4hgi91-12-12
ASPRUIL1@UA1VM.UA.EDU (Allen L Spruill)	n4hjc 92-7-20
holt@sdd.hp.com (Alfred Holt Mebane IV)	n4hr 92-5-14
megabyte@chinet.chi.il.us (Mark E Sunderlin)	kd4hri92-12-28
cs00wlh@unccvax.uncc.edu (William Luke Hamaty)	kd4hse92-2-21
70324.1010@CompuServe.COM (William Luke Hamaty)	kd4hse92-9-24
ee05cdm@unccvax.uncc.edu (Charles D Morgan)	kd4hsj92-3-3
cdmorgan@unccsun.uncc.edu (Charles D Morgan)	kd4hsj92-9-19
cdmorgan@opticslab1.uncc.edu (Charles D Morgan)	kd4hsj92-8-21
randy@secola.Columbia.NCR.COM (Randy M Mechling)	wa4hox91-10
n4hy@tang.UUCP (Bob W McGwier Jr)	n4hy 93-1-9
n4hy@growler.UUCP (Bob W McGwier Jr)	n4hy 93-1-15
n4hy@idacrd.UUCP (Bob W McGwier Jr)	n4hy 92-9-24
mac@idacrd.UUCP (Bob W McGwier Jr)	n4hy 91-10
n4hy@wahoo.UUCP (Bob W McGwier Jr)	n4hy 93-1-19
thompson@cactus.org (Charles D Thompson)	wb4hvd92-6-31
g-taylor4@tamu.EDU (Greg S Taylor)	kd4hz/wa9otd92-12-
4	
CWAGAR@AUDUCVAX.BitNet (Clayton Wagar)	kd4idn 92-6-
11@	
cwagar@ducvax.auburn.edu (Clayton Wagar)	kd4idn92-6-11@
cheech@med.unc.edu (Gregory B Young)	kd4iia 92-11-
15@	
BDY5049%TNTECH.BITNET (Bryan D Young)	kd4iic 92-4-
25@	
smb@bselab.bls.com (Stephen M Blust)	wa4ipi 92-11-
29	
tfugate@ca.uky.edu (Terry A Fugate)	wn4isx92-5-6
dwilson@s850.mwc.EDU (David L Wilson)	ac4iu 92-5-21
tskelton@ncrclm.ClemsonSC.NCR.COM (Tom E Skelton Jr)	wb4iux92-9-11
COP70090@UCF1VM.BITNET (Mitch E Winkle)	ac4iy 92-7-20
nmr1248@ariel.lerc.nasa.gov (Nancy Rabel)	kc4iyd91-12-7
nmr1248@venus.lerc.nasa.gov (Nancy Rabel)	kc4iyd92-8-1
jks@giskard.uthscsa.edu (Jack K Spitznagel Jr)	kd4iz 92-2-18
rejo@gnv.ifas.ufl.edu (Robert E Johnson)	wb4jcm91-11-3
re_sims@vax.muskingum.edu (Jim K Sims Sr)	n4jdp 92-11-29
re_sims@vax.cns.muskingum.edu (Jim K Sims Sr)	n4jdp 92-11-29
Jeff.Anderson@launchpad.unc.edu (Jeffrey Brian Anderson)	kd4jia93-1-11@
johng.all_proj@mot.com (John M Gilbert)	ka4jmc 91-11-
13	
johng.all_proj@ecs.comm.mot.com (John M Gilbert)	ka4jmc91-12-5
johng@ecs.comm.mot.com (John M Gilbert)	ka4jmc 92-10-
10	

mcnc.org!concert.net!abc@decwrl.uucp (Alan B Clegg)	kd4jml92-2-4@
abc@concert.net (Alan B Clegg)	kd4jml 92-10-
29@	
abc@banjo.concert.net (Alan B Clegg)	kd4jml 92-9-
13@	
kd4jml.ampr.org!kd4jml@gateway.com (Alan B Clegg)	kd4jml92-12-24@
bstp_ltd@uhura.cc.rochester.edu (Brian L Stamper)	kb4jpo92-5-16
jschonk@msd.gatech.edu (John B Schonk)	n4jqd 91-12-8
matd!jschonk@gatech.uucp (John B Schonk)	n4jqd 91-12-8
robichau@freedom.msfc.nasa.gov (Paul Robichaux)	kd4jzg92-3-4@
mojo@netcom.COM (Morris M Jones)	aa4kb 91-10
sweiler1@cc.swarthmore.edu (Samuel Weiler)	kd4khy92-9-27@
JEMMONS.1@<GENIE> (John C Emmons Jr)	wd4kke 92-9-5
GARLOUGH@TGV.COM (Trey Garlough)	wn4kkn92-10-10
BRIANLANTZ@delphi.COM (Brian A Lantz)	ko4ks/kd4bgh
93-1-20	
DFREY@isc.scarolina.edu (David Frey)	kq4kt/kd4nar
93-1-23*	
dfrey@bigbird.csd.scarolina.edu (David Frey)	kq4kt/kd4nar92-6-
4*	
rnutter@ca.uky.edu (Ron I Nutter)	ka4kyi92-5-6
moorer@infonode.ingr.com (William Randy Moore)	ks4l 91-10
pbrock@usasoc.soc.mil (Perry Brock Jr)	n4lbb 92-1-3
srm@world.std.com (Stevens R Miller)	wa4lda 92-10-
11	
Will.Snyder@bbs.oit.unc.edu (James William Snyder Jr)	kb4lfd91-11-21
SNYDER@uncvxl.acs.unc.EDU (James William Snyder Jr)	kb4lfd92-1-26
david@wilson.JOBSOFT.COM (David R Wilson)	wb4lho92-5-16
jbs@rti.rti.org (Joe B Simpson)	kd4llv 92-5-
23@	
jbs@ee.egr.duke.edu (Joe B Simpson)	kd4llv92-12-1@
bcoleman@hayes.uucp (George Bill Coleman)	aa4lr 91-11-12
bcoleman@hayes.com (George Bill Coleman)	aa4lr 92-8-15
krandy@hubcap.clemson.edu (Randy B Kaufman)	wd4luj92-5-16
zawodny@arbd0.larc.nasa.gov (Dr Joseph M Zawodny)	ko4lw 92-9-4
rsj@wa4mei.ampr.org (Randy S Jarrett)	wa4mei 92-6-3
rsj@wa4mei (Randy S Jarrett)	wa4mei 92-6-3
PORTER04%TSU.BITNET@cunyv.cuny.edu (Curt W Porter)	n4mey 92-11-15
jcockey@nswc-wo.nswc.navy.mil (Joshua H Cockey Jr)	w4mhq 92-12-24
jcockey@relay.nswc.navy.mil (Joshua H Cockey Jr)	w4mhq 92-12-4
shaw@email.ncsc.navy.MIL (Bob A Shaw)	ac4mi 92-8-16
steve@vulture.ksc.nasa.gov (Steve F Schindler)	wd4mjj92-10-6
gp310ad@prism.gatech.EDU (Robert M Duckworth)	wb4mnf92-9-7
eckman@eos1.larc.nasa.gov (Richard S Eckman)	ko4mr 93-1-11
eckman@asdsun.larc.nasa.gov (Richard S Eckman)	ko4mr 91-10
eckman@dobson.larc.nasa.gov (Richard S Eckman)	ko4mr 93-1-11
waters@nddsun1.sps.mot.com (Mike A Waters)	aa4mw 91-10
doughty@PCS.CNU.EDU (David C Doughty Jr)	n4mya 92-9-30
reese@usasoc.soc.mil (Alton Reese Mozingo Jr)	n4myn 92-1-3
SGU@stc10.ctd.ornl.gov (Sally A Guthrie)	wb4ndx92-5-1
GUTHRIES@utkvx.utk.EDU (Sally A Guthrie)	wb4ndx92-5-28
dbennett@wb3ffv.ampr.org (Don H Bennett Jr)	k4ngc 91-11-3
rwham00@ukpr.uky.edu (Robert W Ham)	kc4ngf92-5-6
Mahan_Stephen@lanmail.ncsc.navy.MIL (Mahan Stephen)	kd4ngu92-5-28@
jhobson@su19f.harris-atd.com (James Harvey Hobson Jr)	wb4npl92-11-22
jhobson@d100g.ess.harris.com (James Harvey Hobson Jr)	wb4npl92-5-12
jhobson@SU19F.UUCP (James Harvey Hobson Jr)	wb4npl92-11-22



weakly@usasoc.soc.mil (John C Weakly)	n4nta 92-1-3
dug@kd4nc.uucp (Doug B Drye)	kd4nc 91-12-10
currier@duke.cs.duke.edu (Bob D Currier)	n4nxq 91-10
javogt@batph39.Berkeley.EDU (John V Vogt III)	km4ob 93-1-9
javogt@bnr.ca (John V Vogt III)	km4ob 93-1-9
javogt@batph35.Berkeley.EDU (John V Vogt III)	km4ob 92-1-17
javogt@batph60.Berkeley.EDU (John V Vogt III)	km4ob 92-2-11
clay@minerva.cis.yale.edu (Torsten [Rudolf] L Clay)	n4ogw 92-8-8
jim@ka4ojn.raleigh.nc.us (Jim R Curran)	ka4ojn 92-12-
24	
FBCABAC%CFRVM.BITNET@VTVM2.CC.VT.EDU (Ross F Wilder)	n4oju 92-7-8
FBCABAC%CFRVM.BITNET@cunyv.cuny.edu (Ross F Wilder)	n4oju 92-12-2
FBCABAC@CFRVM.CFR.USF.EDU (Ross F Wilder)	n4oju 92-12-2
jhawkins@bnr.ca (John F Hawkins)	kd4okn92-6-29@
Gfoley@anniston-emh2.army.mil (Glenn Foley)	ko4ol 92-8-15@
jmd@cube.handheld.com (Jim M De Arras)	wa4ong 92-3-9
jgd@Dixie.Com (John G DeArmond)	wd4oqc 92-6-3
jgd@rsiatl (John G DeArmond)	wd4oqc 92-6-3
mad@turing.acs.virginia.edu (Mark A Day)	n4oqk 91-10
vls@cube.handheld.com (Vern L Stant)	wb4ore 92-6-
29	
wright%morekypr.BITNET@cunyv.cuny.edu (Tim Wright)	kd4ovm92-6-11@
WRIGHT@morekypr.BITNET (Tim Wright)	kd4ovm92-12-1@
WRIGHT@morekypr.UCS.D.EDU (Tim Wright)	kd4ovm 92-12-
1@	
tarumph@uncc.edu (Timothy Allen Rumph)	kd4ows 92-11-
21@	
tarumph@mosaic.uncc.edu (Timothy Allen Rumph)	kd4ows92-11-21@
gregm@hpcvra.cv.hp.com (Greg J May)	kb4ox 92-6-2
swamp@nrtpa037.bnr.ca (H Alan Harp)	k4pb 92-1-7
aharp@bnr.ca (H Alan Harp)	k4pb 92-2-3
harp@bnr.ca (H Alan Harp)	k4pb 93-1-9
kevin@cseic.saic.com (Kevin E Brown)	n4pbk 91-12-7
dooley%muppet.DEcnet@consrt.rok.com (Mike S Dooley)	ke4pc 91-10
donl@gracilis.com (Don G Lemley Jr)	n4pcr 92-5-24
M14494@mwvm.mitre.org (Mike J White)	n4pdy 93-1-6
sam@wa4phy.async.com (Sam W Drinkard III)	wa4phy93-1-24
sam@galois.nscf.org (Sam W Drinkard III)	wa4phy93-1-14
wa4phy!sam@galois.nscf.org (Sam W Drinkard III)	wa4phy92-10-1
sam@wa4phy.ampr.org (Sam W Drinkard III)	wa4phy93-1-18
sam@wa4phy.NSCF.Org (Sam W Drinkard III)	wa4phy92-11-20
sam@wa4phy.uucp (Sam W Drinkard III)	wa4phy 93-1-
18	
clay-rudolf@CS.YALE.EDU (Torsten [Rudolf] L Clay)	n4ogw 92-8-8
RLSNSDL@ducvax.auburn.edu (Robert L Schafer)	ka4pkb92-3-2
rlsnsdl@eng.AUburn.EDU (Robert L Schafer)	ka4pkb92-5-1
meharp01@vlsi.louisville.edu (Michael E Harpe)	n4ple 91-12-7
MEHARP01%ULKYVX.BITNET@cunyv.cuny.edu (Michael E Harpe)	n4ple 91-12-7
jackhill@jackatak.raider.net (Jack G F Hill)	w4ppt 92-12-24
76427.31@CompuServe.Com (Jack G F Hill)	w4ppt 93-1-14
root@jackatak.raider.NET (Jack G F Hill)	w4ppt 93-1-14
eddie@hssc.scarolina.edu (Hollis Eddie King Jr)	n4psh 91-12-7
MEIDLING@ACAVAX.LYNCHBURG.EDU (August Meidling Jr)	n4pvu 92-9-21
74130.2367@Compuserve.Com (August Meidling Jr)	n4pvu 92-9-21
segrest@bobseg.enet.dec.com (Bob Segrest)	kd4pwu93-1-26@
rfa@Turing.ORG (Robert F Alexander)	kd4qbd92-7-8@
Alan@wa4qch.UUCP (William Alan Painter I)	wa4qch92-7-8

neal@lrc.edu (Neal George) 14@	kd4qel 92-7-
harper@huntsville.sparta.com (Christie Harper)	kd4qio93-1-19@
lanzo@tekelec.com (Mark Lanzo) 15@	kd4qlz 92-12-
R.PRINCE8@<GENie> (Robert C Prince III)	wa4qoq 92-9-5
dlr@testeng.ksc.nasa.gov (Doug L Reed)	n4qvy 92-10-6
ckslf@knuth.mtsu.edu (Kelly L Fulks) 24	kc4rdj 93-1-
enge@almaden.ibm.com (H Roy Engehausen)	aa4re 92-12-26
ENGE@ALMVMA.VNETXYZ (H Roy Engehausen)	aa4re 92-8-5
keller@usasoc.soc.mil (Al Keller)	wa4reo92-1-3@
3113659@mcimail.com (Frank M Butler Jr)	w4rh 92-6-29
JEAST@uga.cc.uga.EDU (Jerry W East)	wb4rhu92-12-2
cullen@orph23.phy.ornl.gov (David Cullen)	kd4rib92-12-11@
cullen@orph01.bitnet (David Cullen)	kd4rib92-12-11@
cullen@orph14.phy.ornl.gov (David Cullen)	kd4rib92-12-11@
JSCHWITZ@eclx.psu.edu (Jay Schwitz)	kd4rlm92-12-24@
Michael.Baumann@f60.n374.z1.fidonet.org (Michael Baumann)	kd4rqv92-9-19@
chuck@n4rsy (Chuck W Hicks)	n4rsy 92-6-3
RSTACKHOUSE@JAGUAR.ESS.HARRIS.COM (Randy E Stackhouse) 10	n4rtl/kb4qxq93-1-
wordy@caliban.Corp.Sun.COM (Steven K Roberts)	n4rve 92-5-23
wordy@lorien.qualcomm.com (Steven K Roberts)	n4rve 92-7-9
wordy@bikelab.Corp.Sun.COM (Steven K Roberts)	n4rve 92-2-4
Steve.Roberts@bikelab.Corp.Sun.COM (Steve K Roberts)	n4rve 92-5-7
fritz@uva386.schools.virginia.edu (Joseph D Fritz)	kd4rwx92-11-21@
eri316@tijk02.uucp (Ed R Ingraham)	wx4s 92-6-2
UWELTO@UNC.OIT.UNC.EDU (John M Welton)	n4sjw 92-10-13
billmcc@seanews.wa.com (Bill McCormick)	kc4skv 92-5-9
billmcc@microsoft.com (Bill McCormick)	kc4skv 92-5-9
zielke@FOZZIE.NRL.NAVY.MIL (David M Zielke)	ka4sli92-7-20
moseby@brtpa88.bnr.ca (John R Moseby) 20	ka4smc 91-12-
johnh@eng.auburn.edu (John H Henderson Jr)	n4smx 92-2-4
jfs@seismo.CSS.GOV (Jim Scheimer)	ac4sv 92-10-18@
feit@ERA.COM (Mark A Feit) 15@	kd4taj 92-11-
jbc@unx.sas.com (Jennifer Clegg)	kd4tcr92-10-29@
Tim=J.=Madden%FC%GenAv.Mlb@BANYAN9.CAcD.CR.rockwell.COM (Jim J Madden) 91-12-20	ki4tg
JREED@sctnve.sct.peachnet.EDU (John W Reed)	n4tii 91-12-7
n4tii@kd4nc.uucp (John W Reed)	n4tii 93-1-14
n4tii%kd4nc.uucp@gatech.edu (John W Reed)	n4tii 93-1-14
D.HIBBERT@<GENie> (David Hibbert)	kc4tj 92-9-5
LEELM@VXC.UNCWIL.EDU (Murrie Lee)	kd4tkb92-12-15@
mcovingt@athena.cs.uga.edu (Michael A Covington)	n4tmi 92-5-23
mcovingt@uga.cc.uga.edu (Michael A Covington)	n4tmi 92-10-8
mcovingt@aisun3.ai.uga.edu (Michael A Covington)	n4tmi 92-10-8
DCROWE@GITVM1.BITNET (Devon G Crowe)	kk4tt 93-1-24*
dhaibach@encore.com (David R Haibach) 92-12-30	ke4tu/wd4con
dante@tecnet1.jcte.jcs.mil (William Mike Dante)	kn4ty 91-10
TBARNETT@lexmark.com (Albert Tyler Barnett)	n4ty 92-7-14
johnr@mik.uky.edu (John S Roberts Jr) 29@	kd4ubm 92-11-
mtbb136@ms.uky.edu (John S Roberts Jr)	kd4ubm 92-11-

29@

johnr@nx22.mik.uky.edu (John S Roberts Jr)  
johnr%agnostic@ms.uky.edu (John S Roberts Jr)  
L.MANN@<GENie> (Larry A Mann)  
cchapman@matd.gatech.edu (Chuck H Chapman)  
ed.jelf@ukwang.uky.edu (Ed P Jelf Jr)  
harrism@aquila.rtp.dg.com (Mike Harris)  
harris@rtp.dg.com (Mike Harris)  
harrism@zero.rtp.dg.com (Mike Harris)  
patterso@anser.ORG (Gary M Patterson)  
tluttrell@homer.msfc.nasa.gov (Terry M Luttrell)  
Werner@utkvx.utk.edu (Bob T Werner Jr)  
werner@utkvx3.utk.edu (Bob T Werner Jr)  
crisp@ecsvax.uncecs.edu (Russ C Crisp)  
CRISP@WCUVAX1.WCU.EDU (Russ C Crisp)

24

Rmcellig%msrd@redstone-emh2.army.mil (Robert D McElligott)  
sonny@sonny.ufnet.ufl.edu (Arnold E Sonny Johnson)  
protein@garfield.catt.ncsu.edu (Chris K Blackmon)  
Terry.Murphy@bbs.oit.unc.edu (Terry J Murphy)  
Terry.Murphy@launchpad.unc.edu (Terry J Murphy)  
gt3491a@prism.gatech.EDU (John C Mayson IV)  
CDAY@<GENie> (Charlie E Day Jr)  
jkl141@tijk02.uucp (John K Leroy)  
rliles@spuds.mlb.semi.harris.com (Ray H Liles Jr)  
rliles@heimdall.mlb.semi.harris.com (Ray H Liles Jr)  
gedwards@ncratl.AtlantaGA.NCR.COM (Gordon L Edwards III)  
S.JENKINS5@<GENie> (Stephen A Jenkins)  
JPB7946%TNTECH.BITNET@mitvma.mit.edu (Jon P Brazelton)  
JPB7946%TNTECH.BITNET@cunyvms.cuny.edu (Jon P Brazelton)  
JPB7946@TNTECH.Edu (Jon P Brazelton)  
cutter@gloster.mind.org (Chris Ness)  
cutter@gloster.via.mind.org (Chris Ness)  
jism@n4vu.UUCP (John S Miller)  
ornitz@kodak.kodak.com (Barry L Ornitz)  
A.BYRNES@<GENie> (Arthur J Byrnes Jr)  
cole@jazz.concert.net (Derrick C Cole)  
cole@concert.net (Derrick C Cole)  
opfrank@ukcc.uky.edu (Frank B McCormick)  
youngwa@b8.ingr.com (Butch A Young)  
youngwa@n4wmt.b24c.ingr.com (William A Young)  
WB4WOR%UNCG.BITNET@ncsuvms.cc.ncsu.EDU (Charles Layno)  
WB4WOR@iris.uncg.EDU (Charles Layno)

16

bill@c3177208.ssr.hp.com (Bill J Chidester)  
bill@ssr.hp.com (Bill J Chidester)  
zmlek@dcatla.uucp (Larry E Kollar)  
tcamp@ecsvax.uncecs.edu (Ted A Campbell)  
nelson@seq.uncwil.edu (Jim H Nelson)  
mjb@mjbbtn.JOBSOFT.COM (Mark J Bailey)  
root@mjbbtn.JOBSOFT.COM (Mark J Bailey)  
csmjb@knuth.mtsu.edu (Mark J Bailey)  
root@raider.raider.net (Mark J Bailey)  
neil.j@pro-magic.cts.com (Neil P Johnson)  
gbastin@x102c.harris-atd.com (Gary L Bastin)  
gbastin@x102a.ess.harris.com (Gary L Bastin)  
radneyt@iccgcc.decnnet.ab.com (Thomas Lee Radney)

kd4ubm92-12-25@  
kd4ubm92-12-25@  
n4ugn 92-9-5  
wb4uih92-8-8  
kc4ujm 92-5-6  
km4ul 92-3-28  
km4ul 92-1-7  
km4ul 91-12-6  
aa4ur 93-1-18  
ke4ur 91-10  
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n4vgk 92-2-13  
ab4vj 92-11-9  
ab4vj 92-11-9  
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wb4yaf92-2-7  
kc4ybk92-3-28

##30@UTMARTN.BITNET (Terry W Lewis)	kc4ylk92-5-16
sazerb@pnet01.cts.COM (Steve A Zerbe)	ka4ynd 92-2-
13	
tom@cherokee.UUCP (Tom S Thompson)	n4yos 91-12-7
kdj@iinus1.ibm.com (Ken D Johnson)	kc4yoz92-7-8
pswecker@med.unc.edu (Peter G St Wecker)	n4yrj 91-12-7
Curt.Phillips@f7009.n124.z1.fidonet.org (William Curt Phillips)	kd4yu 92-7-
31	
wcollin@relay.nswc.navy.mil (William Dave Collins)	kc4yyx91-10
kme@node_1f11c.bnr.ca (Ken Michael Edwards)	n4zbb 92-11-20
cnc23a@bnr.ca (Ken Michael Edwards)	n4zbb 92-11-20
brit@dobbs.MIT.EDU (Christopher Brit Gould)	kb4zbp92-6-3
brit@hagbard-celine.MIT.EDU (Christopher Brit Gould)	kb4zbp92-8-20
brit@athena.mit.edu (Christopher Brit Gould)	kb4zbp92-8-20
benchhoff@groupw.cns.vt.edu (Phil E Benchhoff)	kc4zen93-1-14
n4zfd!frodo@rutgers.uucp (Jim M Blakely)	n4zfd 91-12-7
frodo@n4zfd.uucp@rylos.n2idf.ampr.org (Jim M Blakely)	n4zfd 91-12-7
J.BLAKELY1@<GENie> (Jim M Blakely)	n4zfd 92-9-5
boyd@afsp.b30.ingr.com (Stan D Boyd Sr)	kc4zgf 92-12-
1	
tucker@sed002.enet.dec.com (David R Tucker)	kc4zgo91-12-6
dennis@nanovx (Dennis J Boylan)	n4zmq 92-6-3
dennis@nanovx.uucp (Dennis J Boylan)	n4zmq 92-9-21
mhall@ducvax.auburn.edu (Harold Mark Hall)	n4zuk 91-12-7
gary@ke4zv.uucp (Gary R Coffman)	ke4zv 92-8-2
jeplyler@uncc.edu (Jonathan E Plyler)	n4zvy/kc4qjl
92-12-5	
jeplyler@unccsun.uncc.edu (Jonathan E Plyler)	n4zvy/kc4qjl92-12-
5	
prestipw@clutx.clarkson.edu (Pete Presti)	kc4zwi91-10@
## US 5 District	
jjohn@lawton.lonestar.org (John Johnson)	kj5aa 93-1-5@
gak@n5abi.hou.tx.us (Gene A Kennedy)	n5abi 92-10-10
mjpujol@jemez.eece.unm.edu (Matt J Pujol)	wd5acr92-12-25
nix@muppet.DEcnet@consrt.rok.com (Paul N Nix)	wb5agf91-10
u1906ad@unx.ucc.okstate.edu (Martin G McCormick)	wb5agz92-2-12
martin@datacomm.ucc.okstate.edu (Martin G McCormick)	wb5agz92-10-29
mab3474@venus.tamu.edu (Myles A Barkman)	kg5ai 92-12-24
barkman@gamma.is.tcu.edu (Myles A Barkman)	kg5ai 92-7-20
mab3474@zeus.tamu.edu (Myles A Barkman)	kg5ai 92-12-24
J.SHAFER5@<GENie> (Jim J Shaffer)	ke5a1 92-9-5
dube@cpdvax.CSc.ti.COM (Dube D Todd)	ab5ap 92-12-13
KB5AWM@<GENie> (Jim D Heil)	kb5awm 92-9-5
jeff.racz@cutting.hou.tx.us (Jeff Racz)	kj5az 92-12-11@
pitt!bellcore!texbell!ark!lrark!argate!richard (Richard C Duncan)	wd5b 91-10
kurt@cs.tamu.edu (Kurt A Freiberger)	wb5bbw 93-1-
18	
paul.graziani@chaos.lrk.ar.us (Paul J Graziani)	wd5biv92-8-17
craigs@mcopn1.CSc.ti.COM (Craig S Young)	ka5bou91-10
oo7@ut-emx.uucp (Derek Wills)	aa5bt 92-11-15
oo7@astro.as.utexas.edu (Derek Wills)	aa5bt 92-11-15
oo7@emx.utexas.edu (Derek Wills)	aa5bt 92-11-15
dsterner@unkaphaed.UUCP (Don L Sterner)	kd5bt 92-3-30
ronh@sunriver.com (Ronnie D Hughes)	n5cse 92-11-15
ronh@sunriv.UUCP (Ronnie D Hughes)	n5cse 92-11-15
swilhelm@chnews (Carroll [Spence] S Wilhelm)	kb5cyx93-1-15
spence_s_wilhelm@fmccm.intel.com (Carroll [Spence] S Wilhelm)	kb5cyx

93-1-15

reed@mozart.amd.com (David F Reed)	kk5d/7j1ago/xelzdr92-3-17
johnc@llama.cactus.org (John M Crittenden)	wd5dax91-10
gdmauldin@ualr.edu (Grayson Doug Mauldin)	k5dh 92-10-22
bbx!yenta!ben@unmvax.cs.unm.edu (Ben Klausner)	n5dj1 92-12-1
ben@yenta.alb.nm.us (Ben Klausner)	n5dj1 92-12-1
tford@neptune.convex.com (Tom B Ford)	n5dom 92-9-5
tford@convex.com (Tom B Ford)	n5dom 92-9-5
NA5E@<GENie> (Larry L Ledlow Jr)	na5e 92-9-5
r.thomson3@genie.geis.com (Ollie Ramsey Thomson)	nj5e 92-11-20
r.thomson3@<GENie> (Ollie Ramsey Thomson)	nj5e 92-11-20
mkhudson@ualr.edu (Mitchell Keith Hudson)	n5eez 92-12-30
hudson@ualr.edu (Mitchell Keith Hudson)	n5eez 92-12-30
hudson%eivax@ualr.edu (Mitchell Keith Hudson)	n5eez 92-12-30
LINSCOT@RICEVM1.RICE.EDU (Stephen M Linscott)	w5egp 92-10-10
Lee.Laird@f7009.n124.z1.fidonet.org (Earnest Lee Laird)	wa5eha92-3-17
davros@ccwf.cc.utexas.edu (Clyde [Buddy] A Brannan III)	kb5elv92-1-19
tgs@genrad.com (Trevor G Smith)	ab5eu 92-7-14@
BOBPRIEZ%SLU.BITNET@ricevml.rice.edu (Robert G Priez)	wb5fbs92-2-21
BOBPRIEZ@selu.EDU (Robert G Priez)	wb5fbs92-7-8
rick@lrark.UUCP (Rick L Mobley)	wb5fdp 92-2-
18	
LRARK@GENie (Rick L Mobley)	wb5fdp 92-5-
24	
alan@adept.UUCP (Alan R Ruffer)	wb5fkh 92-8-9
adams@chuck.dallas.sgi.com (Chuck N Adams)	k5fo 92-10-10
greg@monty.b17b.ingr.com (Gregory J Montllor)	n5fsw 92-6-2
ellis@convex.com (Robert C Ellis)	kb5ftt91-12-6
stltd@rosie.uh.edu (Matthew R Mucker)	kb5fwg 92-10-
27	
stltd@elroy.uh.edu (Matthew R Mucker)	kb5fwg 92-11-
6	
T.GATES2@<GENie> (Tom W Gates)	ab5g 92-9-5
Tom.Blackwell@f7009.n124.z1.fidonet.org (Tom M Blackwell)	n5gar 92-3-17
ee5391aa@triton.unm.edu (Thomas [Duke] M McMullan Jr)	n5gax 91-10
BIEKERT@HOUMVMSCC.VNET.IBM.COM (Bob E Biekert)	ka5glx91-11-18
KA5GLX@<GENie> (Bob E Biekert)	ka5glx 92-9-5
plesteri@m11.SEws.wpafb.af.MIL (Robert I Plested)	n5gna 91-10
rtssmith@memstvx1.memst.edu (Richard D Smith)	ki5gt 91-12-7
WFAUST@NOMVS.LSUMC.EDU (Wm Bryant Faust IV)	n5gwf 92-7-20
jbromley@joshua.intel.com (James E Bromley)	w5gyj 92-11-27
jbromley@sedona.intel.com (James E Bromley)	w5gyj 92-11-27
sbrown@charon.dseg.ti.com (Steve E Brown)	wd5hcy92-12-24
hurta@hcvdl.CSc.ti.COM (Dwaine S Hurta)	n5hd 91-11-13
haynes@nrl.navy.mil (John K Haynes)	n5hei 91-10
hhg9751@tamsun.tamu.edu (Herb H Graeber)	k5hg 92-5-28
ben@val.com (Ben J Thornton)	wd5hls 93-1-
18	
ben@VAL.val.COM (Ben J Thornton)	wd5hls93-1-18
cs.utexas.edu!val!ben (Ben J Thornton)	wd5hls 93-1-
18	
jeff@CORONA.AUE.COM (Jeff A Holly)	n5hsj 92-7-14
terry@unx.ucc.okstate.edu (Terry J Klarich)	n5hts 92-3-2
sds@sat.datapoint.com (Steve D Sternitzke)	ns5i 92-5-7
j.graham@ieee.org (James D Graham)	n5ial/9 92-12-
18	
grahj@gagme.chi.il.us (James D Graham)	n5ial/9 92-10-

19	jim@n5ial.chi.il.us (James D Graham)	n5ial/9	92-12-
18			
	jim@chi.amoco.com (James D Graham)	n5ial/9	91-11-
5			
	jim@n5ial.mythical.com (Jim D Graham)	n5ial/9	92-12-
18			
	grahj@valinor.mythical.com (Jim D Graham)	n5ial/9	92-12-
18			
	kelly@naodpc.SINet.SLB.COM (Paul L Kelly)	ke5ib	91-10
	chris@hplvec.LVLD.HP.COM (Chris P Kelly)	wd5ibs	91-10
	KI5IC@sunova.ssc.gov (Frank W Stocker)	ki5ic/n2jcc	92-12-
17			
	stocker@sscvx1.ssc.gov (Frank W Stocker)	ki5ic/n2jcc	92-12-
17			
	mcl9337@grouxo.tamu.edu (Mark C Lowe)	kb5iii	91-12-
6			
	Christopher.Boone@farwest.FidoNet.Org (Christopher W Boone)	wb5itt	91-10
	greg@vaxb.acs.unt.edu (James Greg Jones)	wd5ivd	91-10
	Greg.Jones@ee.SUrrrey.ac.UK (James Greg Jones)	wd5ivd	92-5-29
	72047.3455@CompuServe.COM (James Greg Jones)	wd5ivd	93-1-5
	wd5ivd@tapr.ampr.org (James Greg Jones)	wd5ivd	93-1-5
	jreese@NeoSoft.com (Jim L Reese)	wd5iyt	92-8-15
	jreese@sugar.neosoft.com (Jim L Reese)	wd5iyt	92-8-
15			
	jim@kf5iw.lonestar.org (Jim R Blocker)	kf5iw	92-8-7
	jbus@sabea-oc.af.mil (Joe G Buswell)	k5jb	92-11-27
	harold@cc.gatech.edu (Harold C Forbes)	n5jcm	92-9-23
	harold@terminus.gatech.edu (Harold C Forbes)	n5jcm	92-9-23
	etxmalk@garbo.ericsson.se (Alan S Malkiel)	ke5jl	91-10
	davidb@ce.washington.edu (David W Barts)	n5jrn/ka5uay	92-12-
4			
	dxxb@hardy.u.washington.edu (David W Barts)	n5jrn/ka5uay	92-12-
4			
	gerry@mec.jsc.nasa.gov (Gerry Creager)	n5jxs	91-12-14
	gcreager@gothamcity.uucp (Gerry Creager)	n5jxs	92-11-29
	gcreager@gothamcity.jsc.NASA.GOV (Gerry Creager)	n5jxs	93-1-18
	pete@ctbilbo.UUCP (Carl Pete Ritter)	wb5kly	92-12-
25			
	uunet!ctbilbo!pete (Carl Pete Ritter)	wb5kly	92-12-
25			
	borm@cs.ubc.ca (Eric A Borm)	kb5kmv	92-2-
29			
	jpd@ucs.usl.edu (James P Dugal)	n5knx	92-8-8
	miles@emx.cc.utexas.edu (Miles L Abernathy)	n5kob	92-9-29
	rrw@naucse.cse.nau.edu (Robert Reid Wier)	wb5kxh	93-1-5
	rrw@sunset (Bob Reid Wier)	wb5kxh	92-11-
21			
	rrw@sunset.cse.nau.edu (Bob Reid Wier)	wb5kxh	93-1-5
	Andy.Mans@f7009.n124.z1.fidonet.org (Andy J Mans)	n5ldi	92-7-14
	terry@red.uucp (Terrence R Redding Sr)	wb5lmj	92-10-
29			
	terry%red@lawton.lonestar.org (Terrence R Redding Sr)	wb5lmj	93-1-5
	uunet.UU.NET!red!terry@decwrl.uucp (Terrence R Redding Sr)	wb5lmj	93-1-5
	rwsys!lawton!red!terry (Terrence R Redding Sr)	wb5lmj	93-1-5
	B.KOONTZ@<GENIE> (Brian A Koontz)	ki5lp	92-9-5
	kenb@techsup.UUCP (Ken J Brookner)	n5lpi	92-5-14

ron@nsu.DNET.NASA.GOV (Ron E Wright Jr)	ka5lug 92-6-2
RON@NSULA.EDU (Ron E Wright Jr)	ka5lug 92-8-5
lcz@sat.datapoint.com (Lee C Ziegenhals)	n5lyt 91-12-7
lcz@DPTSPD.SAT.DATAPOINT.COM (Lee C Ziegenhals)	n5lyt 93-1-24
morris.middleton@chaos.lrk.ar.us (Morris H Middleton)	ad5m 92-12-28
marcbg@metronet.com (Marc B Grant)	n5mei/ae/kb5ckq
93-1-18	
marcbg@feenix.metronet.com (Marc B Grant)	n5mei/ae/kb5ckq
93-1-21	
kf5mg@iinus1.ibm.com (Jack W Snodgrass Jr)	kf5mg 92-11-27
kf5mg@vnet.ibm.com (Jack W Snodgrass Jr)	kf5mg 93-1-26
JGRASS@VNET.IBM.COM (Jack W Snodgrass Jr)	kf5mg 93-1-5
DWG8047@tamvenus (Derek W Goff)	n5moj/kb5ep1
92-12-17	
DWG8047@venus.tamu.edu (Derek W Goff)	n5moj/kb5ep1
92-12-17	
dihle@awis.auburn.edu (Dave M Ihle)	wb5msb92-12-24
williams@qualcom.qualcomm.com (Paul T Williamson)	kb5mu 92-5-11
stevedak@cpe.UUCP (Steve P Dakin)	wq5n/kd5mi 92-12-
20	
aa5nc.ccwf.cc.utexas.edu (Benjamin R Menke)	aa5nc 91-12-5
K.VINTHER@<GENie> (Kevin M Vinther)	n5npt 92-9-5
jks@wb5nrn.cirr.com (Jerry K Schieffer)	wb5nrn 91-10
barryc@mpd.tandem.com (Barry D Chalcroft)	n5nwi 92-4-24
vic@seas.smu.edu (Vic G Hill III)	n5nzg 91-12-7
brewer@anarky.enet.dec.com (John M Brewer)	wb5oau92-5-26
n5off@w5ddl.aara.org (Thomas Marcotte)	n5off 92-5-25
horak@convex.com (David M Horak)	n5ofq 92-9-24
ebs@baba.lanl.gov (E Brooks Shera)	w5ojm 92-10-29
ebs@lanl.gov (E Brooks Shera)	w5ojm 92-10-29
ger@sunriver.com (Gerald F Youngblood)	ke5oh 91-10
BOB@WINROCK.ORG (Bob E Hambuchen Jr)	n5omw/kb5izu
93-1-14	
elmore@rap.rap.ucar.edu (Kim L Elmore)	n5op 91-10
elmore@virga.ucar.edu (Kim L Elmore)	n5op 91-10
anderson@skvax1.csc.ti.com (John H Anderson)	n5opy 91-12-7
anderson@dseg.ti.com (John H Anderson)	n5opy 92-9-1
Mark.Prater@f7009.n124.z1.fidonet.org (Mark W Prater)	n5oru 92-5-16
erkkila_bruce_h@ofvax.lanl.gov (Bruce H Erkkila)	kc5ov 92-7-8
woe@asl.dl.nec.com (Joe D Ayers)	n5ovo 91-12-7
jda@seas.smu.edu (Joe D Ayers)	n5ovo 91-11-5
ssampson@sabea-oc.af.mil (MSgt Steve Sampson)	n5owk 93-1-27*
phantom@pro-haven.cts.com (Tiffany M Bloxom)	kb5owz92-8-20
stankus@leland.Stanford.EDU (John J Stankus)	n5pee 91-12-7
Ocker@dseg1.CSc.ti.COM (Charlie C Ocker)	kd5pj 92-6-5
brian@amdcl2.amd.com (Brian D McMinn)	n5pss 93-1-14
brian@nucleus.amd.com (Brian D McMinn)	n5pss 92-2-11
brian@nucleus.uucp (Brian D McMinn)	n5pss 91-12-7
Mike_Beezley.houstoncssc@xerox.COM (Mike E Beezley)	n5pwp 92-5-23
"MBeez.HoustonCSSC"@Xerox.COM (Mike E Beezley)	n5pwp 92-5-23
n5pyd@pyd.UUCP (Paul D Wardell)	n5pyd 92-11-15
n5pyd%pyd@lawton.lonestar.org (Paul D Wardell)	n5pyd 92-11-5
71601.3112@Compuserve.COM (Paul D Wardell)	n5pyd 92-11-5
N5PYD@lawton.lonestar.org (Paul D Wardell)	n5pyd 93-1-5
jwj2047@sigma.tamu.edu (Joe W Jurecka)	n5pyk 92-2-3
jwj2047@rigel.tamu.edu (Joe W Jurecka)	n5pyk 92-12-2
jwj2047@zeus.tamu.edu (Joe W Jurecka)	n5pyk 92-12-2

jwj2047@summa.tamu.edu (Joe W Jurecka)	n5pyk 92-12-17
AGENGCC@OSUCC.BITNET (Gordon C Couger Jr)	n5qaq/ab5dg 91-12-
7	
unx3197@unx3.ucc.okstate.edu (Gordon C Couger Jr)	n5qaq/ab5dg 91-12-
14	
gcouger@olesun.okstate.edu (Gordon C Couger Jr)	n5qaq/ab5dg 92-11-
15	
gcouger@olesun.agen.okstate.edu (Gordon C Couger Jr)	n5qaq/ab5dg 92-11-
15	
SOMMER@HOUVMSCC.VNET.IBM.COM (Robert M Sommer)	ki5qc 92-10-22
kossack@qvi.com (Jordan M Kossack)	n5qvi 92-7-8
lrk@k5qwb.lonestar.org (Lyn R Kennedy)	k5qwb 91-10
jhoward@helps.cactus.org (James Deroy Howard)	aa5r 92-5-26
taormina@asl.SINet.SLB.COM (Tom Taormina)	k5rc 91-10
edh@sga.dsg.ti.com (Ed D Humphries)	n5rck 91-12-7
edh@hpuerca.atl.hp.com (Ed D Humphries)	n5rck 93-1-5
perry@beach.gal.utexas.edu (John A Perry)	kg5rg 91-12-7
perry@jpunix.com (John A Perry)	kg5rg 92-8-5
perry@johann.jpunix.com (John A Perry)	kg5rg 92-11-16
perry@leopold.jpunix.com (John A Perry)	kg5rg 92-11-16
jahern@geohub.gcn.uoknor.edu (Jud L Ahern)	kc5ri 92-6-17
roman@oakhill.sps.mot.com (Roman L Robles)	n5ric 92-1-7
msw1633@summa.tamu.edu (Mark Steven Whitsitt)	n5rjf 92-10-12
msw1633@zeus.tamu.edu (Mark Steven Whitsitt)	n5rjf 92-10-12
zslf08@trc.amoco.com (Steven L Farmer)	wa5rpf 92-10-
27	
sschend@magnus.acs.ohio-state.edu (Steve E Schendel)	wb5rws92-6-11
kipper@ccwf.cc.utexas.edu (Kipper)	k5ryk 91-10@
bateman@nsslsun.nssl.uoknor.edu (Monte G Bateman)	wb5rzx92-3-9
gstephe@nyx.cs.du.edu (Geoff G Stephens)	n5sbf 92-11-16
geoff@tenet.edu (Geoff G Stephens)	n5sbf 92-11-16
J.PUTNAM5@<GENIE> (Jim A Putnam Jr)	wa5skk92-9-5
rick@ricksys.lonestar.org (Richard McCombs)	kb5snf93-1-24@
bo836@cleveland.freenet.edu (Richard McCombs)	kb5snf93-1-24@
yono@ccwf.cc.utexas.edu (Paulus Suryono Adisoemarta)	n5snn 92-5-14
carter@cmptrc.lonestar.org (Carter R Bennett Jr)	ki5sr/ka5wbc92-12-
18	
carter@scilab.lonestar.org (Carter R Bennett Jr)	ki5sr/ka5wbc92-12-
18	
willis@cs.tamu.edu (Willis F Marti)	n5szf 92-8-5
rthomps@sbctri.sbc.com (Roger V Thompson)	ad5t 91-10
miltonm@inetnode.austin.ibm.com (Milton Miller)	kb5tkf93-1-15@
wes@iphase.com (Charles Wes Atchison)	wa5tku 92-11-
2	
lewis@mpd.tandem.com (Charles R Lewis)	n5tlo 92-12-20
lewis@binky.UUCP (Charles R Lewis)	n5tlo 92-12-20
lewis@devnull.mpd.tandem.com (Charles R Lewis)	n5tlo 92-12-20
david@moe.ece.utexas.edu (William David Lee)	n5tlz 92-8-14
wdlee@ccwf.cc.utexas.edu (William David Lee)	n5tlz 92-8-14
rpo@trsvax.tandy.com (Rodney Paul Opitz)	n5tpq 92-6-5
C.BROWN@<GENIE> (Charlie N Brown Jr)	n5tyi 92-9-5
Michael.Cedeck@f7009.n124.z1.fidonet.org (Michael J Cedeck)	n5tzt 92-3-19
jab0684@usl.edu (Jean A Boudreaux)	kb5udf92-9-11@
kb5udf@usl.edu (Jean A Boudreaux)	kb5udf92-9-11@
mll@deephthought.unm.edu (Mike LaPierre)	kb5ugq 92-8-
5@	
forozco@nmsu.edu (Luis F Orozco)	n5uhb 93-1-12



forozco@dante.nmsu.edu (Luis F Orozco)	n5uhb 93-1-12
forozco@freedom.nmsu.edu (Luis F Orozco)	n5uhb 93-1-12
talon@wizard.etsu.edu (David Fox)	kb5ulk92-12-15@
s8623f@etsuv2.etsu.edu (David Fox)	kb5ulk92-12-15@
skaggs@nssl.sun.nssl.uoknor.edu (Gary A Skaggs)	wb5ulk92-3-28
geraldg@oakhill.sps.mot.com (Gerald W Garcia)	n5umb 91-10
mrz@FOZZY.AUD.ALCATEL.COM (Kris I Mraz)	aa5uo 92-9-19
mrz@rockdal.aud.alcatel.com (Kris I Mraz)	aa5uo 92-9-19
wlin@rockdal.AUD.alcatel.COM (Weifan Lin)	n5ups 92-11-20
coolguy@unkaphaed.UUCP (Guy Shechter)	n5uri 92-7-14
P.PRITSCHOW@<Genie> (Paul M Pritschow)	n5uro 92-9-5
stlpb@rosie.uh.edu (Dean E Burris)	kb5usc92-9-7@
stlpb@elroy.uh.edu (Dean E Burris)	kb5usc92-9-30@
stlpb@jane.uh.edu (Dean E Burris)	kb5usc92-11-5@
dankell@techsup.UUCP (Dan S J Kellner)	n5utk 92-8-2
cheselka@cactus.org (Michael R M Cheselka)	n5uvv 93-1-14
os9@gnu.ai.mit.edu (Michael R M Cheselka)	n5uvv 93-1-14
pcl@engr.uark.EDU (Peter C Laws)	n5uwy 92-12-24
P.LAWS1@<Genie> (Peter C Laws)	n5uwy 93-1-6
PLAWS@UAFSYSB.UARK.EDU (Peter C Laws)	n5uwy 92-12-24
plaws@uafsysb.bitnet (Peter C Laws)	n5uwy 93-1-6
plaws@uafhp.uark.edu (Peter C Laws)	n5uwy 93-1-6
Angelo_Glorioso_Iii@agwbbs.new-orleans.LA.US (Angelo Glorioso III)	n5uxt 93-1-14
93-1-14	
rex!agwbbs!angelo_glorioso_III (Angelo Glorioso III)	n5uxt 93-1-14
lairdpg@lub001.lamar.edu (Phillip G Laird)	n5uyh 92-7-20
Jerry.Decker@f7009.n124.z1.fidonet.org (Jerry B Decker)	wr5v 92-8-7
RICK_A._MARTIN.OKLAHOMA_CITY@xerox.COM (Rick A Martin)	kb5vdt92-10-27@
psmith@convex.com (Presley E Smith Jr)	n5vgc 92-2-24
jim@rwsys.lonestar.org (James T Wyatt)	ka5vj1 92-9-
11	
root@gbdata.COM (Gary B Clark II)	n5vmf 91-11-7
G.CLARK8@<Genie> (Gary B Clark II)	n5vmf 92-9-5
bpb9204@tamsun.tamu.edu (Brent P Burton)	n5vmg 92-8-1
toal@convex.com (Bruce C Toal)	n5vqp 91-10
kriss@austin.lockheed.com (Richard [Dick] M Kriss)	kd5vu 91-10
emx.utexas.edu!las-shrike!kriss (Richard [Dick] M Kriss)	kd5vu 91-10
jpd4680@rigel.tamu.edu (Jon Patrick DeShazo)	n5wbt 92-2-13
ham@ualr.edu (P Stuckey)	kb5wce 92-12-
2@	
blw7149@tamsun.tamu.edu (Brandon Lee White)	kb5wdr92-12-23@
stevel@aio.jsc.nasa.gov (Steve Lancaster)	n5whw 92-12-19
M.MITCHELL36@<Genie> (Michael A Mitchell)	n5wkh 92-9-5
082589@hyperion.lanl.gov (Jerry Halladay)	kb5wpj93-1-8@
D.SIREN@<Genie> (Donna J Siren)	wb5wpm 92-9-5
collier@gallant.apple.com (Will Collier)	kb5wrk93-1-20@
chuck_adams.mag_qa@qmail.ssc.gov (Chuck P Adams)	wb5wrr92-2-3
chuck_adams@qmail.ssc.gov (Chuck P Adams)	wb5wrr92-12-30
barron@cactus.org (Robert J Barron Jr)	ka5wss 92-7-
20	
kjhome@lawton.lonestar.org (Kevin M Johnson)	n5wts 93-1-5
mancus@sweetpea.jsc.nasa.gov (Keith P Mancus)	n5wvr 92-8-15
mancus@norm.jsc.nasa.gov (Keith P Mancus)	n5wvr 92-8-15
dwaddell@ipxpress.aws.waii.com (David Waddell)	kb5wx93-1-21@
will@prism.austin.ibm.com (Will M Edwards)	wa5wza92-9-4
will@ot.austin.ibm.com (Will M Edwards)	wa5wza 92-9-4
hawk@oakhill.sps.mot.com (George C Hawkins)	ki5x 92-7-26

hawk@hawk.sps.mot.com (George C Hawkins)	ki5x	92-12-18
roman@oakhill.sps.mot.com (Roman Robles)	ki5xz	92-7-20@
roman@jethro.sps.mot.com (Roman Robles)	ki5xz	92-8-15@
fdvlba@zia.aoc.nrao.edu (Steve Cowell)	ki5yg	92-8-17@
svh@verdix.com (Steven V Hovater)	aa5yh	92-9-30
3511297@mcimail.com (Fred O Maiya)	w5yi	91-10
76476.2327@CompuServe.COM (Sam G Williams)	wb5yni	93-1-5
f_speerjr@ccsvax.sfasu.edu (Jim R Speer III)	k5yut	93-1-8
ma690188@mbcr.bcm.tmc.edu (R Mark Adams)	n5yyy	92-11-9@
J.SHIDLER2@<GENie> (John C Shidler)	ns5z	92-9-5
hoenig@osage.csc.ti.com (Mike L Hoenig)	aa5zc	91-12-7
hoenig@choctaw.csc.ti.com (Mike L Hoenig)	aa5zc	91-12-12
jmaynard@oac.hsc.uth.tmc.edu (Jay R Maynard)	k5zc	92-12-24
wday@vaxb.acs.unt.edu (Randy Wayne Day)	kf5zc/wa5wdb	
92-12-15		
76703.376@CompuServe.Com (Randy Wayne Day)	kf5zc/wa5wdb	92-12-
15		
WDay@unt.edu (Randy Wayne Day)	kf5zc/wa5wdb	
92-12-15		
jfs4892@zeus.tamu.edu (John F Steele)	n5zkc	92-8-18@
John.Steele@f7009.n124.z1.fidonet.org (John F Steele)	n5zkc	92-8-18@
Bryan.Keithly@f7009.n124.z1.fidonet.org (Bryan Keithly)	n5zkv	92-6-29@
mlodge@ca.NOvell.COM (Michael D Lodge)	wb5zld	92-3-
12		
z_vaughanja@ccsvax.sfasu.edu (Z Vaughanja)	n5zml	92-6-11@
gleason@mwk.uucp (Lee K Gleason)	n5zmr	92-8-1@
Chris.Nelson@f7009.n124.z1.fidonet.org (Chris Nelson)	n5zvp	92-6-5@
## US 6 District		
jerry@gumby.Altos.COM (Jerry Gardner)	nj6a	91-10
dgarl.jacksonville@xerox.COM (Dan P Garley)	wh6a	91-12-26
bruno@hpldsla.sid.hp.com (Bruno Bienenfeld)	aa6ad	92-8-5
brunob@hpldsla.sid.hp.com (Bruno Bienenfeld)	aa6ad	92-11-9
Darrell_B._Upson.SCB1_Versatec@xerox.COM (Darrell B Upson)	wb6adz	91-12-12
lockhart@mothra.nts.uci.edu (Jack C Lockhart)	wd6aei	92-12-4
lockhart@uci.edu (Jack C Lockhart)	wd6aei	92-12-4
muschinske%39a.DECnet@scfb.nwc.navy.mil (Erich P Muschinske)	ka6amd	
92-5-29		
MUSCHINSKE%39A.DECnet@scfb.chinalake.navy.mil (Erich P Muschinske)	ka6amd	
92-11-5		
Christopher_J._Kovacs.SCB5_Versatec@xerox.COM (Christopher J Kovacs)	wa6anm	
91-11-21		
ring@kelvin.Jpl.Nasa.Gov (Warren Ring)	kn6ar/ar	93-1-
19@		
minh@inst-sun1.jpl.nasa.gov (Minh Lang)	kd6ard	92-7-
20		
julian@xenon.sr.com (Julian L Macassey)	n6are	91-10
julian@bongo.UUCP (Julian L Macassey)	n6are	92-12-24
julian@bongo.info.com (Julian L Macassey)	n6are	92-12-24
julian@bongo.tele.com (Julian L Macassey)	n6are	92-12-19
scott@fredf.cts.com (Scott T Swazey)	kd6ars	92-2-9
crash.cts.com!fredf!scott@rutgers.uucp (Scott T Swazey)	kd6ars	92-2-9
andre@boombox.micro.umn.edu (Andre' V Thomas)	wb6atj/wv	92-12-
24		
GAR.HARRIS@<GENie> (Gardner L Harris)	w6axm	92-9-5
ronaldw@sco.COM (Ronald A Wong)	kd6awa	92-4-
24		
drw@esl.com (Dave R Waters)	wa6awz	92-9-

25

73277.311@Compuserve.Com (Dave R Waters)  
larson@snmp.sri.com (Ralph Alan Larson)  
larson@w6yx.Stanford.EDU (Ralph Alan Larson)  
larson@loren.net.com (Ralph Alan Larson)  
bobc@gold.gvg.TEK.COM (Bob L Cobler)  
admitq@violet.berkeley.edu (Graduate Division-Admissions)  
horak@n6bde.pa.dec.com (Brad Horak)  
steve@caticsfresno.CSUFresno.EDU (Steve J Mitchell)  
dmtur@ptsfa.PacBell.COM (Dave M Turner)  
dmtur@PacBell.COM (Dave M Turner)  
derek@hokulea.soest.hawaii.edu (Derek K Y Young)  
ecktons@sirius.byu.edu (Sean S Eckton)

20

sean@noc.byu.edu (Sean S Eckton)  
winter@Apple.COM (Patty F Winter)  
glenn@hpsanaeo.nsr.hp.com (Glenn V Jensen)  
emmayche@apple.com (Mark Hartman)  
billm@hpnmdla.sr.hp.com (Bill Marlin)

27@

kemsley@ipld01.hac.com (Dave H Kemsley)

2

davkemsley@aol.com (David H Kemsley)

2

crisp@netcom.COM (Richard D Crisp)  
crisp@mips.com (Richard D Crisp)  
tony@mpg.phys.hawaii.edu (Antonio A Querubin Jr)  
newman@quisp.pei.com (Dave Newman)  
tomrice@netcom.com (Tom R Rice)  
bweaver@quack.sac.ca.us (Brian J Weaver)  
weaverb@rintintin.Colorado.EDU (Brian J Weaver)  
edg@netcom.COM (Edward W Greenberg)

21

ed\_greenberg@hq.3mail.3com.com (Edward W Greenberg)  
mark@jato.jpl.nasa.gov (Mark M Schaefer)  
ca797@cleveland.Freenet.Edu (Robert D Kliman)  
rkliman@heartland.freenet.edu (Robert D Kliman)  
MCGEE@LECS.ERICSSON.SE (Don H McGee)  
co862@cleveland.Freenet.Edu (Don H McGee)  
ecudhm@erigate.ericsson.se (Don H McGee)  
R.SPRAGUE6@<GENie> (Ron L Sprague)  
J.POLLARD4@<GENie> (Joe M Pollard)  
drawson@Tymnet.com (Dick A Rawson)  
graham@drcv06.DECnet@drcvax.af.mil (Dan J Graham)  
zlau@arll.org (Zack H J Lau)  
zlau%arll.org (Zack H J Lau)  
R.W.OLSEN@<GENie> (Bob K Olsen)  
pjb@gap.caltech.edu (Paul J Brewer)  
pjb@cco.caltech.edu (Paul J Brewer)  
efb@suned1.Nswses.Navy.MIL (Everett F Batey II)  
Wayne\_A\_Lightsey.Roch809\_XBS@xerox.COM (Wayne A Lightsey)  
nomad@ecst.csuchico.edu (Michael G Larish)  
rob@xyzoom.info.com (Rob A Lingelbach)

29

robl@netcom.com (Rob A Lingelbach)  
brian@ucsd.edu (Brian H Kantor)  
brian@ucsd (Brian H Kantor)

wa6awz92-9-25  
wa6azp 91-10  
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wq6b 92-7-8  
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wb6cyt 93-1-8  
wb6cyt 92-12-

19

klaudon@pica.army.mil (Kalman A Laudon) 93-1-15	wd6czi/walsuf
dougb@hpnmdla.sr.hp.com (Doug C Bender)	ww6d 92-9-29
dougb@sr.hp.com (Doug C Bender)	ww6d 92-9-29
kenw@usasoc.soc.mil (Herbert Ken Woodworth)	ka6das92-1-3
chuckb@babbage.csus.edu (Chuck C Bland)	n6dbt 92-8-1
greg@uts.amdahl.com (Greg W Bullough) 25	wa6dcl 92-1-
debry@dsl.scri.fsu.edu (Ron W DeBry) 18	wa6dgx 91-11-
opus@fatcity.cts.com (Richard D Parrott)	km6dh 92-1-26
0004788818@mcimail.com (Jeff L Meyers) 15@	kd6dis 92-1-
jmeyers@ecst.csuchico.edu (Jeff L Meyers)	kd6dis92-10-16@
af029@yfn.ysu.edu (James M Stephens) 19@	kd6dpm 92-5-
C.MATAGA@<GENie> (Cathryn Mataga) 5@	wd6dsc/ae 92-9-
au440@cleveland.Freenet.Edu (Kieran M Donahue)	kc6dse92-8-5
carndt@pan.calpoly.edu (Chris Arndt) 20@	kd6dsi 92-2-
ewing-martin@cs.yale.edu (Martin S Ewing)	aa6e 92-2-3
ewing@yale.edu (Martin S Ewing)	aa6e 93-1-23
ewing-martin@yale.edu (Martin S Ewing)	aa6e 93-1-23
ewing@yalevm.bitnet (Martin S Ewing)	aa6e 93-1-23
m21245@mbvms.mitre.org (Bill T Ralston)	ai6e 92-1-17
wtr@mdf.mitre.org (Bill T Ralston)	ai6e 92-1-17
kaufman@Neon.Stanford.EDU (Marc T Kaufman)	wb6ece91-12-10
hughesr@sandnet.UCSD.EDU (Richard J Hughes)	km6ed 92-10-6
rhughes@ucsd.edu (Richard J Hughes)	km6ed 92-10-6
Jim.Bedient@f100.n282.z1.tdkt.kksys.com (Jim Bedient)	wh6ef 92-10-15@
rkeating@ucsd.edu (Roger Keating)	kd6efq92-1-5@
wd6ehr@wd6ehr.ampr.org (Bertram Mike Curtis)	wd6ehr92-3-19
jcp%octagon.UUCP@UCSD.EDU (John C Peterson)	kd6ekq92-5-26@
peterson@crash.cts.com (John C Peterson)	kd6ekq92-5-24@
rjw@nsa.hp.com (Richard Webber) 31@	kd6elb 92-7-
bassett@merlot.enet.dec.com (Greg A Bassett)	kj6ep 92-10-22
bassett@basset.wro.dec.com (Greg A Bassett)	kj6ep 92-10-22
bassett@merlot.wro.dec.com (Greg A Bassett)	kj6ep 92-10-22
tenney@fantasia.UUCP (Glenn S Tenney)	aa6er 91-12-6
tenney@well.sf.ca.us (Glenn S Tenney)	aa6er 91-12-6
steveh@grafex.Cupertino.CA.US (Steve R Harding)	ka6etb92-11-18
harding@nas.nasa.gov (Steve R Harding) 18	ka6etb 92-11-
grady@public.BTR.COM (Grady Ward)	kd6eth92-1-19@
grady@btr.com (Grady Ward) 14@	kd6eth 92-9-
grady@btr.BTR.COM (Grady Ward) 14@	kd6eth 92-9-
ikluft@uts.amdahl.com (Ian Klufft)	kd6eui92-12-24
jallen@ssf-sys.DHL.COM (John D Allen III) 29	km6ew/kc6vje92-12-
fischler@crayxmp.lmsc.lockheed.com (Ron J Fischler)	aa6fb 91-10
hughb@netcom.COM (Hugh Bussell) 24@	kd6fdo 92-4-

beacker@tomahawk.asd.sgi.com (Bradley R Eacker)	kb6fed92-9-4
beacker@sgi.com (Bradley R Eacker)	kb6fed92-9-4
Larry.Jones@f833.n102.z1.fidonet.org (Larry A Jones)	kb6fet92-3-2
eshamilton@lbl.gov (Edward [Ned] S Hamilton Jr)	ab6fi 91-10
SHIERY@FULLERTON.EDU (Glen R Shiery)	wd6fmz 92-9-
27	
trasmuss@pea.csc.calpoly.edu (Thor F Rasmussen)	n6fnp/ka6pgv92-12-
23	
trasmuss@nike.calpoly.edu (Thor F Rasmussen)	n6fnp/ka6pgv92-12-
23	
kevin@ws066.torreypinesca.NCR.COM (Kevin R Sanders)	kn6fq/kn6fkj93-1-
23*	
kevin@sv001.sandiego.ncr.com (Kevin R Sanders)	kn6fq/kd6fkj93-1-
23*	
kevin@cyber.net (Kevin R Sanders)	kn6fq/kd6fkj93-1-
23*	
bwilkins@iat.holonet.net (Bob C Wilkins)	n6fri 92-11-15
stewart@sco.COM (Stewart I Alpert)	kd6ftd92-7-8@
rsr00@ruts.ccc.amdahl.com (Ramanjit S Rajpal)	kd6fun92-3-3@
jangus@skyld.UUCP (Jeffrey D Angus)	wa6fwi92-8-7
jangus@skyld.sr.com (Jeffrey D Angus)	wa6fwi 92-12-
5	
xenon!skyld!jangus (Jeffrey D Angus)	wa6fwi 92-12-
19	
jangus@skyld.tele.com (Jeffrey D Angus)	wa6fwi 92-12-
19	
mikeh@microme.uucp (Michael L Hasenfratz Sr)	wa6fxt92-6-3
kleing@qualcom.qualcomm.com (Klein S Gilhousen)	wt6g 93-1-9
kleing@qualcomm.com (Klein S Gilhousen)	wt6g 91-10
tony@hacgate.UUCP (Tony R Reeves)	ab6ga 92-10-22
tony@hacgate.SCG.HAC.COM (Tony R Reeves)	ab6ga 92-10-22
tony@hacgate.hac.com (Tony R Reeves)	ab6ga 92-10-22
dkim@cory.berkeley.edu (Doug Kim)	kd6gbs92-7-3@
MERCER_JOHN/SRJC_01@odie.santarosa.EDU (John Mercer)	kd6gcm92-2-29@
J024330@LMSC5.IS.LMSC.LOCKHEED.COM (Chris D Colvin)	n6gdl/ka6ocj92-12-
17	
kh6gdr@uhm.ampr.ORG (Joe A Weite Sr)	kh6gdr 91-10
joseph_weite-manoa@uhplato.bitnet (Joe A Weite Sr)	kh6gdr91-10
stewart@hubble.ifa.hawaii.edu (Christopher M Stewart)	ah6gg 91-10
steve@wattres.SJ.CA.US (Steve Watt)	kd6ggd93-1-12
bsplaine@hpmwtd.HP.COM (Bill J Splaine)	n6ghg 92-3-7
bsplaine@mtmtl8.HP.COM (Bill J Splaine)	n6ghg 92-6-12
bsplaine@mtmtl8.sr.hp.com (Bill J Splaine)	n6ghg 92-12-18
bsplaine@sr.hp.com (Bill J Splaine)	n6ghg 92-12-18
rogerv@sco.COM (Roger T Vortman)	ke6gl 92-10-13
jrey@pnet01.cts.com (Jim Reynante)	kd6glf92-6-11@
glenne@hpnmdla.sr.hp.com (Glenn E Elmore)	n6gn 92-8-8
glenne@sr.hp.com (Glenn E Elmore)	n6gn 92-8-8
pozar@kumr.lns.com (Tim M Pozar)	kc6gnj92-11-20
HAL.S@<GENIE> (Arthur [Hal] Y Sprague)	kh6gpi 92-9-5
clyde@dodeca.UUCP (Clyde R Visser)	kd6gwn92-9-11@
cvisser@ucrmath.ucr.edu (Clyde R Visser)	kd6gwn92-9-11@
waffle@steer.sdsu.edu (Kevin M Savetz)	kc6gwg 93-1-
21	
judd@koa.ifa.Hawaii.Edu (David H Judd)	nh6h 92-7-20
red-eft!driver8@valley.west.sun.com (Hugh D Stegman)	nv6h 92-6-4
driver8@red-eft.uucp (Hugh D Stegman)	nv6h 92-8-7

jta@kilroy.Jpl.Nasa.Gov (Jon T Adams)	nw6h 91-11-13
whitej@iccgcc.decnnet.ab.com (Joe W White)	ke6ha 92-5-16
marc@ekhomeni.austin.ibm.com (Marc Wiz)	wa6hbr 91-10
mwiz@mpd.tandem.com (Marc Wiz)	wa6hbr 92-6-3
kensiski@nas.nasa.gov (David L Kensiski)	kb6hcn91-11-5
kensiski@muddy.nas.nasa.gov (David L Kensiski)	kb6hcn92-5-10
johana!tsw@apple.com (Tom S Watson)	wa6hcn92-5-19
msolinas@micromed.net.netcom.com (Michael Solinas)	kd6hij92-3-31@
michael.solinas@gate.micromed.com (Michael Solinas)	kd6hij92-8-18@
PMcAfee.El_Segundo@xerox.com (Pete McAfee)	kd6hr 92-8-18
ericd@synoptics.com (Eric Davis)	kd6hto92-6-29@
WAS%UHHEPG.BITNET@cornell.cit.cornell.edu (Walt A Simmons)	ah6hu 91-12-6
hammock@kelvin.jpl.nasa.gov (Randy L Hammock)	kc6hur92-6-17
piety@hplred.HP.COM (Bob A Piety)	kg6hv 92-1-8
quoi@netcom.com (Eric Lechner)	kd6hzv 93-1-
7@	
ericl@xilinx.com (Eric Lechner)	kd6hzv 93-1-
7@	
jollis@apollo.hp.com (Roger A Jollis)	ku6i 91-10
moerner@almaden.ibm.com (William E Moerner)	wn6i 92-11-20
mlau@pollux.svale.hp.com (Milton [Mel] Lau)	ab6ib 92-11-16@
drn@hpctdlb.HP.COM (Dave R Novotny)	wa6ifi91-10
darnold@felix.filenet.com (Dave Arnold)	kd6ify 92-5-
21@	
darnold@filenet.com (Dave Arnold)	kd6ify92-5-21@
rosso@mythinc.uucp (Ross Oliver)	kd6ijv92-5-23@
rosso@z-code.com (Ross Oliver)	kd6ijv 92-5-
23@	
morris@grian.cps.altadena.ca.us (Mike R Morris)	wa6ilq92-9-25
boehm@gstore.fidonet.org (David Boehm)	kd6iov 93-1-
5@	
zardoz!dhw68k!gstore!boehm (David Boehm)	kd6iov93-1-5@
ucivax!dhw68k!gstore!boehm (David Boehm)	kd6iov93-1-5@
pete@zehntel (Peter C Danan)	kc6ipr 91-12-
7	
pete@pinot.zehntel.com (Peter Danan)	kc6ipr 92-2-3
plumer@boreas.Stanford.EDU (Edward S Plumer)	km6iq 91-10
fong@galaxy.nsc.COM (Ed Fong)	wb6iqn 92-9-
23	
James_H._Lindwedel.El_Segundo@xerox.COM (James H Lindwedel)	kc6irm92-5-16
jwc@sactoh0.sac.ca.us (James W Chandler)	kd6irv92-5-16@
chandler@beagle.UUCP (James W Chandler)	kd6irv 92-12-
17@	
genem@hpswtgm.cup.hp.com (Gene Marshall)	aa6iy/n6rsx 92-12-
2	
genem@hp.com (Gene Marshall)	aa6iy/n6rsx 92-12-
2	
genem@cup.hp.com (Gene Marshall)	aa6iy/n6rsx 92-12-
8	
genem@hpcuhe.cup.hp.com (Gene Marshall)	aa6iy/n6rsx 92-12-
8	
cmoore@mothra.rose.hp.com (Chris R Moore)	n6iys 93-1-8
cmoore@rose.hp.com (Chris R Moore)	n6iys 93-1-8
gcole@nosc.mil (Guy S Cole)	kq6j 92-7-31
steveb@inst-sun1.tmc.edu (Steve M Bednarczyk)	nj6j 92-9-15
J.STEWART40@<Genie> (Jeff W Stewart)	n6ji 92-9-5
dana@locus.com (Dana H Myers)	kk6jq 93-1-23

wes@hpsmol100.rose.hp.com (Westley C Turner)	kc6jqp92-8-5
henryb@hpspdla.spd.HP.COM (Norman R Henry Black)	kk6jr 91-12-7
cyamamot@kilroy.Jpl.Nasa.Gov (Cliff K Yamamoto)	ka6jrg91-11-18
cyamamot@marconi.Jpl.Nasa.Gov (Cliff K Yamamoto)	ka6jrg92-10-19
pete@puffin.uucp (Pete A Carah)	k6jrr 91-10
hart@madhatter (James A Hart)	n6jss/kb6cmk
92-12-15	
hart@donald.etdesg.TRW.COM (James A Hart)	n6jss/kb6cmk92-12-
15	
kmccrary@hpcc01.corp.hp.com (Kevin McCrary)	kd6jtv92-6-3@
John_L_Levin.El_Segundo@xerox.COM (John L Levin)	km6jv 92-11-15
haynes@cats.UCSC.EDU (Jim H Haynes)	w6jve 92-10-29
haynes@cats.bitnet (Jim H Haynes)	w6jve 92-10-29
HIBBERTS%SCFF.DECnet@scfb.nwc.navy.mil (Mark W Hibberts)	kk6jx 92-3-26
tjonz@caliban.Corp.Sun.COM (Todd C Jonz)	kb6jxt92-10-11
71635.1174@CompuServe.COM (Harold E Price)	nk6k/n6duf 93-1-5
nk6k@tapr.ampr.org (Harold E Price)	nk6k/n6duf 93-1-5
jre@sactoh0.sac.ca.us (Jim R Earl)	kb6kcp92-6-3
jre@earldom.UUCP (Jim R Earl)	kb6kcp 92-10-
11	
jre%earldom@csusac.ecs.csus.edu (Jim R Earl)	kb6kcp92-10-11
buaas@trout.nosc.mil (Robert A Buaas)	k6kgs 92-2-24
greg@hprnd.rose.hp.com (Greg Dolkas)	kd6kgw 92-8-
14@	
greg@core.rose.hp.com (Greg Dolkas)	kd6kgw92-11-18@
palsson@ucselx.sdsu.edu (Jerry D Palsson)	aa6ki 92-7-26
jgt10@uts.amdahl.com (John G Thompson)	kd6kid 92-9-
30@	
barger@aerospace.aero.org (Joseph R Barger)	n6kk 91-10
luis@boltzmann.ee.ucla.edu (Luis E Pacheco)	ab6km 92-9-4@
luis@oahu.cs.ucla.edu (Luis E Pacheco)	ab6km 92-11-6@
green@berlioz.nsc.com (David J Green)	kk6km 91-12-7
cawils1@pbhyg.PacBell.COM (Clyde A Wilson Jr)	km6kr 92-1-25
sawyer@twg.com (Bruce B Sawyer)	aa6kx 92-10-27
bparrish@hpcc01.corp.hp.com (Bill M Parrish)	km6kv 92-5-24
bparrish@rose.hp.com (Bill M Parrish)	km6kv 93-1-5
bparrish@hprfes.rose.hp.com (Bill M Parrish)	km6kv 93-1-5
mjr@netcom.netcom.com (Matthew Rapaport)	kd6kvh92-9-6@
mjr@netcom.com (Matthew Rapaport)	kd6kvh92-9-6@
70371.255@compuserve.com (Matthew Rapaport)	kd6kvh92-9-6@
keenan@usc.edu (Robert N Keenan)	wu6l 92-1-19
paulb@harley.tti.com (Paul Blumstein)	kd6laa 92-8-
1@	
steve@carlyle.com (Steve R Salmon)	aa6lf 92-3-3
steve@carlyle.CARlyle.COM (Steve R Salmon)	aa6lf 92-6-17
Don_R_Moberly.El_Segundo@xerox.COM (Don R Moberly)	wb6lfc92-9-19
lkraft@hprnd.rose.hp.com (Lyle D Kraft)	aa6lk 92-8-8
lkraft@core.rose.hp.com (Lyle D Kraft)	aa6lk 92-12-17
lyle_kraft@hp5200 (Lyle D Kraft)	aa6lk 92-12-17
nh6lq@uhm.ampr.org (David K Shak)	nh6lq 91-12-7
ket@twobeers.EBay.Sun.COM (Keith E Thompson)	ka6lrr92-5-8
catz@wattres.sj.ca.us (Cathi Watt)	kd6lsp93-1-12@
ollie@hydra.unm.edu (David Ollie Eisman)	n6ltj 91-10
ollie@triton.unm.edu (David Ollie Eisman)	n6ltj 91-10
donrm@hpnmdla.sr.hp.com (Don R Montgomery)	k6lts 92-11-6
mn@atari.uucp (John Mike Nowicki)	n6luu 91-12-7
sorgatz@avatar.tti.com (Erik K Sorgatz)	kb6luy 92-10-

10

usenet@ttinews.tti.com (Erik K Sorgatz) kb6luy 92-8-7  
sorgatz@soldev.tti.com (Erik K Sorgatz) kb6luy 92-10-

10

dillon@overload.Berkeley.CA.US (Matthew D Dillon) kc6lvw92-12-23  
uunet.uu.net!overload!dillon (Matthew D Dillon) kc6lvw92-12-23  
aga@gualala.Sitka.Sun.COM (Tony G Angerame) wa6lzh92-1-7  
J.FULMER2@<GEnie> (John R Fulmer) wt6m/kh6 92-9-5  
jeffj@cbnews.cb.att.com (Jeffery N Jones) ab6mb 92-8-16@  
jeffj@seeker.mystic.com (Jeffery N Jones) ab6mb 92-8-16@  
duncan@bolero.ati.com (James R Duncan Jr) wa6mbv92-6-24  
duncan@ravel.ati.com.ati.com (James R Duncan Jr) wa6mbv92-8-8  
kirsanwa@catapult.anatcp.rockwell.COM (William A Kirsanoff) kd6mci92-10-28@  
WAKIRS@ananov.remnet.ab.com (William A Kirsanoff) kd6mci92-10-28@  
dsb@sl.gov (David S Brown) wa6mfz 92-8-

7@

dsbrown@llnl.gov (David S Brown) wa6mfz92-8-7@  
G.LAU3@<GEnie> (Gary T Lau) n6mmm 92-9-5  
jeffr@erg.sri.com (Jeffrey B Rininger) n6mni 91-10  
dharma@btr.com (Jeffery B Rininger) n6mni 92-1-17  
hstocks@mizar.usc.edu (Hugh G Stocks) aa6mq 92-7-3  
POLSO@AIS.UCLA.EDU (Linda G Stocks) aa6mr 92-10-26  
laborde@oak.Jpl.Nasa.Gov (Gregory R LaBorde) kd6msm92-12-17@  
geoffb@Eng.SUn.COM (Geoffrey G Baehr) n6lxa 91-10  
cvadraj@vmsb.is.csupomona.edu (Ed Saxe) ka6mux92-12-11@  
CVADRAJP@CSUPOMONA.EDU (Ed Saxe) ka6mux92-12-11@  
philk@brahms.amd.com (Phil J Keller) n6mwc 91-10  
bagby@amante.Eng.Sun.COM (Dave V Bagby) n6mwe 92-5-21  
mosbrook@beach.csulb.edu (Brent L Mosbrook) kc6mwk91-12-26  
bly@btree.uucp (Roger G Bly Jr) ka6mwt 92-9-

11

randall@informix.com (Randall C Rhea) kk6my 92-11-15  
pyramid!infmx!randall (Randall C Rhea) kk6my 92-9-29  
mikemr@microsoft.com (Michael A Mraz) n6mz 92-8-8  
ronb@netcom.com (Ronald L Barrett Sr) k6mzw 92-12-29  
gnome@flash.ATC.Olivetti.Com (Gary J Traveis) n6nat 92-11-27  
gnome@atc.olivetti.com (Gary J Traveis) n6nat 92-11-27  
remler@ll.mit.edu (Rick L Ferranti) wa6ncx92-2-3  
craigr@marlin.nosc.mil (Raymond D Craig) n6nd 92-3-26  
djk@Nitro.CtEdge.COM (Danial J Karnes) wa6ndt 92-4-

25

sifakis@sono.uucp (George N Sifakis) kc6ndy 91-12-

7

mead@usc.edu (Richard W Mead) wb6ngc 92-9-

28

roode@hydra.acs.uci.edu (Dana F Roode) wa6ngo 91-10  
lockwood@acidqueen.Eng.Sun.COM (Jim Lockwood) km6nk 92-7-31@  
don@fatcity.cts.com (Don C Hamiel) n6nlx 92-5-10  
venkat@nsc.nsc.com (Venkataraman Iyer V) kd6nmq/vu2vvv  
92-9-16@

phil@ncd.com (Philip R Graham) kj6nn 91-12-7  
phil@hansen1.ncd.com (Philip R Graham) kj6nn 92-8-5  
qumqats@citrus.SAC.CA.US (Joel M Baldwin) n6npl 92-9-19  
johnf@scd.hp.com (John P Flowers) n6nqw 92-12-24  
wvs@craywr.cray.com (Walter Spector) kk6nr 92-11-15  
wvs@renaissance.cray.com (Walter Spector) kk6nr 92-11-15  
rkolsen@uswnvg.com (Rick K Olsen) n6nr 92-12-25



danr@ais.org (Daniel M Romanchik)	kb6nu 92-6-29
B.CARLIN@<Genie> (Brian B Carlin)	kb6nvh92-9-5
MGB@SLACVM.SLAC.STANFORD.EDU (Michael G Barbitta)	kd6oay93-1-9@
seligman@CS.Stanford.EDU (Scott M Seligman)	kc6ock92-10-13
pauln@wattres.sj.ca.us (Paul Nguyen)	kd6ocz 93-1-
12	
Paul.Nguyen@kennel.FIDONET.ORG (Paul Nguyen)	kd6ocz92-10-12
uts.amdahl.com!kennel!Paul.Nguyen (Paul Nguyen)	kd6ocz92-10-12
Allyn@cup.portal.com (Allyn Mark Lai)	kb6odf 91-12-
15	
tofstrud@andreas.wr.usgs.gov (Eric Tofstrud)	n6oim 92-11-16
76703.3035@CompuServe.COM (Steve S Silverwood)	kb6ojs92-12-30
steves@dbase.a-t.com (Steve S Silverwood)	kb6ojs91-12-6
steve.silverwood@filebank.cts.com (Steve S Silverwood)	kb6ojs92-12-30
obrien@aero.org (Michael T O'Brien)	kc6ojw92-9-25
DBornemann.Pittsburgh@xerox.COM (Don C Bornemann)	kc6oku92-6-29
borowski@hpspkla.spk.hp.com (Don T Borowski)	wa6omi92-8-5
am001@cleveland.Freenet.Edu (Robert S Radvanovsky)	kc6onl92-10-26
rradvan@heartland.bradley.edu (Robert S Radvanovsky)	kc6onl92-10-26
gwalsh@kilroy.Jpl.Nasa.Gov (Gerald J Walsh)	kb6ooc92-12-28
jblake@hprpcd.rose.hp.com (John H Blake)	kc6orn92-11-27
jblake@hprtrain.rose.hp.com (John H Blake)	kc6orn92-11-27
Bruce@Pixar.com (Bruce Perens)	kd6otd 92-12-
15@	
Douglas_R._Tice.LAX1B@xerox.COM (Douglas R Tice)	kk6ou 92-5-1
johns@hp-ptp.HP.COM (John E Schubert)	kc6ovn 91-12-
7	
johns@hp-ptp.ptp.hp.com (John E Schubert)	kc6ovn92-2-3
red-eft!hbe@valley.west.sun.com (Harris Boldt Edelman)	kb6owb92-6-4
hbe@red-eft.uucp (Harris Boldt Edelman)	kb6owb 92-7-
31	
grich@halide.acs.uci.edu (John J Mangrich)	n6owr 92-7-3
mangrich@uci.edu (John Mangrich)	n6owr 92-7-3
mbothe@netcom.COM (Michael J Bothe)	kb6owt92-3-2
marc@dwp.la.ca.us (Marc Hall)	kc6oxp 91-12-
7	
cleveland@gold.gvg.tek.com (Phillip [Grover] D Cleveland)	wt6p 92-7-3
groverc@gold.gvg.tek.com (Phillip [Grover] D Cleveland)	wt6p 92-12-2
mahaun@sactoh0.sac.ca.us (Mark A Haun)	kj6pc 92-7-26
bbs.railroad@tsoft.net (Mike Leland)	kd6piw 93-1-
12@	
capener@netcom.com (Chris L Capener)	kc6pjj 91-12-
9	
andrews@COMORO.island.COM (Jim Andrews)	kc6pjjw 93-1-
26*	
rec@chiton.ucsd.edu (Richard E Currier)	aa6pn 91-12-6
jpgervais@weber.ucsd.edu (Joe Gervais)	kd6prd 93-1-
5@	
jpgervais@ucsd.edu (Joe Gervais)	kd6prd 93-1-
5@	
psilva@humu.nosc.mil (Paul Silva)	n6pud 92-2-3@
rtoyama@uhunix.uhcc.Hawaii.Edu (Ralph H Toyama)	nh6py 92-1-25
eric@hpsmeng1.rose.hp.com (Eric T Struble)	n6pyf 91-12-7
paulz@hpspdla.spd.HP.COM (Paul A Zander)	aa6pz 92-1-25
jbm@speedy.UUCP (John B McCluskey III)	kb6pzf 91-12-
6	
rbisbey@eis.calstate.edu (Richard Bisbey II)	ng6q 92-11-9@

bisbey@loretta.la.ca.us (Richard Bisbey II)	ng6q 92-11-9@
endelman@wellworld.Sun.COM (Aaron F Endelman)	kk6qh 91-12-7
endelman@eng.sun.com (Aaron F Endelman)	kk6qh 92-8-8
nickb@netcom.netcom.com (Nicholas L Barbieri)	kb6qi 92-2-5
barbieri@zycad.UUCP (Nicholas L Barbieri)	kb6qi 92-2-5
spcedt@deephth.santa-cruz.ca.us (John H DuBois III)	kc6qkz91-10
mrapple@quack.sac.ca.us (Nick W Sayer)	n6qqq 93-1-27
tslater@NMSU.EDU (Ted M Slater)	n6qxa 92-8-5
tweek@tweekco.uucp (Michael D Maxfield)	n6qya 91-12-7
nfunamura@nuwes-111.navy.mil (Norman K Funamura)	kh6r 92-2-29
nfunamura%mis2.DECnet@nuwes-111.navy.mil (Norman K Funamura)	kh6r 92-6-
11	
NFunamura@Nuwes-111.navy.mil (Norman K Funamura)	kh6r 92-6-11
combs@hpsciz.sc.hp.com (Bob T Combs)	kca6rc 91-10@
kevinr@Tandem.com (Kevin J Rowett)	n6rce 91-12-7
Kirk.Smith@launchpad.unc.edu (Kirk Smith)	kd6rct93-1-27*
dsmith@tcomeng.uucp (David P Smith)	wb6rdk91-11-15
dpsmith@pbhyb.PacBell.COM (David P Smith)	wb6rdk92-2-13
bobm@apldbio.com (Robert J Mattaliano)	n6rfm 91-12-20
billp@Syntex.COM (Bill W Putney)	wb6rfrw92-11-6
oliveb!synseer!billp (Bill W Putney)	wb6rfrw 92-11-
6	
rkarlqu@hpscit.sc.hp.com (Rick K Karlquist)	n6rk 92-5-8
rkarlqu@hpsciz.sc.hp.com (Rick K Karlquist)	n6rk 92-1-25
rkarlqu@scd.hp.com (Richard K Karlquist)	n6rk 92-11-2
hunter@ccv.nersc.gov (Steve L Hunter)	kc6rkv 91-10
hunter@s07.es.llnl.gov (Steve L Hunter)	kc6rkv 92-9-
29	
walsh@optilink.UUCP (Mark E Walsh)	kc6rzk91-10
laduke@hpdmd48.boi.hp.com (Terry L Laduke)	wa6rnf91-11-26
domae@snow.nrtc.northrop.com (Terry P Domae)	kc6roi92-6-3
marchant@ssl.Berkeley.EDU (Will T Marchant)	kc6rol91-12-31
marchant@sag4.ssl.berkeley.edu (Will T Marchant)	kc6rol92-12-4
marchant@cea.berkeley.edu (Will T Marchant)	kc6rol92-12-4
brian@telebit.com (Brian P Lloyd)	wb6rqn91-10
stan@service.West.Sun.COM (Stan G Galonski)	kb6rqz92-11-22
stever@hp-ptp.HP.COM (Steve T Roth)	kc6rsc91-12-14
bmp@hp-ptp.HP.COM (Brian M Perkin)	n6rsw 91-12-7
bmp@pollux.svale.hp.com (Brian M Perkin)	n6rsw 92-11-15
wb6rth@tapr.ampr.org (Mike L Lee)	wb6rth93-1-5
jerry@key.COM (Jerry R Pendleton Jr)	kc6rto 92-2-6
72110.11@CompuServe.COM (Jerry P Pendleton Jr)	kc6rto92-2-6
rafferty@dish.jpl.nasa.gov (Mike H Rafferty)	wa6ruq92-2-9
allenf@oet1.scf.lmsc.lockheed.com (Allen B Fugelseth)	wb6rwu92-2-25
tconboy@nv2.uswnvg.com (Terry A Conboy)	n6ry 92-6-2
tconboy@uswnvg.com (Terry A Conboy)	n6ry 92-12-25
spikes@hpscit.sc.hp.com (Bill F Spikes III)	wb6rzg92-6-29
stevew@netcom.com (Steven D Wilson)	ka6s 92-5-23
stan@hprpcd.rose.hp.com (Stan T Witherspoon)	n6sce 92-2-3
holly@hpcupt1.cup.hp.com (Merle Jim Hollenback)	wa6sdm92-8-8
wills@netcom.com (Dave J Wills)	kc6sfq 92-8-8
wales@CS.UCLA.EDU (Rich B Wales)	wa6sga92-8-5
james@netcom.COM (James L Paul)	n6siw 92-3-26
72767.3436@CompuServe.COM (James L Paul)	n6siw 92-3-26
wille@hpcc01.corp.hp.com (Ross M Wille)	n6sjd 92-4-25
wille@hpcuhe.cup.hp.com (Ross M Wille)	n6sjd 92-3-17
jeffj@seeker.mystic.com (Jeffrey N Jones)	kc6skv/ae/ab6mb

92-7-20

bobt@bach.net.com (Bob Tykulsker) km6so 92-11-20@  
bobt@net.com (Bob Tykulsker) km6so 92-11-20@  
johnm@jetsun.weitek.COM (John B Mcleod) n6rcd 92-9-6  
CSMSCST@MVS.OAC.UCLA.EDU (Chris S Thomas) aa6sq 92-11-29  
matthew@ucscb.ucsc.edu (Matthew T Kaufman) ka6sqq92-1-2  
abeals@catnip.berkeley.ca.us (Andrew Scott Beals) kc6sss92-8-18  
abeals@autodesk.com (Andrew Scott Beals) kc6sss91-12-20  
asb@telebit.com (Andy Scott Beals) kc6sss92-10-22  
kc6sss@catnip.berkeley.ca.us (Andrew Scott Beals) kc6sss92-11-22  
shibumi@net.bio.net (Kenton A Hoover) kc6sst 92-9-4  
shibumi@joes.garage.com (Kenton A Hoover) kc6sst92-9-4  
shibumi@kc6sst.ampr.org (Kenton A Hoover) kc6sst92-9-4  
mcgrew@gvg47.gvg.TEK.COM (Bruce K McGrew) n6ssu 92-7-8  
jeffl@comix.UUCP (Jeff I Liebermann) wb6ssy 92-5-  
11  
pineapp@netcom.COM (Daniel L Curry) wb6stw92-5-21  
rnielsen@tapr.ampr.ORG (Bob D Nielsen) w6swe 92-10-12  
71540.2364@Compuserve.Com (Bob D Nielsen) w6swe 93-1-5  
bob@tardis.video.ARizona.EDU (Bob D Nielsen) w6swe 92-11-20  
w6swe@tapr.ampr.org (Bob D Nielsen) w6swe 93-1-5  
0060880@CCMAIL.EMIS.hac.com (Bob D Nielsen) w6swe 93-1-17  
techie@netcom.com (Bob A Vaughan) kc6sxc92-9-23  
techie@well.sf.ca.us (Bob A Vaughan) kx6sxc 91-11-  
6  
techie@w6yx.Stanford.EDU (Bob A Vaughan) kc6sxc92-9-23  
jliston@megatest.UUCP (Jim E Liston) kc6sxh 91-11-  
21  
kirk@enterprise.Eng.Sun.COM (Kirk R DeHaan) n6sxr 92-5-10  
W.BRANNICK@<GENIE> (Bill L Brannick) kc6sze 92-9-5  
jerryb@jerber.sandiego.sgi.com (Jerry P Bransford) kc6tay92-10-31  
pst@cisco.com (Paul S Traina) kc6tcn 92-4-  
25  
collins@sono.uucp (Michael J Stratford Collins) kc6tcu91-10  
PAT@POMONA.CLAREMONT.EDU (Pat J Flannery) kc6tdr92-5-19  
PFlannery@HMCVAX.Claremont.EDU (Patrick J Flannery) kc6tdr92-5-28  
Pat@Pomona.Claremont.EDU (Patrick J Flannery) kc6tdr92-5-28  
singer@ibm.com (David S Singer) n6tfx 91-12-7  
R.SHERMAN@<GENIE> (Rick M Sherman) kc6tgb92-9-5  
armyrman@vmsclst1.sc.csupomona.edu (Alex R Myrman) kc6tmb92-12-3  
armyrman@csupomona.edu (Alex R Myrman) kc6tmb 92-12-  
3  
tcg060@ipl.jpl.nasa.gov (Tom C Greer) kc6tml 92-7-3  
lkawamot@zeus.calpoly.edu (Len Kawamoto) n6tql/kb6wqd93-1-8  
lkawamot@polyslo.calpoly.edu (Len Kawamoto) n6tql/kb6wqd93-1-8  
lkawamot@athena.calpoly.edu (Len Kawamoto) n6tql/kb6wqd93-1-8  
faunt@cisco.com (Doug Faunt Jr) n6tqs 92-10-27  
faunt@dirtd.cisco.com (Doug Faunt Jr) n6tqs 92-12-23  
faunt@netcom.Netcom.COM (Doug Faunt Jr) n6tqs 92-12-25  
medin@cod.NOSC.MIL (Ted Medin) n6trf 91-12-7  
tonyz@hpwrce.mayfield.hp.com (Tony M Zugates) wb6tru92-12-20  
stu@Tandem.com (Stuart G Phillips) n6tto 91-12-7  
wdh@oversteer.Eng.Sun.COM (William Dennis Henderson) n6ttw 93-1-14  
kenw@col.hp.com (Ken D Wyatt) wa6tty 92-9-1  
nh6tw@uhm.ampr.org (Dameon D Welch) nh6tw 91-12-7  
Joe\_Red@3mail.3com.COM (Joe L Reda) kc6txu 92-12-  
15

Dan.Pritchett@EBay.Sun.COM (Dan L Pritchett)	kc6txz92-5-6
D.PRITCHETT3@<Genie> (Dan L Pritchett)	kc6txz 92-9-5
dlp@zule.Eng.Sun.COM (Dan L Pritchett)	kc6txz 92-8-
14	
kchen@Apple.COM (Kok S Chen)	aa6ty 92-5-29
tonyb@novell.COM (Tony D Bamberger)	n6tyg 91-12-7
mikeh@sdd.hp.com (Mike L Hoggatt)	kc6tyx92-5-24
sjhawk2@pacbell.com (Steve J Hawkins)	wv6u 91-12-7
pbhyf!sjhawk2@ns.PacBell.COM (Steve J Hawkins)	wv6u 92-12-29
sjhawk@pbhyf.UUCP (Steve J Hawkins)	wv6u 92-12-29
gemeadj@pbhye.PacBell.COM (Gil E Mead Jr)	kc6udj91-12-4
admitq@violet.berkeley.edu (Michael S Dahl)	kc6ufr91-12-20
Brad_Foss@qmgate.RedBrick.COM (Brad I Foss)	n6ufz 92-12-2
bfoss@RedBrick.COM (Brad I Foss)	n6ufz 92-12-2
brianm@hprnd.rose.hp.com (Brian D Mahaffy)	n6ugp 91-12-7
gregb@hpsad.sad.hp.com (Greg P Brahms)	wb6uhh 92-8-
14	
kawai@Cslis.Stanford.EDU (Goh Kawai)	n6uok 92-10-19
kawai@speech.sri.com (Goh Kawai)	n6uok 92-10-19
brettb@cruzio.santa-cruz.ca.us (A Brett Breitwieser)	kc6upu91-10
lancelot@cruzio.santa-cruz.ca.us (A Brett Breitwieser)	kc6upu92-9-25
jan@suncad-gw.nwc.navy.MIL (Jan Anthony Barglowski)	kc6uth91-10
ez006683@othello.ucdavis.edu (Daniel D Todd)	kc6uud92-12-30
ddtodd@ucdavis.edu (Daniel D Todd)	kc6uud92-12-30
erik@peewee.nwc.navy.mil (Erik W Van Bronkhorst)	kc6uut92-10-8
n6vbg@debisa (Javier Henderson)	n6vbg 92-3-11
n6vbg@debisa.uucp (Javier Henderson)	n6vbg 92-6-29
jhenderson@pomona.claremont.edu (Javier Henderson)	n6vbg 92-8-8
Butch@qualcomm.com (Lindsay [Butch] A Weaver Jr)	kc6vee92-8-7
dlarsen@ssf-sys.dhl.com (Dave E Larsen)	kc6vhn 92-12-
29	
casc@hpindda.cup.hp.com (David [Cas] M Caswell)	kc6vhq91-10
rmt@svcs1.UUCP (Rich M Tweedie)	k6vkt 92-2-4
rmt@voyager.unet.com (Richard M Tweedie)	k6vkt 92-7-8
Gogian_Yee.ES_GSD/WCO@xerox.COM (Gogian Yee)	kc6vkz92-3-18
hank@well.sf.ca.us (Hank Roberts)	n6vsb 92-2-11
georgez@synopsys.com (George Zafiroopoulos)	kj6vu 92-1-22
self@bastille.ics.uci.edu (John T Self)	kc6vug 91-10
doug@kronos.nisd.cam.unisys.com (Doug B Hardie)	wa6vvv91-10
O.HOEL@<Genie> (Otto Hoel)	kc6vvg 92-9-5
jimallen@hpcuhb.cup.hp.com (Jim J Allen)	kc6vww92-1-7
ALLEN_JIM/HP4700_F2@hpesf.cup.hp.com (Jim J Allen)	kc6vww92-3-2
jimallen@hpcss01.cup.hp.com (Jim J Allen)	kc6vww92-12-11
darrel@dii.com (Darrel J Van Buer)	ki6vy 92-10-22
darrel@palomino (Darrel J Van Buer)	ki6vy 92-7-31
COLE@babette.ISi.EDU (Edwin Randy Cole)	kn6w 91-10
sking@wattres.SJ.CA.US (Steve J King)	kc6wch 92-3-9
mlau@pollux.svale.hp.com (Milton [Mel] J Lau)	kc6wck91-10
orvb@microme.UUCP (Orv K Beach)	wb6wey 91-10
jpotts@hpspdla.spd.HP.COM (John P Potts)	kb6wgl92-5-7
szeto@kilroy.Jpl.Nasa.Gov (James T Szeto)	kc6wik92-12-15
fel@hpcuhe.cup.hp.com (Frank [Skip] E La Fetra Jr)	aa6wk 91-12-6
slafetra@pollux.svale.hp.com (Frank [Skip] E La Fetra Jr)	aa6wk 92-11-6
dspeed@phoenix.princeton.edu (David L Speed)	kc6wki92-2-3
dspeed@usc.pppl.gov (David L Speed)	kc6wki92-2-3
dspeed@well.sf.ca.us (David L Speed)	kc6wki 92-2-3
tomg@hpihoah.cup.hp.com (Tom T Graham)	n6wlf 92-3-17

VFOAO007@VAX.CSUN.EDU (Michael J Reagan)	kk6wo 92-12-24
MReagan@vax.csun.edu (Michael J Reagan)	kk6wo 92-12-24
Larry.Goodwin@f833.n102.z1.fidonet.org (Larry S Goodwin)	kc6wog92-3-3
mont@netcom.com (Mont Pierce)	km6wt 92-7-20@
Hugh_E._Wells.El_Segundo@xerox.COM (Hugh E Wells)	w6wtu 92-8-24
HWells.El_Segundo@xerox.COM (Hugh E Wells)	w6wtu 92-8-2
frankb@hpsad.sad.hp.com (Ethan Frank Ball III)	kc6wug92-8-1
mikey@slic.cts.com (Mike P Shirley)	wb6wui92-12-24
SLIC@<GEnie> (Mike P Shirley)	wb6wui 92-12-
24	
FDBBC@cunyv.cuny.edu (Fred D Bogin)	wa6wup 92-10-
10	
dan@fredf.cts.com (Dan Fettner)	kc6wyz 92-2-9
2542030@MCIMAIL.com (Fried Heyn)	wa6wzo92-9-19
tony@hacgate.scg.hac.com (Tony Reeves)	kk6xc 91-10@
bobt@ism.isc.com (Bob S Teeter)	n6xjj 91-12-7
trop@hls.COM (Troy T Pummill)	n6xmv 92-9-24
dreeves@ese3.ese.ogi.edu (Bryan Doug Reeves)	n6xhw 92-5-9
alan@dtd.es.com (Alan A Brubaker)	k6xo 92-6-11
alan@bambam.es.com (Alan A Brubaker)	k6xo 92-6-11
hlivak@hale.IFA.Hawaii.Edu (Bob Hlivak)	nh6xo 91-10
queue@ucscb.UCSC.EDU (Qarin Van Brink)	n6xzw 93-1-7
garym@telesoft.com (Gary A Morris)	kk6yb 93-1-14
jdm@cadence.com (Joe D Mastroianni)	aa6yd 92-10-31
paluzzi@pioneer.arc.nasa.gov (Peter R Paluzzi)	n6yeo 92-9-23
paluzzi@ames.arc.nasa.gov (Peter R Paluzzi)	n6yeo 92-9-23
billg@hpspddi.spd.hp.com (Bill G Gingras)	kb6yhl91-12-7
hubbell@meltami.dsd.trw.com (Steve Q Hubbell)	kc6yhn91-10
ted@uhccux.uhcc.Hawaii.Edu (Ted A Brattstrom)	nh6yk 91-10
garnet@genghis.borland.com (Garnet R Chaney)	kc6yke92-11-1
garnet@borland.com (Garnet R Chaney)	kc6yke 92-11-
20	
lash1@applelink.apple.com (Rob D Lash)	n6ykh 91-12-7
pvh@apple.com (Pete V Helme)	n6ylj 92-6-29
whinery@hale.ifa.hawaii.edu (Dorrell A Whinery)	nh6yo 91-10
dpepper@ssf-sys.dhl.com (Dave R Pepper)	kc6yod 92-12-
29	
mj@hpihoah.cup.hp.com (Marlin M Jones Jr)	kc6yta91-10
hugo@huge.West.Sun.COM (Osvaldo Hugo Tafel)	n6ywh 92-2-25
mdbomber@w6yx (Matt J Bartley)	n6ywi 92-5-24
mdbomber@w6yx.stanford.edu (Matt J Bartley)	n6ywi 92-5-24
droid@kerner.com (Marty Brenneis)	kc6yyp92-4-24
labelle@hfglobe.intel.com (George S La Belle)	wb6yzz92-10-27
engle@wdl1.wdl.loral.com (David C Engle)	ke6ze 92-9-21
scotto@ipars.cts.com (Scott A O'Connell)	n6zek 92-1-15
jeff@xanadu.com (Jeff L Crilly)	n6zfx 91-12-7
jeff@markets.amix.com (Jeff L Crilly)	n6zfx 91-12-7
price@nosc.mil (James N Price)	k6zh 92-8-14
SteveSgt@cup.portal.com (Steven Eugene Sergeant)	kc6zkt92-12-13
SteveSgt@torrent.sj.ca.us (Steven Eugene Sergeant)	kc6zkt92-12-13
STEVSERGEANT@<GEnie> (Steven Eugene Sergeant)	kc6zkt92-12-13
Larry.Mc.Donald@ofa123.fidonet.org (Larry E McDonald)	n6zmb/kc6kwy92-12-
30	
mmt@RedBrick.COM (Maxime Taksar)	kc6zps92-12-24
AKBiocca@lbl.gov (Alan K Biocca)	wb6zqz91-11-15
adg@netcom.com (Allan D Grier)	kc6ztw92-7-8
OBERG%GVAX.DEcnet@SCFE.NWC.NAVY.MIL (William K Oberg)	n6ztz 92-8-14

yoony@aix.rpi.edu (Young-Hoon Yoon)	n6zud/2	92-12-
1		
yoony@rpi.edu (Young-Hoon Yoon)	n6zud/2	92-12-
1		
N.STACEY@<GENie> (Niles Greg Stacey)	n6zvz	92-9-5
nh6zw@uhm.ampr.org (Jeff C Miller)	nh6zw/n8/afalhe/afa8jm	91-12-
5		
jmiller@afit.af.mil (Jeffrey C Miller)		
nh6zw/n8/afalhe/afa8jm		92-12-1
## US 7 District		
polari!raoul@polari.UUCP@sumax.seattleu.edu (Jeff E Benedict)	kb7ail	
91-12-7		
raoul@halcyon.com (Jeff E Benedict)	kb7ail	92-8-2
mcdermj@atlantis.CS.ORST.EDU (Jeremy C McDermond)	kb7akh	92-12-29
durr@SSD.intel.com (Jeffrey A Durr)	ka7aku	92-5-6
mustang@sequent.com (Dennis C Johnson)	ka7amz	92-7-
31		
Jim.Colville@f8.n346.z1.fidonet.org (Jim D Colville)	wb7avd	92-12-6
70541.2374@CompuServe.COM (Dan Morrison)	kv7b/kb3uc	93-1-5
kv7b@tapr.ampr.org (Dan Morrison)	kv7b/kb3uc	93-1-5
collier@intl3.hf.intel.com (Collier S C Chun)	nm7b	91-10
JSHCH%ALASKA.BITNET@cornellc.cit.cornell.edu (Herb C Holeman)	wl7bil	
91-10		
JSHCH@acad1.alaska.EDU (Herb C Holeman)	wl7bil	92-10-
31		
flloyd@L1-A.West.Sun.COM (Fred L Lloyd)	aa7bq	92-9-29
flloyd@sunburn.West.Sun.COM (Fred L Lloyd)	aa7bq	92-5-26
Fred.Lloyd@west.sun.com (Fred L Lloyd)	aa7bq	92-9-29
sun!flloyd (Fred L Lloyd)	aa7bq	92-9-29
jimkirk@corral.uwo.edu (Jim R Kirkpatrick)	wb7bup	92-1-17
n7949188@henson.cc.wvu.edu (John B Hatten)	n7bwx	92-9-15
bailey@fenris.com (Kirk A Bailey)	n7ccb	92-8-15
bailey@mist.cs.orst.edu (Kirk A Bailey)	n7ccb	92-8-15
cookav@catapult.anatcp.rockwell.COM (Alan V Cook)	n7ceu	92-12-24
AVCOOK@ananov.remnet.ab.com (Alan V Cook)	n7ceu	92-12-24
AUBMD@acvax.inre.asu.edu (Brett M Duane)	ka7cgb	92-9-4
AUBMD%asuacvax.BITNET@sds.sdsc.edu (Brett M Duane)	ka7cgb	92-9-13
fletcher@moho.uwo.edu (Walter Reid Fletcher)	wb7cjo	92-7-14
root@orbgmcn.uucp (Christopher L McNabb)	kb7dar	92-6-17
lowell@techbook.com (Lowell R Brunson)	kc7dx	92-3-18
mhs@tybalt.caltech.edu (Michael H Stockett)	wa7dyx	91-12-30
john@anasazi.com (John R Moore)	nj7e	92-6-12
john%anasaz.uucp@asuvax.eas.asu.edu (John R Moore)	nj7e	92-6-12
mcdphx!anasaz!john (John R Moore)	nj7e	92-6-12
ames!ncar!noao!asuvax!anasaz!john (John R Moore)	nj7e	92-6-12
jfw@ksr.com (John F Woods)	wb7eel	93-1-
22		
M16146@mwvm.mitre.org (Vernon R Eubanks)	aa7ei	92-8-1
erc@unisl.c.uucp (Ed R Carp)	n7ekg	92-10-6
erc@apple.com (Ed R Carp)	n7ekg	92-10-6
royle@tekig6.PEN.TEK.COM (Roy W Lewallen)	w7el	92-9-29
EZAMBRANO@PimaCC.Pima.EDU (Elio Zambrano)	wb7esq	92-7-3
L.OSBORN@<GENie> (Loren P Osborn)	kb7ex	92-9-5
arthurt@microsoft.COM (Art K Tanaka)	n7exf	91-10
Adam.Humiecki@f833.n102.z1.fidonet.org (Adam L Humiecki)	kf7ez	92-2-13
summers@hpspkla.spk.hp.com (Jim B Summers)	kd7f	92-8-5
slovell@milton.u.washington.edu (Sherman M Lovell)	wy7f/n7mcf	92-12-

15

slovel@u.washington.edu (Sherman M Lovell)	wy7f/n7mcf	92-12-
15		
olsenm@ccmail.orst.edu (Monte B Olsen)	n7ffo	92-9-25
olsenm@ucs.orst.edu (Monte B Olsen)	n7ffo	92-9-26
milewski@oregon.uoregon.edu (Steve C Milewski)	aa7f1	92-5-14
rrich@matt.ksu.ksu.edu (Ron D Richolson)	ka7fya	92-11-22
davew@tfs.com (Dave G Whitlock)	n7fzy	92-8-24
rschetge@arrrl.org (Bob J Schetgen)	ku7g	92-6-29
LJACK@umab.umd.edu (Larry L Jack)	kl7glk	91-10
ps2x@andrew.cmu.edu (Peter John Skelly)	kb7gud	91-12-
7		
tad@ssc.com (Paul [Tad] P Cook III)	kt7h	92-10-12
tad@ssc.wa.com (Paul [Tad] P Cook III)	kt7h	92-5-28
3288544@mcimail.com (Paul [Tad] P Cook III)	kt7h	92-10-12
michaeln@hpcvnb.CV.HP.COM (Mike W Nason)	ka7hbb	92-4-24
dr_who@yoko.stat.orst.edu (Ron R Stillinger)	k7hdk	91-10
toml@midas.WR.TEK.COM (Tom D Luther)	k7hfw	91-10
jhgibee@icarus.weber.edu (Jonathan C Higbee)	n7hgm/ka7vfy	92-12-
24		
washer@sequent.com (Jim W Washer)	kg7hh	93-1-21
keithm@wicat.UUCP (Keith J McQueen)	n7hmf	92-12-23
kmcqueen@Spies.COM (Keith J McQueen)	n7hmf	91-10
UMJW@ASUACAD.BITNET (Mike J Woodward)	aa7hn	92-8-17
jbate@ncrcol.ColumbiaSC.NCR.COM (John Bate)	ki7hs	93-1-15@
ray@ole.UUCP (Ray J Berry)	kb7ht	91-10
phxy@vax5.cit.cornell.edu (Bruce C Fingerhood)	ka7i	91-12-18
brucef@ee.cornell.edu (Bruce C Fingerhood)	ka7i	92-3-2
Bruce_Fingerhood@qmee.mail.cornell.EDU (Bruce C Fingerhood)	ka7i	92-8-8
Jay.Townsend@f3.n346.z1.fido.iea.hmm (Jay W Townsend)	ws7i	92-3-26
Jay.Townsend@f3.n346.z1.spk.wa.us (Jay W Townsend)	ws7i	92-8-5
Jay.Townsend@f3.n346.z1.fidonet.org (Jay W Townsend)	ws7i	92-10-8
Jay.Townsend@f8.n346.z1.fidonet.org (Jay W Townsend)	ws7i	92-12-4
bacat@gtephx.UUCP (Tony J Baca)	wv7i	92-5-28
jimla@tekig1.PEN.TEK.COM (James G Larsen)	n7ihq	92-2-13
rusty%anasaz.uucp@asuvax.eas.asu.edu (Carroll [Rusty] D Carruth Jr)	n7ikq	92-6-12
92-6-12		
anasaz.uucp!rusty@asuvax.eas.asu.edu (Carroll [Rusty] D Carruth Jr)	n7ikq	92-6-12
92-6-12		
rusty@anasazi.com (Carroll [Rusty] D Carruth Jr)	n7ikq	92-6-12
kenk@algedi.UUCP (Ken J Koster)	n7ipb	92-3-30
kenk@algedi.ampr.org (Ken J Koster)	n7ipb	92-9-20
algedi!kenk@Pilchuck.Data-IO.com (Ken J Koster)	n7ipb	92-9-20
mbutts@qcktrn.com (Mike R Butts)	kc7it	92-3-17
mbutts@qcktrn.com (Mike R Butts)	kc7it	92-10-24
mbutts@mbutts.mentorg.com (Mike R Butts)	kc7it	92-10-24
tomb@hplsla.HP.COM (Tom V Bruhns)	k7itm	92-5-14
johnr@tvnews.tv.tek.com (John C Reynolds)	nz7j	92-6-4
wes@hpdmd48.boi.hp.com (Glen Wes Nielson)	wz7j	93-1-9
wes@boi.hp.com (Glen Wes Nielson)	wz7j	93-1-9
feinberg@henson.cc.wvu.edu (Richard Feinberg)	ke7jb	92-12-11
dubner@hpspkla.spk.hp.com (Joe L Dubner)	k7jd	92-2-4
steinman@is.morgan.com (Jan W Steinman)	n7jdb	92-10-8
bytesmiths@aol.com (Jan W Steinman)	n7jdb	92-10-8
crawford@ENUXHA.EAS.ASU.EDU (Brian P Crawford)	kl7jddq	92-8-8
crawford@stjhmc.fidonet.org (Brian P Crawford)	kl7jddq	92-8-8
crawford@pl12.f15.n114.z1.fidonet.org (Brian P Crawford)	kl7jddq	92-8-8

bcrawf01@apsc.com (Brian P Crawford)	kl7jddq	92-8-8
gaulandm@tekig7.MAP.TEK.COM (Mike A Gauland)	aa7jff	91-10
gaulandm@tekig7.PEN.TEK.COM (Mike A Gauland)	aa7jff	93-1-5
ddr@flux.isr.alaska.edu (Donald D Rice)	kl7jjiq	91-10
ffjal@alaska.edu (John A Lehman)	al7jjj	92-7-31
donnyj@milton.u.washington.edu (Donald J Sudy)	kb7jka	92-3-17
markm@mesasrv1.sps.mot.com (Mark E Monninger)	kg7jl	92-2-13
markm@bigfoot.sps.mot.com (Mark E Monninger)	kg7jl	93-1-12
rapw20@email.sps.mot.com (Mark E Monninger)	kg7jl	93-1-12
ifjrs@acad3.alaska.edu (John R Stannard)	kl7jl	92-12-1
john@n7kbt.rain.com (John G Opalko)	n7kbt	92-11-24
wi.5327@n7kbt.rain.com (John G Opalko)	n7kbt	92-10-22
news@n7kbt.rain.com (John G Opalko)	n7kbt	92-12-24
mhughes@loft386.uucp (Mike H Hughes)	w7kcb	91-10
GIDEN@WSUVM1.CSC.WSU.EDU (Robert E Giden)	n7kcg	92-3-3
jferguso@microndns.micron.com (John P Ferguson)	ka7kge	92-5-6
caf@omen.UUCP (Chuck A Forsberg)	wa7kgx	92-12-13
caf@omen.COM (Chuck A Forsberg)	wa7kgx	91-10
tektronix!reed!omen!caf (Chuck A Forsberg)	wa7kgx	92-12-13
garfield@sunspot.noao.edu (Brian D Armstrong)	ka7kpn	92-5-10
brown@hpspkla.spk.hp.com (Pat R Brown)	n7krq	92-4-24
full_gl@pts.mot.com (Glen Fullmer)	wa7kse	92-12-28
glen_fullmer@pts.mot.com (Glen Fullmer)	wa7kse	92-12-
28		
hcooper@javelin.sim.es.com (Harrison R Cooper Jr)	n7kst	92-9-25
Anthony.Seebeck@f7009.n124.z1.fidonet.org (Anthony G Seebeck)	aa7kv/ki5tk	
92-12-29		
charlier@hplsla.hp.com (Charlie R Panek)	kx7l	92-8-19
charlier@lsid.hp.com (Charlie R Panek)	kx7l	92-8-19
Larry.Lund@f97.n105.z1.therose.fidonet.org (Larry J Lund)	n7lbp	92-5-26
Larry.Lund@p12.f97.n105.z1.fidonet.org (Larry J Lund)	n7lbp	92-12-21
Larry.Lund@p12.f79.n105.z1.fidonet.org (Larry J Lund)	n7lbp	92-12-28
joehol@microsoft.com (Joseph R Holman)	ka7ldn	92-1-
10		
zardo@rx-db.hf.intel.com (Jim L Garver)	wa7ldv	92-10-28
zardo@rx-db (Jim L Garver)	wa7ldv	92-10-
28		
zardo@hfglobe.intel.com (Jim L Garver)	wa7ldv	92-12-
11		
larryj@countach.telcom.tek.com (Larry R Johnson)	k7lj/7jlacp	92-10-
22		
petrisko@evax2.engr.arizona.edu (William J Petrisko)	n7lwo	92-10-8
uunet!4gen!warlok!gargle!omnise!thumper!bill (William J Petrisko)	n7lwo	
92-10-8		
tcmaint@pogo.wv.tek.com (Terry R Burge)	ki7m	92-10-22
bruce@tekgen.bv.tek.com (Bruce W Cheney)	ni7m	92-5-23
Pat.Dockrey@f3.n346.z1.fido.iea.hmm (Raymond Pat Dockrey)	nq7m	92-3-12
cle@doc.bmd.trw.com (Cory K Lee)	kb7mac	92-11-18
Clee@oz.bmd.trw.com (Cory K Lee)	kb7mac	92-11-18
mostler@omega.sim.es.com (Mike J Ostler)	n7mel	92-7-8
barry@hpdmd48.boi.hp.com (Barry D Kurtz)	n7mkn	91-12-7
kp2a@andrew.cmu.edu (Keith T Poole)	k7moa/3	92-7-
31		
kp2a+@andrew.cmu.edu (Keith T Poole)	k7moa/3	92-8-
14		
pfowler@hpdmd48.boi.hp.com (Pat Fowler)	n7mps	92-6-29
sxb@inel.gov (Steven R Bryan)	n7mpy	92-10-6



peterk@seanews.akita.com (Peter A Klein)	kd7mw 92-11-20
greyfox@nevada.edu (Jim E Williams)	kf7mw 91-12-20
bobw@cc.usu.edu (Bob J Wood)	wa7mxz 91-10
frohro@wwc.edu (Henry Rob Frohne)	kl7na 92-12-22
neilr@tekgen.BV.TEK.COM (Neil A Robin)	wa7nbf 91-10
henryk@MILORI.CCIT.ARIZONA.EDU (Henry R Knoepfle)	kb7nie93-1-5
d38987@proteus.pnl.GOV (Ron B Melton)	n7niq 92-9-11
rb_melton@pnl.gov (Ron B Melton)	n7niq 92-9-11
sltmw@cc.usu.edu (Wulf, Daniel D Holmes in CB)	n7nkr 93-1-15?
sltmw@cache.declab.usu.edu (Wulf)	n7nkr 93-1-15?
T.BELSAN1@<Genie> (Tom D Belsan)	kb7nrg92-9-5
MV012841@NDSUVM1.BITNET (Greg L Woods Jr)	n7nvx 92-2-21
GWOODS@NDSUVM1.BITNET (Greg L Woods Jr)	n7nvx 92-12-4
gwoods@vml.nodak.edu (Greg L Woods Jr)	n7nvx 92-12-4
vodall@hpbv.fc.hp.com (Bill L Vodall)	wa7nwp 92-5-
23	
vodall@hpfco.FC.HP.COM (Bill L Vodall)	wa7nwp 91-10
datwyler@javelin.sim.es.com (Doug L Datwyler)	wr7o 92-5-7
ckranz@Auspex.COM (Chuck R Kranz)	wa7oef92-11-22
wa7oef!chuck@auspex.com (Chuck R Kranz)	wa7oef 92-11-
22	
chuck%wa7oef@sanjose.ampr.org (Chuck R Kranz)	wa7oef92-11-22
johann@nevada.edu (Jason W Cathcart)	n7ojn 92-5-9
MAS059@MIPL5.JPL.NASA.GOV (Marc A Sarrel)	n7oli 92-1-25
hnk@pine.circa.ufl.edu (Hamid N Khan)	n7olj 92-1-7
bem00@charon.amdahl.com (Brent E Miller)	n7olq 92-1-8
dalyb@gtephx.UUCP (Brian K Daly)	wb7oml91-10
fesmith@tramp.Colorado.EDU (Frank E Smith)	wb7ote91-12-7
fesmith@boulder.colorado.edu (Frank E Smith)	wb7ote92-10-22
bobh@cup.hp.com (Charles Bob Headrick)	wa7ovu 92-6-3
bobh@hpcupt1.cup.hp.com (Charles Bob Headrick)	wa7ovu92-6-3
dale@sequent.com (Dale E Mosby)	n7pex 92-9-29
netmail!dale@sequent.com (Dale E Mosby)	n7pex 92-12-2
rrgd50@email.sps.mot.com (Chris Terwilliger)	kb7ppt92-10-15@
joberreu@sumax.seattleu.edu (Jesse Oberreuter)	kb7psg92-9-22@
joberreu@seattleu.edu (Jesse Oberreuter)	kb7psg92-9-22@
R.MORROW10@<Genie> (Bob T Morrow)	n7ptm 92-9-5
jerry@jaizer (Jerry G Gaiser Jr)	n7pwf 91-12-7
jerryg@ssd.intel.com (Jerry G Gaiser Jr)	n7pwf 92-8-12
davidc@hplsla.hp.com (David Cook)	kb7qcl92-10-18@
davidc@lsid.hp.com (David Cook)	kb7qcl 92-10-
18@	
andersen@hpspkrb.spk.hp.com (Brad E Andersen)	n7qfl 92-3-3
angerhof@dsd.es.com (Norman Angerhofer)	aa7qg 92-10-1@
cjackso@uswnvg.UUCP (M Clay Jackson)	n7qnm 92-8-14
cjackso@nv6 (Clay Jackson)	n7qnm 92-8-14
miked@hp-vcd.HP.COM (Mike D Dobbs)	n7qqi 91-10
tlanders@atlastele.com (Troy Landers)	kb7qwe 92-12-
18@	
R.SCHAHNER@<Genie> (Roy D Schahner)	n7qyk 92-9-5
chuckb@tc.fluke.COM (Chuck D Bowden)	wb7r 92-1-7
mj_peterson@pnl.gov (Marty J Peterson)	wi7r 91-12-27
d3c054@carbon.pnl.gov (Marty J Peterson)	wi7r 91-12-27
cmdorat@tc.fluke.COM (Richard J Kowalsky)	n7ray 92-8-5
markz@ssc.wa.com (Mark S Zenier)	n7rcx 92-9-28
mzenier@polari.UUCP (Mark S Zenier)	n7rcx 91-10
markz@ssc.com (Mark S Zenier)	n7rcx 92-9-28

ronk@cascade.ens.tek.com (Ron C Kirkpatrick)	n7rfa 92-8-20
Ron.C.Kirkpatrick@tek.com (Ron C Kirkpatrick)	n7rfa 92-8-20
ronk@zephyr.ens.tek.com (Ron C Kirkpatrick)	n7rfa 92-1-13
JSDCF2%ALASKA.BITNET@cornellc.cit.cornell.edu (Duncan C Fowler)	kl7rh 91-10
king@hpdml48.boi.hp.com (Steve P King)	kd7ro 92-2-13
bruceo@isc-br.ISC-BR.COM (Bruce J Oscarson)	n7rwo 91-11-9
tk@sequent.com (Tom E Kloos)	ws7s 91-12-7
kohlwey@nu.sim.es.com (Randolph J Kohlwey)	n7sfi 92-6-17
Daniel.N.Law@dartmouth.edu (Daniel N Law)	wlet/ka7sfr 92-10-
22	
ckinsman@yoda.eecs.wsu.edu (Chris L Kinsman)	n7sie 91-10
scxc3@tincan-sawyer.af.mil (MSgt Michael A Barnes)	wa7skg92-3-12
LWRCLMR@strathost.stratcom.af.mil (MSgt Michael A Barnes)	wa7skg92-8-1
tea6219@evtprp0b (Terry E Acker)	kg7sp 91-10
jeffh@oregon.uoregon.edu (Jeff L Hite)	kf7sz 92-1-26
jeffh@ludwig.uoregon.edu (Jeff L Hite)	kf7sz 92-6-2
jeffh@ludwig.cc.uoregon.edu (Jeff L Hite)	kf7sz 92-11-22
mgustof@hfglobe.intel.com (Mark E Gustoff)	wo7t 92-2-20
Cynthia_Varnay@ccm.hf.intel.com (Cynthia B Varnay)	wu7t/kb7dve 93-1-
12	
CVARNAY@AZ.intel.com (Cynthia B Varnay)	wu7t/kb7dve 92-12-
30	
stoll@ocf.berkeley.edu (Cliff P Stoll)	k7ta 93-1-11
crh@hpcvaac.cv.hp.com (Clyde Ron Henderson)	wa7tas92-9-27
crh@cv.hp.com (Clyde Ron Henderson)	wa7tas92-9-27
C.NEHRBASS@<GENie> (Charles R Nehrbass)	n7tgb 92-9-5
sped@cc.usu.edu (Bruce A Jones)	n7tkx 91-10
sl8wm@cc.usu.edu (Bruce A Jones)	n7tkx 92-7-31
rstory@milkyway.mentorg.com (Ron N Story)	n7tlc 92-4-1
choke@milton.u.washington.edu (Carl H Okerstrom)	n7tpy 91-12-14
ddodell@stjhmc.fidonet.org (David S Dodell)	wb7tpy92-1-26
david@stat.com (David S Dodell)	wb7tpy 93-1-
18	
ddodell@stat.com (David S Dodell)	wb7tpy92-11-1
dlim@BBN.COM (Denny Y Lim)	wa7tqs 91-10
A.CHING3@<GENie> (Anthony B Ching Jr)	n7tuh 92-9-5
R.KELLER12@<GENie> (Richard A Keller)	w7twu 92-9-5
jeffl@servprod.inel.gov (Jeff B Later)	wb7tza 91-10
freeman@watsun.cc.columbia.EDU (J Mike Freeman)	k7uij 92-12-24
k7uij@pacifier (J Mike Freeman)	k7uij 91-10
M.FREEMAN11@<GENie> (J Mike Freeman)	k7uij 92-12-24
mikef@pacifier.rain.com (J Mike Freeman)	k7uij 92-12-24
mcronenw@pyramid.pyramid.com (Mark D Cronenwett)	ka7uld91-10
skimmel@amex-trs.com (Steve J Kimmel III)	n7ulw 91-12-24
watson@intermec.com (Bob B Watson)	n7umu 91-12-5
CRAWFORD@ritchie-emh1.army.mil (Jerry E Crawford)	k7upj 92-6-3
70521.2356@Compuserve.COM (Jerry E Crawford)	k7upj 93-1-5
k7upj@tapr.ampr.org (Jerry E Crawford)	k7upj 93-1-5
tatsuya@hamblin.math.byu.edu (Tatsuya Kawasaki)	n7uqj 91-11-25
daveb@SSD.intel.com (David J Billstrom)	n7uuk 92-5-16
sergio@sail.LABS.TEK.COM (Sergio A Sanielevici)	n7uuo 91-12-4
kb7uv@panix.com (Andy R Funk)	kb7uv 92-11-18
rwc9664@evtprp0b (Robert W Carey)	n7uvn 92-6-2
John_Hays@NeXT.COM (John D Hays)	kd7uw 92-12-15
72725.424@Compuserve.Com (John D Hays)	kd7uw 92-12-13
hays@genie.geis.com (John D Hays)	kd7uw 92-12-13
gvogel@csulx.weber.edu (George Vogel)	n7vcz 92-12-15@

george@sunstone.uucp (George Vogel)	n7vcz 92-12-15@
george@mastersa.UUCP (George Vogel)	n7vcz 92-12-15@
cnelson@sedona.intel.com (Chris Nelson)	n7vec 92-3-5@
day@william.vancouver.wsu.edu (Steve Day)	n7vhy 92-5-10@
notes@hpcvix.cv.hp.com (Rich E Lovin)	n7viy 92-4-24
notes@hpcvnb.CV.HP.COM (Rich E Lovin)	n7viy 92-10-27
awk@sequent.com (Dave Aucsmith)	n7vkc 91-12-31@
slp9m@cc.usu.edu (Scott E Parker)	wa7vyj91-10
gayhart@mailhub.scf.lmsc.lockheed.com (Bill C Gayhart)	wz7w 92-5-28
dsiler@col.hp.com (Dan Siler)	n7wbg 92-5-16@
cuddeback@merlin.nmhu.EDU (Ken R Cuddeback Sr)	nl7wd 93-1-14
a-kevinp@microsoft.com (Kevin Purcell)	n7wim/g8udp 93-1-
23@	
scotthon@microsoft.COM (Scott Honaker)	n7wlo 93-1-5@
marshall@hplsla.hp.com (Marshall Lollis)	n7wvf 92-6-17@
andrem@pyramid.com (Andre J Molyneux)	wa7wvv 91-10
richw@hplsla.hp.com (Rich Wilson)	n7wwu 92-10-22@
richw@hplsla.lsid.HP.COM (Rich Wilson)	n7wwu 92-10-22@
thorn@iastate.edu (Bob W Thornburg)	ka7www/0 92-3-
30	
steveh@hpcvra.cv.hp.com (Steve L Harper)	kf7wy 92-8-16
danb@cv.hp.com (Dan Bjerke)	n7xaf 92-5-26@
danb@hpcvnb.CV.HP.COM (Dan Bjerke)	n7xaf 92-5-28@
islej@acad2.alaska.edu (Loren E Johnson Jr)	nl7xf 92-10-13
cberthel@cc.utah.edu (Cheryl Berthel)	n7xhz 92-5-16@
jtilton@willamette.edu (James Tilton)	n7xir 92-4-27@
davidbro@microsoft.com (David D Brown)	n7xjc 92-7-20@
brad@microm.UUCP (Bradley W Fisher)	n7xss 92-8-1@
brad@microm.tnet.com (Bradley W Fisher)	n7xss 92-12-15@
brad@bradf.uucp (Brad W Fisher)	n7xss 92-12-15@
asuvax!ennews!telesys!microm!brad (Brad W Fisher)	n7xss 92-12-15@
schuch@phx.mcd.mot.com (John R Schuch)	n7xvs 93-1-7@
schuch@mcdphx.mot.com (John R Schuch)	n7xvs 92-11-4@
70733.3330@CompuServe.COM (John R Schuch)	n7xvs 93-1-7@
smesko@hpdmd48.boi.hp.com (Steve P Mesko)	wb7y 91-12-7
miked@nauvax.ucc.nau.edu (Mike Dougherty)	n7yir 92-7-14@
cvm@nauvax.ucc.nau.edu (Chris V Michels)	n7yiu 92-7-31@
mcross@hpcvnb.CV.HP.COM (Minor W Cross)	kd7yj 92-2-20
kanefsky@src.honeywell.com (Steve Kanefsky)	n7ykg 92-5-28@
derry@milton.u.washington.edu (Derry Lyons)	n7ypg 92-6-24@
ed@imp.pnl.GOV (Edward W Kleckner)	n7yqr 93-1-5@
ew_kleckner@pnl.gov (Edward WKleckner)	n7yqr 92-10-26@
ew_kleckner@pnl.gov (Edward W Kleckner)	n7yqr 93-1-5@
N7YQR@amsat.org (Edward W Kleckner)	n7yqr 93-1-5@
vyankey@hal.gnu.ai.mit.edu (Vincent Lee Yankey)	n7yvl 92-11-27@
vyankey@gnu.ai.mit.edu (Vincent Lee Yankey)	n7yvl 92-12-24@
an511@freenet.cwru.edu (Vincent Lee Yankey)	n7yvl 92-12-24@
rwd@gnu.ai.mit.edu (Rob)	n7yvm 92-12-11@
bobc@hplsla.hp.com (Bob T Cutler)	ke7zj 92-10-18
griff@littlei.intel.com (Thomas [Griff] G Griffin III)	n7zkl 92-7-8@
michaelb@wshb.csms.com (Michael R Batchelor)	ka7znz91-10
WEBBG@wsuvml.csc.wsu.edu (Geoffrey Webb)	n7zrr 93-1-8@
rrbk50@email.sps.mot.com (Rick Cottle)	n7zsd 92-12-18@
cottle@prism.sps.mot.com (Rick Cottle)	n7zsd 92-12-18@
## US 8 District	
clemens@acpwwv.UUCP (Rich C Clemens)	kb8aob 91-12-

uupete@ariel.lerc.nasa.gov (F Pete Michaelis)	n8atr 91-12-18
swood@vela.acs.oakland.edu (Scott W Wood)	wq8b 92-5-28
nutter@a.coe.wvu.wvnet.edu (Roy S Nutter Jr)	n8bhi 91-10
kd8@cbnews.cb.att.com (Martin E Hartwell)	kd8bj 92-8-14
ac873@cleveland.Freenet.Edu (Thomas R Kimball)	ka8bzb91-10
isoper@matrix.cs.wright.edu (Ivan W Soper)	wb8ceh92-7-26
chutch@arrl.org (Chuck L Hutchinson)	k8ch 92-6-29
BAKER@LECS.ERICSSON.SE (Mike A Baker)	w8cm 92-7-3
b-banko@uiuc.edu (Bradley T Banko)	kb8cne92-4-8
kb8cne@uiuc.edu (Bradley T Banko)	kb8cne92-4-8
btbg1194@uxa.cso.uiuc.edu (Bradley T Banko)	kb8cne92-4-8
vjh21@cas.org (Vince J Herried)	ka8cte 92-7-3
kjh@pollux.usc.edu (Kenneth J Hendrickson)	n8dgn 92-7-31
kjh@usc.edu (Kenneth J Hendrickson)	n8dgn 92-7-31
kjh@gringo.usc.edu (Kenneth J Hendrickson)	n8dgn 92-7-31
76556.2225@Compuserve.com (Chuck P Scott)	n8dnx 92-5-29
rab@hal.cwru.edu (Roger A Bielefeld)	aa8dv 92-9-24
wrb@cbnews.cb.att.com (Wallace R Blackburn)	aa8dx 92-5-1
gerry@bluemoon.rn.com (Gerard M Foley)	k8ef 92-10-29
gerry@bluemoon.use.com (Gerard M Foley)	k8ef 92-9-15
gerry@bluemoon.rn (Gerald M Foley)	k8ef 92-10-29
RDRNBS@legacy.Calvin.EDU (Robert J Doornbos)	ka8eit93-1-21
rdrnbs@calvin.edu (Robert J Doornbos)	ka8eit 93-1-
21	
gws@n8emr.cmhnet.org (Gary W Sanders)	n8emr 93-1-8
gws@n8emr.columbus.oh.us (Gary W Sanders)	n8emr 92-7-8
72277.1325@CompuServe.COM (Gary W Sanders)	n8emr 93-1-8
flash@lopez.UUCP (Gary T Bourgois)	wb8eoh91-10
Dave.Beaujean@davespc.UUCP (Dave M Beaujean)	n8epf 91-12-20
Bob_Dixon@osu.edu (Bob S Dixon)	w8erd 91-10
kelsey@teal.csn.org (Bill M Kelsey)	n8et 92-10-22
mike@hernix.org (Mike A Herman)	wb8evi 92-7-
31	
tlhst10@vm2.cis.pitt.edu (Terry L Huston)	w8fk 91-10
w8fk@hpb.cis.pitt.edu (Terry L Huston)	w8fk 91-10
n8fow@n8fow.ampr.ORG (Ron C Atkinson)	n8fow 91-10
au351@po.cwru.EDU (Ron C Atkinson)	n8fow 91-11-12
ron@chaos.eng.wayne.EDU (Ron C Atkinson)	n8fow 93-1-18
wb8foz@mthvax.cs.miami.edu (David Leshner)	wb8foz91-10
wb8foz@skybridge.SCL.CWRU.Edu (David Leshner)	wb8foz92-10-13
gurney@eeceae.msu.edu (Eddy J Gurney)	n8fpw 91-10
tdle+@andrew.cmu.edu (Thomas Alan Dockstader)	kb8fta92-5-28
flbbs!todd.zelasko@ncoast.ORG (Emil Todd Zelasko)	ka8gef93-1-8
strohs@STROHPUB.COM (Steve Stroh)	n8gnj 93-1-24*
rdale@nyx.cs.du.edu (Robert P Dale)	n8gsk 92-9-25
rdale@attserv.atms.purdue.edu (Robert P Dale)	n8gsk 92-9-25
rdale@mentor.cc.purdue.edu (Robert P Dale)	n8gsk 92-2-3
74010.302@compuserve.com (Robert P Dale)	n8gsk 92-9-25
L.SMITH11@<Genie> (Larry D Smith)	kb8gt 92-9-5
rlong@magnus.acs.ohio-state.edu (Ronald K Long)	w8gus 92-3-3
lwwald@lims01.lerc.nasa.gov (Larry W Wald)	ke8gw 92-9-14
am454@cleveland.Freenet.Edu (Jonathan K Long)	n8gxz 92-3-7
ad815@yfn.ysu.edu (John S Kennedy)	kb8gys92-6-3
kimc@w8hd.org (Kim P Culhan)	w8hd 92-11-6
sbbrown@magnus.acs.ohio-state.edu (Stephen B Brown)	n8hfi 92-11-15
tshrilla@magnus.acs.ohio-state.edu (Thomas R Shrilla)	wb8hjl92-11-28
WARNER@OHIO.GOV (Bill Warner III)	n8hjp 91-10

mdr4@po.CWRU.Edu (Mark D Rutherford)	kb8hnh	92-2-
20		
hideg@spsd4360a.erim.org (Istvan [Steve] G Hideg)	n8hsc	92-8-6
hideg@spsd630a.erim.org (Istvan [Steve] G Hideg)	n8hsc	92-11-3
tbell@ncoast.ORG (Terry L Bell)	n8hsp	91-11-18
ab617@cleveland.freenet.edu (Terry L Bell)	n8hsp	91-11-18
usenet.ins.cwru.edu!ncoast!n8hsp!tbell (Terry L Bell)	n8hsp	91-12-31
B.Staff@zds.com (Brad Staff)	aa8if	92-10-8@
bjstaff@zds-ux.UUCP (Brad Staff)	aa8if	92-10-8@
bjstaff@zds-ux.zds.com (Brad Staff)	aa8if	92-10-8@
bjstaff@zds-ux.mi04.zds.com (Brad Staff)	aa8if	92-10-8@
bluemoon.rn.com!copi3b2!copi!bob (Bob Williams) ?/wn8ifu/wn8rlh		91-12-30@
nyoung@desire.wright.edu (Nils R Young)	wb8ijn	92-3-
26		
furtaw@comm.mot.com (Bob W Furtaw)	w8il	92-9-12
sford@arrl.org (Steve R Ford)	wb8imy	92-7-
14		
R0264@vmcms.csuohio.edu (Phil L Emerson)	wd8iza	92-12-19
fmfedor@sven.lerc.nasa.gov (Alvin Wayne Fedor)	n8jga	93-1-5
n8jga@sven.lerc.nasa.gov (Alvin Wayne Fedor)	n8jga	93-1-5
JKERR45069@<GENie> (John J Kerr III)	n8jk	92-9-5
chuck@cmhcsys.cmhcsys.com (Chuck Stickelman) ?/wd8jpr		92-12-11@
chuck@cmhcsys.com (Chuck Stickelman)	?	wd8jpr 92-12-
11@		
roth@smoot.enet.dec.com (Lee W Roth III)	n8jqy	91-12-7
jsamul@mtu.edu (John A Samuli)	n8js	92-11-27
bl528@cleveland.Freenet.Edu (Ken A Meinken)	wa8jxm	92-2-11
leadfoot@lectroid.sw.stratus.com (Mark A Curtis)	we8k	92-2-20
payne@tc.cornell.edu (Andrew C Payne)	n8kei	92-2-13
payne@crl.dec.com (Andrew C Payne)	n8kei	92-9-25
Healy@Moriah.unr.edu (Bill R Healy)	n8khn	92-2-24
healy@moriah.ee.UNR.EDU (Bill R Healy)	n8khn	93-1-26
GORDDA@legacy.Calvin.EDU (Dan L Gordon)	kb8kky	93-1-
24		
gordda@calvin.edu (Dan L Gordon)	kb8kky	93-1-24
K.KEMPER1@<GENie> (Keith K Kemper Jr)	n8kol	92-9-5
pfluegerm@gtephx.UUCP (Mike W Pflueger)	wd8kpz	91-10
rat1969@lims03.lerc.nasa.gov (Richard A Tyo)	kc8l	91-10
decarlis@mtu.edu (Daniel E Carlisle)	wk8l	92-2-21
95cms@cs.williams.edu (Charles Matt Schroth)	wt8l	92-2-3
LSPRINGSTEEN@wsmr-simtel20.army.mil (Larry L Springsteen)	wb8lbz	91-10
walborn@cs.pitt.edu (Gary D Walborn)	wb8lea	91-10
me_palmer@a.coe.wvu.wvnet.edu (George M Palmer)	k8lg	91-10
AMELMN02@ysub.yzu.edu (James K Chapman)	n8lgv	92-1-4
rrk@cblpf.att.com (Robert R Kenyon)	k8lj	92-2-3
grebus@edwin.enet.dec.com (Gary L Rebus)	k8lt	91-12-6
grebus@isis1.bxb.dec.com (Gary L Grebus)	k8lt	93-1-26
grebus@isis1.enet.dec.com (Gary L Grebus)	k8lt	93-1-26
glg@balrog.k8lt.ampr.org (Gary L Grebus)	k8lt	93-1-26
achaboty@desire.wright.edu (Andrew S Chaboty)	kb8luq	92-2-14
lydic@ka8lvz.uucp (John W Lydic Jr)	ka8lvz	92-9-20
lydic@ka8lvz.cmhnet.org (John W Lydic Jr)	ka8lvz	92-9-20
JROBBINS@MPS.OHIO-STATE.EDU (James A Robbins)	wd8lwh	92-10-6
ag807@cleveland.Freenet.Edu (Steve W Wolf)	no8m	92-5-21
flbbs!larry.mittman@ncoast.ORG (Larry H Mittman)	n8mgu	92-10-26
bwc@chickadee.icd.ab.com (Barry W Cunningham)	kb8mjx	91-10
T.RZESZOTARS@<GENie> (Ernest P Rzeszotarski)	kb8mlz	92-9-5

daveb@wb3ffv.ampr.org (David W Borden)	k8mmo 91-11-3
rwiley@magnus.acs.ohio-state.edu (Robert H Wiley)	n8mmr 92-1-4
w8mx@vax5.cit.cornell.edu (Vernon W Sherman Sr)	w8mx 91-10
gss@edsdrd.eds.com (Gary S Schiltz)	kb8nat91-11-29
jamaass@bluemoon.use.com (Jeffrey A Maass)	k8nd 92-12-3
jamaass@bluemoon.uucp (Jeffrey A Maass)	k8nd 92-12-3
allbery@NCoast.ORG (Brandon S Allbery)	kf8nh 92-5-26
clmorgan@miavx3.mid.muohio.edu (Carl L Morgan)	k8nhe 92-7-8
au297@cleveland.Freenet.Edu (Jim Evers)	kb8nht 92-5-
26@	
aq474@cleveland.Freenet.Edu (Tedd A Mirgliotta)	kb8nw 92-11-23
tedd@railnet.nshore.ncoast.ORG (Tedd A Mirgliotta)	kb8nw 91-10
macy@fmsystm.ncoast.org (Macy M Hallock Jr)	n8obg 91-10
gibbonsj@iccgcc.decnab.com (John C Gibbons)	n8obj 91-10
af557@cleveland.Freenet.Edu (John C Gibbons)	n8obj 92-10-22
vbreault@rinhp750.gmr.com (Val Breault)	n8oef/ae 92-8-8
moodyblu@buhub.bradley.edu (Matthew S Weisberg)	kf8oh 91-11-5
Matt.Weisberg@f16.n120.z1.fidonet.org (Matthew S Weisberg)	kf8oh 91-11-5
moodyblu@ais.org (Matthew S Weisberg)	kf8oh 92-12-17
benj@fmsystm.ncoast.org (Ben J Hallock)	n8ohn 91-10
tooyevaa@angus.mi.org (Ted Ooyevaar)	kb8ohv 92-12-
2@	
RPATTERS%KENTVM.BITNET@sds.sdsc.edu (Rick M Patterson Jr)	n8oil 92-5-19
sdkuo@cargo.acs.oakland.edu (Steven D Kuo)	n8oph 92-8-11
sdkuo@vela.acs.oakland.edu (Steve D Kuo)	n8oph 92-8-11
tcain@x400gate.bnr.ca (Tom T A Cain)	wb8oue 92-7-3
tcain@bnr.ca (Tom T A Cain)	wb8oue 93-1-9
tcain@brtph87.bnr.ca (Tom T A Cain)	wb8oue93-1-9
jcv26@cas.org (Jon C Vander Hill)	n8pap 92-10-6
jon@cas.org (Jon C Vander Hill)	n8pap 92-10-6
friberg@mtu.edu (Kenneth W Friberg)	n8pbe 92-8-1
00039196@ysub.ysu.edu (Jeff A Formhals)	ka8pgk 92-1-
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P1782@VMCMS.CSUOHIO.EDU (Robert A Bennett)	kf8ph 92-6-11
T.CHIPPS1@<Genie> (Ted A Chipps)	n8phk 92-9-5
danp@mystis.wariat.org (Dan T Pickersgill)	n8pkv 92-12-28
dmontgom@wtcp.DaytonOH.NCR.COM (Don C Montgomery)	w8plq 91-10
Don.Montgomery@wtcp.DaytonOH.NCR.COM (Don C Montgomery)	w8plq 91-10
N8PTT@UTCAM.local (Ken D Chamberlain)	n8ptt 93-1-17
n8ptt@utcaml.cse.utoledo.edu (Ken D Chamberlain)	n8ptt 93-1-17
jmilhoan@magnus.acs.ohio-state.edu (Jason T Milhoan)	n8puy 92-9-17
flbbs!mike.morrell@ncoast.ORG (Mike D Morrell)	n8qay 92-10-26
pitonyak@mostaccioli.cis.ohio-state.edu (Andrew D Pitonyak)	n8qkr 92-9-1
pitonyak@tortoise.cis.ohio-state.edu (Andrew D Pitonyak)	n8qkr 92-9-11
nzimmerm@magnus.acs.ohio-state.edu (Neil J Zimmerman)	n8qlf 92-2-4
zimmerma@cis.ohio-state.edu (Neil J Zimmerman)	n8qlf 92-2-4
J.TSCHERNE1@<Genie> (Joel W Tscherne)	n8qvd 92-9-5
klangfor@afit.af.mil (Kenneth W Langford)	wd8qwd92-6-3
pillera@csd630a.irim.org (Joe A Pillera)	n8qyo 92-7-26
gratclif@magnus.acs.ohio-state.edu (Gregory W Ratcliff)	nz8r 92-9-15
Ratcliff.8@osu.edu (Gregory W Ratcliff)	nz8r 92-9-15
joel@cfctech.cfc.com (Joel D Lessenberry)	wb8rhg91-10
bjstaff@zds-ux.UUCP (Brad Staff)	n8rmq 92-4-25@
34ID2QW@CMUVM.CSV.CMICH.EDU (R Mike Wardin)	n8rta 92-12-25@
majewski@spsd4330a.irim.org (Ron M Majewski)	wb8ruq91-11-6
jmseb@cbnewsd.cb.att.com (John M Sebeson)	kb8ry 92-6-29
jerry@ncc.uky.edu (Jerry R Nokes Jr)	wy8s 92-5-6

tstader@attmail.COM (Terry M Stader)	ka8scp	92-5-
19		
tstader@aol.COM (Terry M Stader)	ka8scp92-7-14	
w8sdz@TACOM-EMH1.Army.Mil (Keith B Peterson)	w8sdz	93-1-21
w8sdz@vela.acs.oakland.edu (Keith B Peterson)	w8sdz	93-1-21
ramon@fdavax.cber.nih.gov (Ramon Jose Hontanon)	ke8sf/ea1ul	92-11-
15		
ramon@ccucvx.unican.es (Ramon Jose Hontanon)	ke8sf/ea1ul	92-11-
15		
mladair@mtu.edu (Matthew L Adair)	n8sha	92-10-22@
mladair@mtus5.cts.mtu.edu (Matthew L Adair)	n8sha	92-10-22@
JNAAB@UCS.INDIANA.EDU (John W Naab)	ka8tna93-1-18	
jnaab@indiana.edu (John W Naab)	ka8tna	93-1-
18		
YA57@FERRIS.BITNET (Bruce L Werner)	wb8tvd91-12-10	
wwm@ef5003.efhd.ford.com (Bill Meahan)	wa8tzg	92-10-
31		
wwm@wa8tzg.mi.org (Bill Meahan)	wa8tzg	92-10-
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fmsrl7!pmsmam!wwm (Bill Meahan)	wa8tzg	92-10-
31		
pulse@meaddata.com (Tom Hesley)	n8ubu/ae	92-11-
20@		
flinxwei@magnus.acs.ohio-state.edu (Eric Linxweiler)	n8unn	92-10-29@
linxweiler.1@osu.edu (Eric Linxweiler)	n8unn	92-10-29@
wvanhorn@magnus.acs.ohio-state.edu (William E Van Horne)	w8uof	92-6-17
bobf@partech.com (Robert W Fries)	wa8usa91-10	
jga@dreaml.wariat.org (Jon Anhold)	n8usk	92-7-14@
AB155@yfn.ysu.edu (Carmen [Skip] J Renda Jr)	kd8uu	92-1-4
tim@ais.org (Tim D Tyler)	ka8vir	92-6-3
morris@ucunix.san.uc.edu (Ted A Morris)	wb8vrv	92-1-1
mju@mudos.ann-arbor.mi.us (Marc J Unangst)	n8vrh	92-12-21@
MOROURKE@cmsa.gmr.com (Mike J O'Rourke)	aa8w	92-11-18
wtm@uhura.neoucom.edu (Bill Mayhew)	n8wed	93-1-5@
res@colnet.cmhnet.org (Rob E Stampfli)	kd8wk	92-8-7
rob@colnet.cmhnet.org (Rob E Stampfli)	kd8wk	92-8-7
res@colnet.uucp (Rob E Stampfli)	kd8wk	92-5-14
res@kd8wk.uucp (Rob E Stampfli)	kd8wk	92-5-14
bill.nadzam@pcs.sj.ca.us (Bill G Nadzam)	k8wn	92-12-24
SCHU@cas.CALVIN.EDU (Quentin J Schultze)	kx8x	91-12-5
dxk10@po.CWRU.Edu (David Kazdan Md)	ad8y	92-2-20
rlwest@flop2.CSc.ti.COM (Bob L West Jr)	wa8ycd91-10	
fyfe@andy.bgsu.edu (Bob J Fyfe)	ka8ywg	92-2-2
gcr2@po.CWRU.Edu (George C Rybicki)	ke8yx	91-12-7
MEDELMA@cms.cc.wayne.edu (Michael J Edelman)	ke8yy	92-3-2
jkesling@cup.portal.com (John Darrell Kesling)	wa8zgo91-12-21	
macmillan@iccgcc.decnet.ab.com (Jim D MacMillan)	wa8zhn91-10	
af255@cleveland.Freenet.Edu (Jim D MacMillan)	wa8zhn92-3-2	
dul@cimtwo::kendul.enet.dec.com (Ken J Dul)	k8zr	92-10-15
garland@ohstpy.mps.ohio-state.edu (Jim C Garland)	w8zr	92-12-15
GARLAND@MPS.OHIO-STATE.EDU (Jim C Garland)	w8zr	92-12-15
dlf@phx.mcd.mot.com (Dave L Fritsche)	wb8zxx	92-2-
25		
## US 9 District		
JRA1854@TNTECH.EDU (Jeffrey Austen, James E Chaggaris in CB)		kj9a/n9bgs
93-1-12?		
prg@mgweed.att.com (Phil R Gunsul)		wb9aax92-11-27

prg@mgweed.uucp (Phil R Gunsul)	wb9aax	92-11-
27		
bachler@marlin.rtsg.mot.com (Andrew J Bachler)	n9ab	92-12-28
edw@sequent.com (Ed M Wright)	ka9ahq	92-11-
27		
rtaylor@ux1.cso.uiuc.edu (Roger H Taylor)	k9ald/afa3wg	92-8-8
DIEDRIMD@cnsvox.uwec.edu (Mark D Diedrich)	kb9amg	91-12-29
perschau@mdcbbs.com (Bob C Perschau Jr)	ka9art	91-10
lapin@casbah.acns.nwu.edu (Gregory D Lapin)	kd9az/walnuk	93-1-
15		
glapin@nwu.edu (Gregory D Lapin)	kd9az/walnuk	93-1-
15		
dunncl@rose-hulman.edu (Christopher L Dunn)	n9bgy	92-12-1
dunncl@NeXTwork.Rose-Hulman.Edu (Christopher L Dunn)	n9bgy	92-12-1
csteenbe@heartland.bradley.edu (Charles B Steenbergen)	wd9bjn	92-11-27
kla@mentor.cc.purdue.edu (Kenneth L Adams)	kb9bjw	92-7-3
pnz46378@uxa.CSo.uiuc.EDU (Paul Norman Zaremba)	aa9bk	91-10
markb@casbah.acns.nwu.edu (Mark E Brodsky)	kb9bly	92-12-21
salnick@dejavu.spk.wa.us (Bob W Salnick)	wa9bve	92-8-8
brian@towers.uucp (Brian J Murrey)	kb9bvn	91-12-7
MURREY@<GENie> (Brian J Murrey)	kb9bvn	92-9-5
wheatley@cbnewsk.att.com (Steven M Wheatley)	ku9c	92-1-20
jcusey@heartland.bradley.edu (Jim Cusey)	nt9c	92-11-27
jd@camelot.bradley.edu (Jeremy D Ruck)	wm9c	92-10-27
jd@cegt201.bradley.edu (Jeremy D Ruck)	wm9c	92-11-27
jruck@heartland.bradley.edu (Jeremy D Ruck)	wm9c	92-11-27
wm9c@wb9uus.bradley.edu (Jeremy D Ruck)	wm9c	92-11-27
wm9c@wb9uus.ampr.org (Jeremy D Ruck)	wm9c	92-11-27
jd@cegt201.bradley.edu (Jeremy D Ruck)	wm9c	92-12-17
uhasun!iwtgo.att.com!rjp2 (Robert J Plechaty)	k9cgd	92-1-25
tom@aro-emh1.army.mil (Tom L Doligalski)	n9cgd	92-8-8
rdewan@casbah.acns.nwu.edu (Rajiv Dewan)	aa9ch	92-11-15
r-dewan@nwu.edu (Rajiv Dewan)	aa9ch	92-11-15
scraig@heartland.bradley.edu (Steve S Craig)	wd9cir	92-10-27
mrwizard@camelot.bradley.edu (Steve S Craig)	wd9cir	92-10-27
jdully@heartland.bradley.edu (Jim R Dully)	kb9cpe	92-12-17
rmcgarra@heartland.bradley.edu (Robert V McGarrah)	kb9cph	92-11-27
markh@edsi.plexus.COM (Mark J Heimmerman)	kf9cs	92-2-15
jsymmond@heartland.bradley.edu (Jon R Symmonds)	ka9csu	92-11-27
loren_thompson@gmgate.anl.gov (Loren J Thompson)	kb9ctj	92-3-7
derry@NeXTwork.Rose-Hulman.Edu (John H Derry)	k9cun	92-5-1
DERRY@ROSEVC.Rose-Hulman.EDU (John H Derry)	k9cun	92-9-30
DERRY@EE.Rose-Hulman.EDU (Jack H Derry)	k9cun	92-12-11
woodward@bert.eecs.uic.edu (Jeff P Woodward)	wb9cyi	92-12-18
B10990@ANLVM.CTD.ANL.GOV (Gary E Myers)	k9czb	92-2-29
ino@fnalo.fnal.gov (Takashi Ino)	kf9da	92-2-29
miller@en.ecn.purdue.edu (Tim J Miller)	n9dki	92-5-19
FULLER@UWSTOUT.EDU (Jon H Fuller)	kf9du	92-9-27
D.JACOBSEN1@<GENie> (Dave L Jacobsen)	n9dvs	92-9-5
ignacij@meishan (Ignacy Misztal)	no9e/sp8fwb	92-2-
20		
ignacij@meishan.animal.uiuc.edu (Ignacy Misztal)	no9e/sp8fwb	92-8-
20		
ignacy@uiuc.edu (Ignacy Misztal)	no9e/sp8fwb	92-8-
20		
lisbon@vpnet.chi.il.us (Gerry P Swetsky)	wb9ebo	92-3-18
proulx@ucsu.Colorado.EDU (Mark Jerome Proulx)	n9edk/0	92-10-



11	proulx@ucsu.Boulder.EDU (Mark Jerome Proulx)	n9edk/0	92-10-
11	drudetb@infonode.ingr.com (Ted B Drude)	ka9elv	92-8-
18	ant-vent@precipice.chi.il.us (Paul C Graham)	k9erg	92-12-23
	foxd@silver.ucs.indiana.edu (Daniel B Fox)	kf9et	92-8-14
	mikebo@timesink.chi.il.us (Michael J Borowiec)	n9euz	92-12-30
	mikebo@i88.isc.com (Michael J Borowiec)	n9euz	92-12-30
	mikebo@isc.com (Michael J Borowiec)	n9euz	92-12-30
	greg@sscvx1.ssc.gov (Greg A Chartrand)	wa9eyy	92-10-
26	LEY@UWSTOUT.EDU (James P Ley)	nx9f	92-9-11
	m21198@mwunix.mitre.org (John D McHarry)	wa9fch	92-3-19
	plecocq@heartland.bradley.edu (Paul F Lecocq)	w9fem	92-11-27
	kline@ux1.cso.uiuc.edu (Charley V Kline)	kf9ff	92-12-28
	cvk@uiuc.edu (Charley V Kline)	kf9ff	92-12-28
	bmoers@corp.qgraph.COM (Brad S Moersfelder)	wb9fip	92-10-18
	aaa33750@uxa.cso.uiuc.edu (Andrew [Drew] A Arnett)	kb9fko	93-1-6
	arnett@uiuc.edu (Andrew [Drew] A Arnett)	kb9fko	93-1-6
	72727.2641@CompuServe.COM (Pete J Eaton)	wb9flw	93-1-5
	wb9flw@tapr.ampr.org (Pete J Eaton)	wb9flw	93-1-5
	zawada@ncsa.uiuc.edu (Paul J Zawada)	kb9fmn	91-12-
7	mrennich@heartland.bradley.edu (Merv L Rennich)	n9fxs/ka9vcm	92-12-
17	paulf@w6yx (Paul A Flaherty)	n9fzx/5w1jx	92-8-5
	paulf@w6yx.Stanford.EDU (Paul A Flaherty)	n9fzx/5w1jx	92-8-
18	paulf@Stanford.EDU (Paul A Flaherty)	n9fzx/5w1jx	92-9-
25	paulf@umunhum.stanford.edu (Paul A Flaherty)	n9fzx/5w1jx	92-12-
24	paulf@calvin.stanford.edu (Paul A Flaherty)	n9fzx/5w1jx	92-9-
25	svb@cs.purdue.edu (Stephan V Bechtolsheim)	kx9g	92-3-2
	csjos@uxa.ecn.bgu.edu (John O Stafford)	kb9gig	92-7-
31	70307.2642@CompuServe.com (Chuck W Kelly Jr)	wb9goe	92-7-8
	dlh@gvgdsd.gvg.tek.com (David L Hershberger)	w9gr	92-7-8
	mixcom.mixcom.com!kkeek@mix.mixcom.com (Richard A Victor)	wd9gri	92-12-24
	Richard.Victor@mixcom.mixcom.com (Richard A Victor)	wd9gri	92-12-24
	Richard.Victor@mixcom.com (Richard A Victor)	wd9gri	92-12-24
	70465.276@CompuServe.Com (Richard A Victor)	wd9gri	92-12-24
	kagoos@memstvx1.memst.edu (Suresh Kagoo)	n9gsa	93-1-24
	stennant@heartland.bradley.edu (Steve A Tennant)	kb9gst	92-11-27
	knowles@FNALNJ.FNAL.GOV (Rich N Knowles Sr)	wa9hhb/afa3of/kz5nk/ka8rk	
	92-12-29		
	knowles@fnal.fnal.gov (Rich N Knowles Sr)	wa9hhb/afa3of/kz5nk/ka8rk	
	92-12-29		
	jfwillia@heartland.bradley.edu (James F Williams)	n9hhu/wd8alm	92-11-
27	bcraig@heartland.bradley.edu (Bradford Craig)	n9hhu	92-10-27
	k9hi@world.std.com (Phil E Temples)	k9hi	93-1-24
	dewaldz@attmail.COM (Dave)	n9hkm	93-1-24*
	tylinen@heartland.bradley.edu (Tim J Ylinen)	n9huw/kb0bky	92-11-
27			

aapflem@heartland.bradley.edu (Philip B Fleming)	n9hwo 93-1-25
PFLEMING.3@<Genie> (Philip B Fleming)	n9hwo 92-6-11
P.FLEMING3@<Genie> (Philip B Fleming)	n9hwo 93-1-25
70323.251@CompuServe.Com (Philip B Fleming)	n9hwo 93-1-25
ctennant@heartland.bradley.edu (Chris F Tennant)	n9hyn 92-11-27
rcoltrin@heartland.bradley.edu (Richard R Coltrin Jr)	wd9hyy92-11-27
young@eg.ecn.purdue.edu (Mike P Young)	ka9hze 92-5-21
tucker@eedsp.gatech.edu (Jeff L Tucker)	n9hzq 93-1-9
tucker@gauss.eedsp.gatech.edu (Jeff L Tucker)	n9hzq 92-12-24
tucker@fisher.eedsp.gatech.edu (Jeff L Tucker)	n9hzq 93-1-9
tucker@bombay.eedsp.gatech.edu (Jeff L Tucker)	n9hzq 91-12-7
tucker@delhi.eedsp.gatech.edu (Jeff L Tucker)	n9hzq 91-12-20
kwjones@heartland.bradley.edu (Ken W Jones)	wd9ibj92-12-17
mlynarik@author.ecn.purdue.edu (J M Mlynarik/J Peter Stonitsch in CB)	n9icq 92-4-25?
wstrahl@cbnewsg.cb.att.com (Wayne A Strahl)	w9ii 92-1-25
rice@ttd.teradyne.com (John F Rice)	k9ij/k8yzzr/kh6ghc/wb9csp/w9mmb/waltxv 92-12-28
MROWEN%STLAWU.BITNET@cunyv.cuny.edu (Michael R Owen)	w9ip 92-8-2
AllanWS@cup.portal.com (Allan W Schlaugat)	n9isn 92-9-29
hpa@casbah.acns.nwu.edu (Peter Anvin)	n9itp/sm4tkn 93-3-2
WENEWKIR@CREMS.CR.ROCKWELL.COM (William E Newkirk)	wb9ivr91-10
wen@dllws.cca.CR.rockwell.COM (William E Newkirk)	wb9ivr91-10
William=E.=Newkirk%Pubs%GenAv.Mlb@ns14.cca.CR.rockwell.COM	(William E Newkirk) wb9ivr 93-1-8
W.NEWKIRK@<Genie> (William E Newkirk)	wb9ivr 92-9-5
WEN%32868.DECnet@beach.rockwell.COM (William E Newkirk)	wb9ivr92-11-1
tedk@gagme.chi.il.us (Ted G Kekatos)	n9ixe 92-12-24
tedk@ihlpl.att.com (Ted G Kekatos)	n9ixe 91-12-7
psfales@cbnewsc.att.com (Peter S Fales)	n9iyj 91-12-7
JRA1854%TNTECH.BITNET@cunyv.cuny.edu (Jeffrey R Austen)	k9ja 92-7-20
richardfr@comm.mot.comm (Richard W France)	n9jfd 92-8-2
jjw@precipice.chi.il.us (John J Welch)	n9jzw 92-12-18
rick@ee.uwm.edu (Rick Miller)	ka9jhh 92-10-22@
rick@discus.mil.wi.us (Rick Miller)	ka9jhh92-10-22@
shea4460@vms.macc.wisc.edu (Kevin G Shea)	n9jkg 92-12-31
76266.1537@CompuServe.COM (Kevin G Shea)	n9jkg 92-12-31
shea4460@macc.wisc.edu (Kevin G Shea)	n9jkg 92-12-31
phil@k9hi.optron.ingr.com (Phil E Temples)	k9hi 91-11-20
tucker@eedsp.gatech.edu (Jeff L Tucker)	n9hzq 92-11-6
munger@fnalo.fnal.gov (Cordon R Kerns)	n9lcm 93-1-9
jason@studsys.mscs.mu.edu (Jason J Hanson)	n9lea 92-10-10
2ai6hansonj@vms.csd.mu.edu (Jason J Hanson)	n9lea 92-10-10
gvb@TEFS1.acd.com (George V Bowles)	n9lkg 92-8-20
drx@chinet.chi.il.us (Scott C Whittle)	n9jkn 92-8-8
jimm@gvgadg.gvg.TEK.COM (Jim A Michener)	k9jm 92-7-8
k9jma@cbnewsc.cb.att.com (Edwin M Schaefer III)	k9jma 92-5-7
mwgordon@nyx.cs.du.edu (Mike W Gordon)	n9loi 92-10-13
99681084@uwwvax.uww.edu (Mike W Gordon)	n9loi 92-10-13
jpears@heartland.bradley.edu (Jim R Pearsall)	n9joy 92-6-11
reichert@motcid.UUCP (Chuck H Reichert)	kd9jq 91-10
Glenn.Butzlaff@mixcom.mixcom.com (Glenn R Butzlaff)	we9k 92-10-27
Glenn.Butzlaff@mixcom.com (Glenn R Butzlaff)	we9k 92-10-27
chbeck@anl.gov (Charles H Beck)	wo9k 92-9-25

GR6588%SIUCVMB.BITNET@cunyvm.cuny.edu (Kelly D Jones)	ke9kd 92-3-31
GR6588@SIUCVMB.CDALE.SIU.EDU (Kelly D Jones)	ke9kd 92-3-31
dreyerd@silver.ucs.indiana.edu (Dan W Dreyer)	n9kdf 91-12-7
ajd@turing.ORG (Andrew J Doane)	n9ket 92-9-4
ket@uiuc.edu (Andrew J Doane)	n9ket 92-9-4
sims@zds-oem.zds.com (Mike J Sims)	ka9kim92-10-31
bday@heartland.bradley.edu (Brad L Day)	n9kuj 92-11-27
news@bpdsun1.uucp (Bob J Crockett)	n9kut 91-10
J.ANDERSON32@<GENie> (Jim L Anderson)	n9kvx/aa 92-9-5
isildur@wallaby.ecn.purdue.edu (George William Slade)	n9kwl 92-12-8
lusere@norand.UUCP (Ronald E Luse)	kd9kx 91-10
resistor@edsi.plexus.COM (Jason J Hanson)	n9lea 91-10
dil@mace.cc.purdue.edu (Perry G Ramsey)	n9lff 92-1-25
dick@smith.chi.il.us (Dick H E Smith III)	n9lip 91-11-3
n9ljx@en.ecn.purdue.edu (Scott A Stambaugh)	n9ljx 92-5-26
stigall@bronze.ucs.indiana.edu (John D Stigall)	n9lkl 91-10
mtjachim@maxwell15.ee.mtu.edu (Matthew T Jachimstal)	n9lmw 92-2-4
mtjachim@mtu.edu (Matthew T Jachimstal)	n9lmw 92-10-29
2543byrne@vms.csd.mu.edu (Mike W Gordon)	n9loi 91-10
sde@larry.sal.wisc.edu (Scott D Ellington)	k9ma 91-12-5
jrw@quintro.uucp (Jon R Wahlmann)	n9mcy 92-9-6
jtuszk@uwspmail.uwsp.edu (Jim M Tuszka)	n9meb 91-10
DALE.GATES@<GENie> (Clarence D Gates Jr)	n9mes 92-9-5
bthomp@heartland.bradley.edu (Beau C Thompson)	n9mfk 92-11-27
ST1860%SIUCVMB.BITNET@cunyvm.cuny.edu (Gary R Smith)	ke9mi 91-12-7
wb9mjn@wb9uus.ampr.org (Donald V Lemke)	wb9mjn 92-1-
22	
wb9mjn@wb9mjn.ampr.org@ke9yq.imsa.edu (Donald V Lemke)	wb9mjn92-3-12
reid@ucs.indiana.edu (Frank S Reid)	w9mkv 92-9-12
becker@areaplg2.corp.mot.com (John E Becker)	k9mm 91-10
thomas@whitefish.rtsg.mot.com (James E Thomas)	n9moo 92-11-7
jweiss@casbah.acns.nwu.edu (Jerry S Weiss)	wb9mri92-1-4
W.DRESCHER@<GENie> (Wayne J Drescher)	n9msa 92-9-5
JULIE.A.S@<GENie> (Julie A Strietelmeier)	n9msn 92-9-5
julie@cel.cummins.COM (Julie A Strietelmeier)	n9msn 92-2-21
davy@ecn.purdue.edu (Dave A Curry)	n9msw 92-2-14
little@nuts2u.enet.dec.com (Todd J Little)	n9mwb 92-11-15
john@edsi.plexus.COM (John L Moder II)	n9mxx 91-12-22
feustel@netcom.COM (David A Feustel)	n9myi 92-9-1
FGHOUSE@LAX.WISC.EDU (Feroz Ghouse)	wu9n 91-12-7
ogden_jon@macmail1.rtsg.mot.com (Jon D Ogden)	ke9na 92-7-20
wn9nbt@ecn.purdue.edu (Dave A Chasey)	wn9nbt 92-12-
22	
mann@eskimo.celestial.com (John Tom Mann)	kd9nl/7 92-7-
14	
mann@eskimo.com (John Tom Mann)	kd9nl/7 92-12-
28	
bjahnke@arrl.org (Bart J Jahnke)	kb9nm 92-6-29
dale@a2605ux1.msr.hp.com (Dale V Hammer)	k9nn 92-12-24
cmaddox@imsa.EDU (Chuck E Maddox III)	n9non 92-6-17
grnwood@gagme.chi.il.us (Jerry Greenwood)	n9nrg 92-1-25@
gt0168b@hydra.gatech.edu (Christoffer Mikael Trossen)	n9nvo 92-6-4@
rgmorgan@heartland.bradley.edu (Ron G Morgan)	kb9nw 92-6-11
sbrant@npal.rn.com (Steve B Brant)	w9obx 92-1-10
svec@rtsg.mot.com (Larry D Svec)	kd9of 92-5-9
svec@motcid.UUCP (Larry D Svec)	kd9of 91-10
n9ofv@wb9uus.ampr.ORG ( )	n9ofv 92-3-18@

wb9omc@dynamo.ecn.purdue.edu (Duane P Mantick)	wb9omc92-5-26
template@NeXTwork.Rose-Hulman.Edu (Michael D Brown)	n9opg 92-4-24@
brownmd@rose-hulman.edu (Michael D Brown)	n9opg 92-3-27@
brownmd@nextwork.rose-hulman.edu (Michael D Brown)	n9opg 92-4-24@
zfxj90@hou.amoco.com (Frithjof Overdal)	ka9ov 93-1-15@
jbradsh2@ookeefe.helios.nd.edu (Jonathan Bradshaw)	n9oxe 92-7-26@
jonathan@nova.next.nd.edu (Jonathan Bradshaw)	n9oxe 92-9-13@
jonathan@nova.decio.nd.edu (Jonathan Bradshaw)	n9oxe 92-12-6@
bradshaw@sage.cc.purdue.edu (Jonathan Bradshaw)	n9oxe 92-12-6@
jbradsh2@darwin.cc.nd.edu (Jonathan Bradshaw)	n9oxe 92-12-6@
jringles@heartland.bradley.edu (Joel R Ingles)	nn9p/wd9ejh 92-11-
27	
nol2321@dsacg4.dsac.dla.mil (Jim E Dunn)	ka9pdd91-10
davids@truevision.com (David Spoelstra)	n9pgh 92-11-29@
plemson@sbctri.sbc.com (Paul H Lemson)	w9pl 92-7-8
fleek@expert.cc.purdue.edu (Dan Fleek)	n9pna 92-7-8@
fleekdc@sage.cc.purdue.edu (Dan Fleek)	n9pna 92-10-19@
knaus@astroatc.UUCP (Dave J Knaus)	wa9pov92-1-10
karn@QUALCOMM.COM (Phil R Karn Jr)	ka9q 93-1-26
karn@servo.qualcomm.com (Phil R Karn Jr)	ka9q 92-9-17
karn@chicago.qualcomm.com (Phil R Karn Jr)	ka9q 92-8-7
karn@qualcom.qualcomm.com (Phil R Karn Jr)	ka9q 92-7-8
karn@ucsd.edu (Phil R Karn Jr)	ka9q 91-10
quintro!bpdsun1!mln@decwrl.uucp (Mike L Nowack)	na9q 92-4-8
arf@ddsw1.MCS.COM (John C Schmidling)	nr9q 91-12-7
jmps@cbnewsd.cb.att.com (John M Sauer)	n9qgw 92-8-5@
jmps@ihlpe.att.com (John M Sauer)	n9qgw 92-8-5@
bish@edserv.cray.com (Dave L Bishop)	wb9qnx 92-2-3
dave@hpl.holl.com (David Vrona)	n9qnz 92-10-15@
sknapp@IASTATE.EDU (Steven M Knapp)	ka9qoa92-5-10
larry@abtlabs.uucp (Larry R Pajakowski)	wa9qoo 91-12-
8	
Loren_Thompson@mctgate.mct.anl.GOV (Loren J Thompson, Argonne ARC in CB)	
w9qve 91-11-25?	
ljthompson@anl.gov (Loren J Thompson)	w9qve 92-12-3?
B10990@ANLVM.CTD.ANL.GOV (Loren J Thompson)	w9qve 92-12-3?
retzer@convex.csd.uwm.edu (Joe J Retzer)	n9qxl 92-9-16@
cromwell@rvl2.ecn.purdue.edu (Bob L Cromwell)	kc9rg 91-12-4
tlc20700@uxa.cso.uiuc.edu (Thomas L Carney)	wb9rxj92-5-7
parnass@cbnewse.cb.att.com (Bob S Parnass)	aj9s 92-8-5
parnass@ihlpm.att.com (Bob S Parnass)	aj9s 92-12-24
wn9s@isp.nwu.edu (Albert E Schmelzer)	wn9s 92-7-4
delusion@casbah.acns.nwu.edu (Albert E Schmelzer)	wn9s 92-7-4
wn9s@thor.isp.nwu.edu (Albert E Schmelzer)	wn9s 92-12-18
freeman@ux1.cso.uiuc.edu (Jay A Freeman)	wt9s 91-12-7
look@s45.csr.d.uiuc.edu (Stephen R Look)	ka9szw 92-7-8
kayjc@rtsg.mot.com (John C Kay)	wv9t 92-11-23
kay@motcid.rtsg.mot.com (John C Kay)	wv9t 92-11-23
hayward@gandalf.UMCS.Maine.EDU (Peter B Hayward)	wx9t 92-12-4
hayward@gargoyle.uchicago.edu (Peter B Hayward)	wx9t 91-12-7
hayward@gargoyle (Peter B Hayward)	wx9t 92-12-4
hayward@cs.uchicago.edu (Peter B Hayward)	wx9t 92-12-24
holman@pop.psu.edu (Darryl J Holman)	wb9tcy 92-12-
15	
holman@darwin.psu.edu (Darryl J Holman)	wb9tcy 92-12-
15	
holman@pop.psu.edu (Darryl J Holman)	wb9tcy 92-12-

15		
	hazen@hazen.ucs.indiana.edu (Dwight L Hazen)	wb9tlh92-3-9
	kennykb@cprd.ge.com (Kevin B Kenny)	ke9tv/2 92-4-1
	dbarnett@heartland.bradley.edu (Derl H Barnett)	wa9twz92-11-27
	john@uhm.ampr.org (John Paul Shalamskas)	kj9u/kh6 91-10
	kj9u@uhm.ampr.ORG (John Paul Shalamskas)	kj9u/kh6 92-12-
	24	
	kj9u@kj9u.ampr.ORG (John Paul Shalamskas)	kj9u/kh6 92-9-
	14	
	johns@uhunix.uhcc.Hawaii.Edu (John Paul Shalamskas)	kj9u/kh6 92-9-
	13	
	shalamsk@sneezy.uhcc.Hawaii.Edu (John Paul Shalamskas)	kj9u/kh6 92-10-
	18	
	shalamsk@sleepy.uhcc.Hawaii.Edu (John Paul Shalamskas)	kj9u/kh6 92-10-
	22	
	shalamsk@grumpy.uhcc.Hawaii.Edu (John Paul Shalamskas)	kj9u/kh6 92-10-
	27	
	shalamsk@uhunix.uhcc.hawaii.edu (John Paul Shalamskas)	kj9u/kh6 92-12-
	24	
	nason@pa881a.inland.com (John M Nason)	na9u 91-10
	czerwonk@cae.wisc.EDU (Tim J Czerwonka)	wo9u 92-9-19
	k9un@cbnewse.cb.att.com (James W Ague)	k9un 92-5-26
	chuck@bradley.bradley.edu (Chuck A Henderson)	wb9uus92-10-27
	wb9uus@wb9uus.ampr.org (Chuck A Henderson)	wb9uus92-10-27
	xxw9uvi@heartland.bradley.edu (Peoria Area Amateur Radio Club)	w9uvi 92-6-
	11@	
	jra@law7.DaytonOH.NCR.COM (John R Ackermann Jr)	ag9v 92-11-23
	john.ackermann@daytonOH.ncr.com (John R Ackermann Jr)	ag9v 93-1-26
	losee@ils.unc.edu (Bob M Losee Jr)	ko9v 92-6-29
	losee@ruby.ils.unc.edu (Bob M Losee Jr)	ko9v 92-10-10
	losee@cs.unc.edu (Bob M Losee Jr)	ko9v 92-10-10
	spinnefm@HYDRA.ROSE-HULMAN.EDU (Fred M Spinner)	ka9vaw92-5-23
	mja@acd4.acd.com (Mike J Allard)	ka9vdc92-12-24
	allardmj@nextwork.rose-hulman.edu (Mike J Allard)	ka9vdc91-10
	waco@cbnewse.cb.att.com (John L Broughton)	wb9vgj92-5-10
	reyer@kirk.msoe.edu (Dr Steven E Reyer)	wa9vnj 92-7-8
	kk9w@eng.uiowa.edu (David R Andersen)	kk9w 92-9-20
	kk9w@uiowa.edu (David R Andersen)	kk9w 92-9-20
	akcs.ken@vpnet.chi.il.us (Ken M Hopkins)	wa9wcp92-3-26
	pdh@netcom.com (Phil D Howard)	ka9wgn 92-2-9
	72777.3143@CompuServe.COM (Doug E Smith)	w9wi 91-10
	buckij@thor.acc.stolaf.edu (Jonathan S Bucki)	n9wks 91-10@
	wrmiller@heartland.bradley.edu (Wayne R Miller)	ke9wq 92-6-11
	mwester@waveguide.Central.Sun.COM (Mike J Westerhof)	ka9wsb91-12-21
	gordon@westford.ccur.com (Gordon J Weast)	wa9wtk92-7-26
	mikeb@wb3ffv.ampr.org (Mike J Bruski)	aj9x 91-11-3
	carlson@linac.fnal.gov (Kermit A Carlson)	w9xa 92-9-15
	saba@tellabs.com (Bruce J Sabalasky)	kd9xt 91-10
	beams@norvax.UUCP (David M Beams)	kk9y 91-12-24
	xavier@camelot.bradley.edu (Gary L Brubaker)	wm9y/ke9ow 92-12-
	17	
	xavier@cegt201.bradley.edu (Gary L Brubaker)	wm9y/ke9ow 92-12-
	17	
	xavier@cegt200.bradley.edu (Gary L Brubaker)	wm9y/ke9ow 92-12-
	17	
	wm9y@wb9uus.bradley.edu (Gary L Brubaker)	wm9y/ke9ow 92-12-
	17	

ronning@edrsys.UUCP (Eric D Ronning)	ke9ye 91-12-7
acraig@ncsa.uiuc.edu (Alan B Craig)	wb9yka92-10-27
jdg41088@uxa.cso.uiuc.edu (Joe Gross)	ka9ylj 93-1-
27*	
pickaxe@uiuc.edu (Joe Gross)	ka9ylj 93-1-
27*	
bob@imsa.edu (Robert A Van Valzah)	ke9yq 91-12-20
dpearsal@heartland.bradley.edu (Dave L Pearsall)	ka9yse92-12-17
larner@atd.mke.ab.COM (Dan L Larner)	wv9z 92-5-16
larner%atdecc.DECnet@consrt.rok.com (Dan L Larner)	wv9z 91-12-7
UICVM.BITNET!U40241@vm.gmd.de (Jim G Limber)	k9zat 92-1-15
U40241@uicvm.uic.edu (Jim G Limber)	k9zat 92-5-21
gary@kimbark.uchicago.edu (Gary W Buchholz)	ke9zm 92-8-15
gary@midway.uchicago.edu (Gary W Buchholz)	ke9zm 92-8-15
drbrown@heartland.bradley.edu (Dewey R Brownfield)	wa9ztg92-11-27
## PERU OA	
hugo@vnet.ibm.com (Hugo Vasquez Aragon)	oa4hv 92-10-16
## AUSTRIA OE	
ernst@ai.univie.ac.at (Ernst Buchberger Jr)	oelebc93-1-23
kkudielk@email.tuwien.ac.at (Klaus Kudielka)	oelkib92-11-27@
K3006E1@ALIJKU11.BITNET (Harald Landvoigt)	oe5len92-11-27@
peter@keba.co.at (Peter Scheer)	oe5psm 92-12-
29	
peter%keba.UUCP@hp4at.eunet.co.at (Peter Scheer)	oe5psm92-12-29
peter@hp4at.eunet.co.at (Peter Scheer)	oe5psm 92-12-
29	
## FINLAND OH	
js79408@ee.tut.fi (Jari Sassi)	oh1cn 91-10
tkaartin@otax.tky.hut.fi (Timo Kaartinen)	oh1ldc92-7-3@
ekho@ttl.fi (Esa Holmberg)	oh1ltm 92-6-
17@	
oh1ltm@nic.funet.fi (Esa Holmberg)	oh1ltm92-10-29@
ekho@ttl.fi (Esa Holmberg)	oh1ltm 92-10-
29@	
rl103465@cs.tut.fi (Rauli U Lauhanen)	oh1mks/oh3mks
91-12-18@	
cut@cc.tut.fi (Rauli U Lauhanen)	oh1mks/oh3mks 91-12-18@
tlaurila@otax.tky.hut.fi (Timo Laurila)	oh1mnp 92-7-
3@	
mea@nic.funet.fi (Matti Aarnio)	oh1mqk 92-11-
23@	
MSUORANTA@finabo.abo.fi (Mika Suoranta)	oh1nzq 92-9-
11@	
rsjoholm@otax.tky.hut.fi (Reijo Sjöholm)	oh1nzt92-7-3@
knuutila@rc.nokia.fi (Timo Knuutila)	oh1qc/oh2mat
92-7-3	
k30963p@talтта.hut.fi (Aki Alho)	oh1ze/oh2lvn92-7-3
malho@vipunen.hut.fi (Marja Alho)	oh1zf 92-7-3
yhofstro@otax.tky.hut.fi (Yrjö K Hofstrom)	oh2avs92-7-3
s29833d@saha.hut.fi (Pekka Lempola)	oh2bbp92-7-3
mlaiho@dshp.ntc.nokia.com (Mikko Laiho)	oh2bch 93-1-
23	
harjula@ntc01.tele.nokia.fi (Arto Harjula)	oh2bgn/oh6gj92-7-3
kataja@vipunen.hut.fi (Kai Kataja)	oh2bhf92-7-3
timo.soirinsuo@rc.nokia.fi (Timo Soirinsuo)	oh2biw92-7-3
mikko@penet.fi (Mikko Voipio)	oh2bjv 92-7-3
Panu.Saren@hut.fi (Panu Saren)	oh2bkf 92-7-3

jim@niksula.hut.fi (Jouni Malinen)	oh2ble92-7-3
tpmannin@vipunen.hut.fi (Tomi-Pekka Manninen)	oh2bns92-7-3
mto@nic.funet.fi (Markku Toijala)	oh2bqz91-10
mto@xerver.icl.fi (Markku Toijala)	oh2bqz92-7-3
sampo.suvisaari@hut.fi (Sampo Suvisaari)	oh2bss92-7-3
rholtta@otax.tky.hut.fi (Risto Holtta)	oh2bww 92-7-3
kfa@atomi.hut.fi (Kim Fallstrom)	oh2bxm92-7-3
Ossi.Neuvonen@hut.fi (Ossi Neuvonen)	oh2bxp 92-7-3
tommi.salo@hut.fi (Tommi Salo)	oh2bya 92-7-3
jasa@otax.tky.hut.fi (Jari Salminen)	oh2byq92-7-3
pietro@otax.tky.hut.fi (Petteri Massetti)	oh2byw92-7-3
jsalmi@otax.tky.hut.fi (Jouni Salmi)	oh2bzb 92-7-3
s32941s@saha.hut.fi (Joni Satila)	oh2bzy92-7-3
squrppi@krk.fi (Sami Reijonen)	oh2kea 92-11-
18@	
oh2lak@krk.fi (Erik Finskas)	oh2lak 92-5-
26@	
Erik.Finskas@krk.fi (Erik Finskas)	oh2lak92-5-26@
toni@niksula.hut.fi (Mikko Riepula)	oh2lew92-7-3@
hks@funet.fi (Harri K Salminen)	oh2lge 92-7-
3@	
tkivivuo@klaava.Helsinki.FI (Toni Kivivuori)	oh2lnm92-12-11@
Tkivivuori@cc.helsinki.fi (Toni Kivivuori)	oh2lnm91-11-5@
hemu@krksun.krk.fi (Samuli Seppala)	oh2lso92-5-21@
stickler@klaava.Helsinki.FI (Patric M Stickler)	oh2luv/kc4yyy
92-12-5	
psti@wsoy.fi (Patrick M Stickler)	oh2luv/kc4yyy
92-12-5	
tsivula@vipunen.hut.fi (Timo Sivula)	oh2lvz 91-11-
12@	
tom@field.fi (Tom Haggblom)	oh2lwn 92-1-
5@	
riku@clinet.fi (Riku Kalinen)	oh2lwo 93-1-8
s379141@kaira.hut.fi (Joni M K Siltaniemi)	oh2lyh92-7-3@
malinen@krksun.krk.fi (Mikko Malinen)	oh2lzp 92-5-
21@	
malinen@krk.fi (Mikko Malinen)	oh2lzp 92-5-
21@	
her@otax.tky.hut.fi (Hannu Eralinna)	oh2mbb/oh5ba
92-7-3	
tiger@vipunen.hut.fi (Karl R Tigerstedt)	oh2mbm92-7-3@
jve@vipunen.hut.fi (Jarkko Venna)	oh2mji92-7-3@
f35412t@puukko.hut.fi (Lauri Parkkonen)	oh2mlm 92-7-
3@	
joonas@krksun.krk.fi (Joonas Kekoni)	oh2mtf 92-5-
21@	
k30119e@talтта.hut.fi (Jarmo Rouhiainen)	oh2mxn92-7-3@
tmm@cs.hut.fi (Tomi Mannisto)	oh2nem 91-12-
5@	
jone@niksula.hut.fi (Jouni Pekkanen)	oh2nya 92-7-
3@	
jype@vipunen.hut.fi (Jyrki Penttinen)	oh2nzp 92-7-
3@	
benjamin@ee.tut.fi (Pentti Gronlund)	oh3bk 92-5-21
plkorhon@vipunen.hut.fi (Mikko Noromaa)	oh3lim 92-3-
26@	
oh3mep@cc.tut.fi (Keskinen Petri)	oh3mep/og3mep 92-12-18@

pk75978@ee.tut.fi (Keskinen Petri)	oh3mep/og3mep	92-12-18@
js79408@ee.tut.fi (Sassi Jari)		oh3mw 91-11-
9@		
ral@mutu.tampella.fi (Rauno Lankinen)		oh3nbj 91-11-
6		
jt63597@ee.tut.fi ([Wes] Tervo Vesa)		oh3nwq 92-9-
14@		
oh3nwq@cc.tut.fi ([Wes] Tervo Vesa)		oh3nwq92-9-14@
oh3nwq@nic.funet.fi ([Wes] Tervo Vesa)		oh3nwq 92-9-
14@		
jt63597@uikku.ee.tut.fi ([Wes] Tervo Vesa)		oh3nwq92-9-14@
jukka@trc.mew.mei.co.jp (Jukka Pekka Savolainen)		oh3oe 92-12-1
ts74113@cs.tut.fi (Timo Saarinen)		oh3yn 92-4-24
jsui@vipunen.hut.fi (Jarmo Suihkonen)		oh4nk/oh7lhc
92-7-3		
jmannine@vipunen.hut.fi (Jarmo Manninen)		oh4nw92-7-3@
hkoi@eng.tele.fi (Heikki Koivula)		oh4ra/oh2nra92-7-3
yari@otax.tky.hut.fi (Jari Annala)		oh5jj 92-7-3
ana@otax.tky.hut.fi (Antti Vahalummukka)		oh5kb 92-7-3
huopio@lut.fi (Kauto Huopio)		oh5lfm 91-10@
pluukkan@vipunen.hut.fi (Petri Luukkanen)		oh5lvt92-7-3@
ovr@vipunen.hut.fi (Otto-Ville Ronkainen)		oh5mfj92-7-3@
hvalkone@otax.tky.hut.fi (Harri Valkonen)		oh5mna92-7-3@
ms86817@cs.tut.fi (Matti Suokko)		oh5mrm91-12-4@
mvirtasa@otax.tky.hut.fi (Markus Virtasalo)		oh5ve 92-7-3
jps@luuri.hut.fi (Pekka Saynatjoki)		oh6by 92-7-3
jsi@vipunen.hut.fi (Jukka Tapio Sirvio)		oh6dd 92-7-8
rko@cs.tut.fi (Risto Kotalampi)		oh6ee 93-1-15
kwi@lesti.hut.fi (Kaj Wiik)		oh6eh 92-2-17
kwi@vipunen.hut.fi (Kaj Wiik)		oh6eh 92-7-3
mmakijas@otax.tky.hut.fi (Matti M[ki-Jaskari)		oh6fb 92-7-3
vsaynatj@otax.tky.hut.fi (Ville S[yn[tjoki)		oh6hf 92-7-3
tsivula@otax.tky.hut.fi (Timo Sivula)		oh6kk 92-7-3
tsivula@vipunen.hut.fi (Timo Sivula)		oh6kk 92-11-5
vtornqvi@vipunen.hut.fi (Vesa T[rnqvist)		oh6lro92-7-3@
mkl@bacall.uwasa.fi (Markus Lamminmaki)		oh6lsa 92-7-
20@		
mkl@chysde.uwasa.fi (Markus Lamminmaki)		oh6lsa 92-7-
20@		
hnorja@otax.tky.hut.fi (Heikki Norja)		oh6qq 92-7-3
kt70766@brando.uwasa.fi (Ari Vepsalainen)		oh6mw/pj9p 92-12-
1		
jukka@jybox.jyu.fi (Jukka Pappinen)		oh6mwq92-12-6@
s32979s@talтта.hut.fi (Timo Yli-Saari)		oh6xj 92-7-3
palaukkanen@tnclus.tele.nokia.fi (Pauli Laukkanen)		oh7bx 92-8-21
jyp@otax.tky.hut.fi (Jyri Putkonen)		oh7jp 92-7-3
riku@otax.tky.hut.fi (Riku Pirhonen)		oh7kr 92-7-3
pekorhon@tnclus.tele.nokia.fi (Pekka Korhonen)		oh8kp 92-3-19
luru@stekt.oulu.fi (Ari Husa)		oh8nup 91-10@
so-mmw@stekt.oulu.fi (Marko Wirtanen)		oh8wm 92-1-13
## CZECHOSLOVAKIA OK		
bodik@cs.pitt.edu (Rastislav Bodik)		ok3tsm92-9-19@
## BELGIUM ON		
onlaot%on6ar%pi8eae.bbs@pi8eae.ampr.org ()		onlaot91-11-12@
anton@aaasun (Anton Mandos)		on6nl 93-1-5
anton@aaa.ine.philips.nl (Anton Mandos)		on6nl 93-1-5
DAULIE%BANUFS11.BITNET@cunyv.cuny.edu (Michel Daulie)		on6ml 91-10



```

## DENMARK OZ
lea@dde.dk (Leif Erik Andersen)                oz1bbm      92-6-4
bjarne@ruc.dk (Bjarne Christensen)             oz1lqt92-9-18@
bjarne@gorm.ruc.dk (Bjarne Christensen)        oz1lqt      92-9-
18@
oz4zk%pi8eae.bbs@pi8eae.ampr.org (Kurt Pedersen)  oz4zk 91-10
## NETHERLANDS PA-PE
gvdg@wb3ffv.ampr.org (Gerard J van der Grinten)  pa0gri91-11-3
gvdg@tophat.cdh.cdc.com (Gerard J van der Grinten) pa0gri92-6-12
gvdg@cdc.com (Gerard J van der Grinten)         pa0gri      92-6-
12
henkp@paramount.nikhef.nikhef.nl (Henk Z Peek)   pa0hzp92-1-5
henkp@nikhef.UUCP (Henk Z Peek)                pa0hzp91-10
henkp@nikhef.nikhef.nl (Henk Z Peek)           pa0hzp      93-1-5
arne%hppcgelo.grenoble.hp.com@HPLB.HPL.HP.COM (Arne F E Luehrs) pa0kkv
93-1-18
arne@hppcgelo.grenoble.hp.com (Arne F E Luehrs)  pa0kkv93-1-18
arne_luehrs@hp6300.desk.hp.com (Arne F E Luehrs) pa0kkv93-1-18
pp@wsinti01.info.win.tue.nl (Peter J F Peters)  pa0ppe92-12-24
pp@info.win.tue.nl (Peter J F Peters)           pa0ppe      92-12-
24
pp@win.tue.nl (Peter J F Peters)                pa0ppe92-12-24
rutgers@prl.philips.nl (Herbert L Rutgers)      pa0su 92-8-2
adam@IGG.TNO.NL (Adam van Gaalen)              pa2aga92-10-27
pa2aga@IGG.TNO.NL (Adam van Gaalen)            pa2aga92-10-27
toms@hpcstmb.NETH.hp.COM (Tom Staal)           pa2tsl      92-7-8
RGREENWO@ESTEC.BITNET (Robin T Greenwood)      pa3acq/g3lba92-11-27
beyer@utrtsdec.dec.com (Peter Beyer[Beijer])   pa3aef91-12-30
ROBERT.VAN.DEN.NIEUWENDIJK@TFDL.AGRO.NL (Robert M van der Nieuwendijk) pa3amo
91-10
johan@ECE.ORST.EDU (Johan K Reinalda)          pa3dis/wg7j 93-1-
18
johan@hobo.ECE.ORST.EDU (Johan K Reinalda)      pa3dis/wg7j 92-10-
18
POSCH@AMC.UVA.NL (Cor Posch)                   pa3dyw      91-10
ramon@blade.stack.urc.tue.nl (Ramon Kolb)       pa3eug92-5-14@
walter@tnoibbc.ibbc.tno.nl (Walter Lohman)     pa3fbg91-10@
besten@chem.ruu.nl (Drs Remco den Besten)      pa3fym92-9-4@
besten@hutruu54.bitnet (Drs Remco den Besten)  pa3fym92-7-31@
Remco.Denbesten@bbs.oit.unc.edu (Drs Remco den Besten) pa3fym92-10-16@
geertj@ica.philips.nl (Geert Jan de Groot)     pelhgz92-12-29
i31@nikhef.nikhef.nl (Paul H Vogt)            pel1pl92-3-11
wimn@hpuamsc.NETH.hp.COM (Wim Nijntjes)       pelntw      92-6-
29@
bosscha@rc7.NHL.NL (F J Bosscha)               pelopi92-5-21@
## PP
ENQ7ADJ%BRUFSC.BITNET@uicvm.uic.edu (Alvaro Tancredo Dippold Jr) pp5aj 92-2-
13
## BRAZIL PT-PY
USERFRFA%LNCC.BITNET@VTVM2.CC.VT.EDU (Francisco Rogerio Fontenele Aragao)
pt2td      92-1-10@
PY2USP@BRUSPVM.BITNET (Luis Gustavo G Kiatake) py2usp91-10@
PY2USP@BRUSPVM.BITNET (Univ Sao Paulo)        py2usp      91-10@
## R UA-UV ? C.I.S.
harry@mosbos.msk.su (Harry B Booklan)         ra3auu      92-12-
3@
rw3ah@mosbos.msk.su (Andy Fyodorov)           rw3ah 92-12-26@

```

mbi@mosbos.msk.su (Dmitry [Andy] N Chesnokov)	ua3ab 92-11-2@
ua3ab@mosbos.msk.su (Dmitry [Andy] N Chesnokov)	ua3ab 92-12-3@
victor@stack.serpukhov.su (Victor Voronkov)	uv3din93-1-10@
ua3dpx@mosbos.msk.su (Andy Melanyin)	ua3dpx 92-12-
3@	
uv3dcx@mosbos.msk.su (Dima E Guskov)	uv3dcx 92-12-
26	
rr@mosbos.msk.su (Romeo Stepanenko)	3w3rr/ya0rr/xy0rr/9d0rr 92-12-
3@	
uz3awo@mosbos.msk.su (ARC of Moscow State Tech Univ)	uz3awo/rk3b 92-12-
3	
ve6mgs.#edm.ab.can.noam!rk3kp.#msk.rus.eu!uz3awo (ARC of Moscow State Tech Univ)	uz3awo/rk3b 92-12-13
## SWEDEN SM	
mats@ericad.ericsson.se (Mats H Wesslen)	sm0itg92-12-30
mats.wesslen@ericsson.se (Mats H Wesslen)	sm0itg92-12-30
Anders.Klemets@cs.cmu.edu (Anders Klemets)	sm0rgv91-10
helgo@elixir.lne.kth.se (Mats Helgostam)	sm0rjv91-12-18
euamih@eua.ericsson.se (Mikael Hausmann)	sm0txh92-3-26@
hawkeye@ludd.luth.se (Hakan Bergstrom)	sm3txo 93-1-
11@	
mol@csd.uu.se (Mikael Olsson)	sm4rdg 92-12-
28	
mol@meryl.csd.uu.se (Mikael Olsson)	sm4rdg92-12-28
bo@lysator.liu.se (Bo Jansson)	sm5kwo 92-2-3
jonas@lysator.liu.se (Jonas Melin)	sm5lzm91-10
gerca@lysator.liu.se (Gert E B Carlsson)	sm5lwc92-2-3@
pme@lysator.liu.SE (P M E)	sm5ohi 92-4-
24@	
marten@kuling.UUCP (Marten Norman)	sm5pay91-10
m91mfr@bellatrix.tdb.uu.se (Mikael Fredriksson)	sm5syo92-9-4@
m91mfr@tdb.uu.se (Mikael Fredriksson)	sm5syo 92-9-
4@	
e88pgp@etek.chalmers.se (Hannes Illipe)	sm6pgp 92-3-
12	
e2rosal@etek.chalmers.se (Robert Sandberg)	sm6swu92-10-6@
d89pn@efd.lth.SE (Patrik Nilsson)	sm6tkg91-10@
Peter.Rojsel@maxlab.lu.SE (Peter Rojsel)	sm7lek92-12-20
linus@lysator.liu.se (Linus Tolke)	sm7ouu92-7-8
## POLAND SN-SQ	
GREG@PLSZUS11.BITNET (Greg)	sp1wsn 92-9-
18@	
andy@mimuw.EDU.PL (Andrzej K Brandt)	sp5wca 92-2-
18@	
jalocha@vxcrna.cern.ch (Pawel Jalocha)	sp9vrc 92-9-
4@	
## GREECE SV	
Svlbds%GRATHUN1.BITNET@cunyv.cuny.edu (George Katsimaglis)	svlbds91-10@
svlbds@leon.nrcps.Ariadne-t.GR (George Katsimaglis)	svlbds 92-6-
3@	
sv1vn@sv1vn.ampr.org (Vasilis [Bill] Frangos)	sv1vn 92-12-24
kkralis@leon.nrcps.Ariadne-t.GR (Dr Costantinos K Krallis)	sv1xv/g7ahn 93-1-
17	
## CANADA VE VO VY CE CJ	
acornwal@fox.nstn.ns.ca (Andy Cornwall)	velcor 92-12-
23*	
dave@velei.uucp (Dave Landon Oldridge)	velei 92-1-3

d098@jupiter.sun.csd.unb.ca (Derek Billingsley)	ve1djb92-2-21
unbham@jupiter.sun.csd.unb.ca (Derek Billingsley)	ve1djb92-9-29
Cairns@upei.ca (David L Cairns)	ve1hg 92-10-10
houlejm@ireq.hydro.qc.ca (Jean-Marie Houle)	ve2aey92-11-6
belangej@ireq.hydro.qc.ca (Jacques Belanger)	ve2bke91-12-2
ve2eh@mala.proteus.qc.ca (Pierre Gagnon)	ve2eh 93-1-7*
castonj@ireq.hydro.qc.ca (Jacques Castonguay)	ve2esm91-12-2
bissonnet@ireq-sim.hydro.qc.ca (Michel Bissonnette)	ve2fyg91-12-2
missout@ireq.hydro.qc.ca (Gilles Missout)	ve2gfm91-12-2
lmcansi@noah.ericsson.se (Andrew Silver)	ve2hhs92-10-19
silver@ee470.ee.mcgill.ca (Andrew Silver)	ve2hhs92-10-19
mlefebvr@ireq.hydro.qc.ca (Marc Jacques Lefebvre)	ve2hqi91-12-2
Vaillan@ireq.hydro.qc.ca (Clement Vaillancourt)	ve2hqj92-12-24
bruno@lightning.McRCIM.McGill.EDU (Bruno Hall)	ve2hum91-11-21
bruno@athena.mcrcim.mcgill.edu (Bruno Hall)	ve2hum92-9-28
bruno@mcrcim.mcgill.edu (Bruno Hall)	ve2hum 92-9-
28	
royre00@DMI.USherb.CA (Roy Rejean)	ve2ims92-5-19
royre00@tohi.dmi.usherb.ca (Roy Rejean)	ve2ims 92-9-
29	
royre00@orac.holonet.net (Roy Rejean)	ve2ims 92-9-
29	
royre00@holonet.net (Roy Rejean)	ve2ims92-9-29
lafom00@DMI.USherb.CA (Martin Laforce)	ve2mlu 92-5-
21	
busatta@ireq-sim.hydro.qc.ca (Raymond Busatta)	ve2nna91-12-2
trepanim@ERE.UMontreal.CA (Martin Trepanier)	ve2ofl92-10-6
ve2okl@info.polymtl.ca (Jean H Theoret)	ve2okl 92-3-4
DAUDET@TOROVMI.VNET.IBM.COM (Daniel Audet)	ve2pnk92-5-14
jalonso@sobeco.com (Joe Alonso)	ve2unx 92-3-
26	
ve2ura@uuisis.isis.org (Douglas W Murray)	ve2ura/ve2vms 92-5-29
doug@owl.isis.org (Douglas W Murray)	ve2ura/ve2vms
92-8-12	
JR_HAY@PAVO.CONCORDIA.CA (Jim R Hay)	ve2ve 93-1-24*
luca@napoleon.dell.com (Luca Martini)	ve2wkr 91-12-
18	
luca@napoleon.eetech.mcgill.ca (Luca Martini)	ve2wkr92-2-7
awpaeth@watcgl.uwaterloo.ca (Alan William Paeth)	ve3awp/kd3xg92-10-
29	
awpaeth@watpix.uwaterloo.ca (Alan William Paeth)	ve3awp/kd3xg92-10-
29	
awpaeth@alumni.caltech.edu (Alan William Paeth)	kd3xg/ve3awp92-10-
29	
briand@trigraph.uucp (Brian Peter Dickson)	ve3bpd92-2-6
jtrimble@micor.ocunix.on.ca (Jason Trimble)	ve3bpp92-11-23*
darel@maccs.dcss.mcmaster.ca (Darel Mesher)	ve3dlt91-12-12
37147_1234@uwovax.uwo.ca (Marv Harold Sherebrin)	ve3fhx91-10
dave@toth.UUCP (David Bradley Toth)	ve3gyq91-11-29
dave@toth.uwo.ca (Dave Bradley Toth)	ve3gyq 92-11-
3	
72255.152@CompuServe.COM (Dave Toth)	ve3gyq 93-1-5
ve3gyq@tapr.ampr.org (Dave Toth)	ve3gyq93-1-5
I.MACMILLAN@<GEnie> (Ian Jim Macmillan)	ve3hxx 92-9-5
bduncan@ve3ied.UUCP (Bill Duncan)	ve3ied93-1-5*
perryd@Software.Mitel.COM (Dave Gareth Perry)	ve3ifb92-1-20
dave@ve3ifb.AMPR.ORG (Dave Gareth Perry)	ve3ifb93-1-18

barry@dgbt.doc.CA (Barry David McLarnon)	ve3jlf 93-1-26
bm@hydra.carleton.ca (Barry David McLarnon)	ve3jlf 93-1-18
ryan.bayne@canrem.com (Ryan Bayne)	ve3kow92-7-14
Ryan.Bayne#canrem.com@mail.uunet.ca (Ryan Bayne)	ve3kow92-7-14
liu@bnr.ca (Bing Liu)	ve3liu 92-8-
14@	
crampton@RD.HYDRO.ON.CA (Stewart William Crampton)	ve3mbt92-12-2
mleech@bnr.ca (Marcus D Leech)	ve3mdl 92-9-
24	
ml@ve3mdl.ampr.org (Marcus D Leech)	ve3mdl92-10-22
ml@hydra.carleton.ca (Marcus D Leech)	ve3mdl 92-10-
22	
u009@csx.cciw.ca (G Stewart Beal)	ve3mwm92-9-11
u009@cs.cciw.ca (G Stewart Beal)	ve3mwm92-9-11
stephen.woo@canrem.uucp (Stephen Woo)	ve3nus 92-1-3
stephen.woo@dosgate.uucp (Stephen Woo)	ve3nus 92-2-
12	
camerond@cc4.crl.aecl.ca (Don J Cameron)	ve3nvu92-11-27
camerond@crl.aecl.ca (Don J Cameron)	ve3nvu 92-11-
27	
dy@hydra.carleton.ca (H Douglas R Yuill)	ve3ocu92-10-18
douglee@becker (Doug Robert Lee)	ve3oyp92-1-5
douglee@douglee.uucp (Doug Robert Lee)	ve3oyp 92-1-5
latour!ve3pak!ve3pak@micor.uucp (Bret Edward Delmage)	ve3pak92-1-5
im@hydra.carleton.ca (Ian A McEachern)	ve3pfh 93-1-
28*	
ian@ve3pfh.ampr.org (Ian A McEachern)	ve3pfh 93-1-
18*	
pdgray@descartes.waterloo.edu (Peter D Gray)	ve3pgd92-5-14
dunc@eecg.toronto.edu (Duncan George Elliott)	ve3pkd92-2-4
rpmackin@student.business.uwo.ca (Robert Patrick MacKinnon)	ve3pmk92-8-2
znha@bnr.ca (Gord Steven Dey)	ve3ppe 92-1-
15	
EETY3439@Ryerson.CA (Michael David Alexander Durrant)	ve3pnx91-12-20
SPCL0006@Ryerson.CA (Michael David Alexander Durrant)	ve3pnx91-12-20
znha@bcrka391.bnr.ca (Gord Steven Dey)	ve3ppe 91-12-
12	
znha@bnr.ca (Gord Steven Dey)	ve3ppe 92-6-
29	
daves@sun470.geod.emr.ca (Dave G Stephenson)	ve3pyg92-3-17
rsanders@sunee.waterloo.edu (Roger King Sanderson)	ve3rks92-3-9
rsanders@bode.uwaterloo.ca (Roger King Sanderson)	ve3rks92-12-24
rph@sq.sq.com (Rolf Pontus Hedman)	ve3rph92-11-20
rszinn@neumann.uwaterloo.ca (Ronald Scotte Zinn)	ve3rsz92-3-29
rszinn@neumann.waterloo.edu (Ronald Scotte Zinn)	ve3rsz92-3-29
johnt@espinc (John Joseph Turner)	ve3smt91-10
kmc@bdwalk.UUCP (Kevin W McIntyre)	ve3snb92-3-19
totten@bmerh287.bnr.ca (Paul William Totten)	ve3spt91-12-12
jim@ghp.UUCP (Robert Jim Stewart)	ve3srj91-12-12
peter@mason.uucp@comix.Santa-Cruz.ca.us (Peter Ralph Jennings)	ve3sun
91-12-12	
woods@eci386.uucp (Greg A Woods)	ve3tcp91-10
woods@robohack.UUCP (Greg A Woods)	ve3tcp92-3-17
flyn@beltrix.guild.org (Francis Albert Lyn)	ve3tdl91-10
flyn@elselec.UUCP (Francis Albert Lyn)	ve3tdl 91-10
chk@alias.com (Conrad Harald Koch)	ve3tla92-2-6
chk@gpu.utcs.utoronto.ca (Conrad Harald Koch)	ve3tla92-2-6

saul@nsq.uucp (Saul Antonio Juliao)	ve3tve92-5-16
saul@aries.yorku.ca (Saul Antonio Juliao)	ve3tve92-5-16
salhany@vnet.ibm.com (Wayne Salhany)	ve3ugi 93-1-
14*	
wright@scorpio.ic.cmc.ca (Russell Wright)	ve3ukb93-1-27*
maciej@stpl.ists.ca (Maciej Siarkiewicz)	ve3upi93-1-11
cs911371@ariel.yorku.ca (Maciej Siarkiewicz)	ve3upi93-1-11
rnelson@watserv1.waterloo.edu (Randy Nelson)	ve3wrn91-12-31
clemon@lemsys.UUCP (Craig Andrew Lemon)	ve3xcl 92-12-
24	
clemon%lemsys@xenitec.on.ca (Craig Andrew Lemon)	ve3xcl92-12-24
lemsys!clemon@uunet.UU.NET (Craig Andrew Lemon)	ve3xcl92-12-24
gordon@pinetree.org (Gordon Dewis)	ve3xgd92-12-25*
jeverett@bnr.ca (Jerry J Everett)	ve3xpm93-1-9*
everett@nmerh97.NoSubdomain.NoDomain (Jerry F Everett)	ve3xpm93-1-9*
Lee.Laird@f7009.n124.z1.fidonet.org (Lee [Bob] Laird)	ve3ybc92-11-27*
cozyer@student.business.uwo.ca (Carl Ozyer)	ve3zco92-9-23
51160_1477@uwovax.uwo.ca (Dave G Colvin)	ve3zdc91-12-12
ppddgc@uwovax.uwo.ca (Dave G Colvin)	ve3zdc 92-3-
29	
rflukes@ccu.umanitoba.ca (Richard Francis Lukes)	ve4aiv92-3-17
drk@inqmind.bison.mb.ca (Dan Keizer)	ve4drk 92-5-9
ve4drk@muug.mb.ca (Dan Keizer)	ve4drk 92-10-
6	
ve4drk@mona.muug.mb.ca (Dan Keizer)	ve4drk92-6-31
jim@sys6626.bison.mb.ca (Jim Jaworski)	ve4jaf 92-12-
31*	
jim@inqmind.bison.mb.ca (Jim Jaworski)	ve4jaf 93-1-
24*	
trooper@inqmind.bison.mb.ca (Jose Luciano Vieira)	ve4jq 91-12-12
umehn@ccu.umanitoba.ca (Paula M Ehn)	ve4mhz 92-7-
31@	
paula@inqmind.bison.mb.ca (Paula M Ehn)	ve4mhz 92-7-
31@	
robert@inqmind.bison.mb.ca (Rob Boux)	ve4rrb 92-12-
15*	
bills@inqmind.bison.mb.ca (Bill T Shymanski)	ve4stw92-3-2
SCHELLEKENS@wl.aecl.CA (Wayne Schellekens)	ve4wts92-10-26*
walzer@inqmind.bison.mb.ca (Bruce D Walzer)	ve4xor91-12-12
Alan.Thoren@mailbox.bison.mb.ca (Alan D Thoren)	ve4yz 92-8-16
LAPORTE@wl.aecl.CA (John M Laporte)	ve4zp 92-10-27
zaphod!dougf@access.USask.ca (Doug A Freestone)	ve5uf 91-12-14
hardie@herald.usask.ca (Peter Andrew Hardie)	ve5va 92-2-21
sylvank@syma.sussex.ac.uk (Jacob Sylvan Katz)	ve5zx 92-9-19
katz@sask.usask.ca (Jacob Sylvan Katz)	ve5zx 92-9-19
dudley@ajfcal.cuc.ab.ca (Dudley Robert Craven)	ve6aap92-4-24
ve6ahm@ve6ahm.ampr.ab.ca (Les Davies)	ve6ahm 93-1-
24	
pbarrow@pbarrow.eche.ualberta.ca (Paul Barrow)	ve6ats91-12-27
ve6avk@ve6avk.ampr.ab.ca (John Verkerk)	ve6avk 93-1-
28	
doug@ve6bc.UUCP (Douglas R MacKintosh)	ve6bc 92-5-6
doug@ve6bc.ampr.ab.ca (Douglas R MacKintosh)	ve6bc 93-1-28
bdmc@oifis.mcc.ab.ca (Brian D McCullough)	ve6bdm93-1-25
alberta!apin!bdmc (Brian D McCullough)	ve6bdm 93-1-
25	
ncc!apin!bdmc (Brian D McCullough)	ve6bdm93-1-25

frank@ve6mgs.ampr.org (Frank Irwin Jackson)	ve6bg 92-12-15
ve6bg@ve6mgs.ampr.org (Frank Irwin Jackson)	ve6bg 92-12-15
tech@cs.AthabascaU.CA (Richard Loken)	ve6bsv 92-9-
29	
tech@aupair.cs.athabascau.ca (Richard Loken)	ve6bsv92-9-29
RICHARDLO@devax.admin.athabascau.ca (Richard Loken)	ve6bsv92-3-3
jerry@vort.cuc.ab.ca (Jerry Angelo Prettigiani)	ve6cbb92-9-25
bud@cs.AthabascaU.CA (Bud Berges)	ve6csx91-10
dan@cpsc.ucalgary.ca (Dan Freedman)	ve6dfm91-12-12
ve6eei@ve6eei.ampr.ab.ca (Evan Idler)	ve6eei 93-1-
24	
ve6gjt@ve6gjt.ampr.ab.ca (Glenn Tracy)	ve6gjt 93-1-
24	
ve6jy@ve6mgs.ampr.ab.ca (Don Moman)	ve6jy 93-1-20
kirk@ve6kik.ampr.ab.ca (D Kirk Davis)	ve6kik 93-1-
28	
@scapa.cs.ualberta.ca:ve6kik!itnbbs!root@nebulus (D Kirk Davis)	ve6kik
92-12-24	
ve6kik@gw-1.ampr.ab.ca (D Kirk Davis)	ve6kik 93-1-
28	
ken@ve6kik.ampr.ab.ca (Ken Laborde)	ve6kth92-5-14
ve6mc%ve6mc@ve6mgs.ampr.org (NARC Packet BBS)	ve6mc 93-1-18
lesley@ve6mgs.ampr.org (Lesley Estelle Salyzyn)	ve6mfb93-1-20
mark@ve6mgs.ampr.org (Mark Gregory Salyzyn)	ve6mgs93-1-20
mark@adec23.UUCP (Mark Gregory Salyzyn)	ve6mgs 93-1-
20	
mark@ve6mgs.uucp (Mark Gregory Salyzyn)	ve6mgs 93-1-
20	
mark@ve6mgs.ampr.ab.ca (Mark Gregory Salyzyn)	ve6mgs93-1-21
anip@mach.phys.ualberta.ca (Alex Nip)	ve6nip 92-11-
28	
trond@calvin.phys.ucalgary.ca (Trond Steinar Trondsen)	ve6nor/laloea
92-3-26	
trond@phys.ucalgary.ca (Trond Steinar Trondsen)	ve6nor/laloea
92-11-6	
trond@smith.phys.ucalgary.ca (Trond Steinar Trondsen)	ve6nor/laloea
92-11-27	
ve6paw@ve6mgs.ampr.org (Fernand Lemire)	ve6paw 91-12-
27	
rwa@aupair.cs.athabascau.ca (Ross W Alexander)	ve6pdq92-8-14
rwa@cs.athabascau.ca (Ross W Alexander)	ve6pdq 93-1-5
CJSRFM@vm.ucs.UAlberta.CA (Ray Semenoff)	ve6rhs93-1-21
davis@denali.UUCP (Glenn Davis)	ve6rsx 92-6-
5@	
ron@cs.athabascau.ca (Ron Haukenfrers)	ve6rwh 92-5-
10	
ron@sigyn.cs.athabascau.ca (Ron Haukenfrers)	ve6rwh92-9-25
dennis@nebulus.ampr.ab.ca (Dennis Breckenridge)	ve6tcp/ve6nos
93-1-28	
geoff@ugc.ab.ca (Geoff Coleman)	ve6ugc 92-7-9
uug@cpsc.ucalgary.ca (William Graham)	ve6uug 92-1-
25	
uug@indigo.cuc.ab.ca (William Graham)	ve6uug 91-10
larry@ve6vq.cuc.ab.ca (Larry David Gadallah)	ve6vq 92-5-6
ve6wks@ve6wks.ampr.ab.ca (Wayne Spoor)	ve6wks 93-1-
24	
holt@cs.athabascau.ca (Peter Holt)	ve6wlf91-11-26

Joel_Weiner@mts.ucs.ualberta.ca (Joel Weiner)	ve6wq 92-9-4
GLPT@UALTAMTS (Joel Weiner)	ve6wq 92-9-4
rosk@rillonia.uucp (Robert George Skegg)	ve7aii91-10
MULTI%TRIUMFER.BITNET@VM.USC.EDU (Timothy [Ya'akov] N Miles)	ve7alq
91-11-21	
miles@mindlink.bc.CA (Timothy [Ya'akov] N Miles)	ve7alq92-8-20
multi@erich.TRiumf.CA (Timothy [Ya'akov] N Miles)	ve7alq92-8-20
rosenaue@mpr.ca (Dennis Frank Rosenauer)	ve7bpe92-7-3
bennett@erich.triumf.ca (Peter Burke Bennett)	ve7cei92-11-15
bennett@reg.triumf.ca (Peter Burke Bennett)	ve7cei92-9-29
richard@wizard.ucs.sfu.ca (Richard Anthony Chycoski)	ve7cvs92-10-6
richard@sfu.ca (Richard Anthony Chycoski)	ve7cvs92-10-6
kdobie@uglw.UVic.CA (Keith Edward Dobie)	ve7cxd92-1-26
dnwangus@flash.LakeheadU.Ca (Dave Norman William Angus)	ve7dbp92-10-26
allenm@wizard.ucs.sfu.ca (Allen Woo Huey Mar)	ve7dpm92-5-11
emd@ham.almanac.bc.ca (Jan Robert Henri Smits)	ve7emd92-8-5
ham!emd@oneb.wimsey.bc.ca (Jan Robert Henri Smits)	ve7emd92-3-17
Doug_Crompton@mindlink.bc.ca (Ronald Doug Crompton)	ve7fgu92-7-8
George_Lin@mindlink.bc.ca (George Lin)	ve7fku 92-5-
6@	
bmassey@sirius.UVic.CA (Bill George Massey)	ve7f1192-9-29
sol.ubic.ca!ve7frg!george (George Farris)	ve7frg91-12-29
george@ve7frg.UUCP (George Farris)	ve7frg92-5-28
ve7frg@ve7frg.ampr.org (George Farris)	ve7frg 92-12-
24	
wagner@mala.bc.ca (Tom Wagner)	ve7gda 93-1-
18*	
djc@samisen.UVic.CA (Doug James Collinge)	ve7gnu92-11-20
samisen!djc@sol.UVic.CA (Doug James Collinge)	ve7gnu92-11-20
dcolling@ve7frg.ampr.org (Doug James Collinge)	ve7gnu92-12-24
comptec91006@camins.camosun.bc.ca (Michael Botten)	ve7gri92-10-19
niallp@ee.ubc.ca (Niall Parker)	ve7hex 92-11-
20*	
jerrys@holly.wimsey.bc.ca (Jerry Sturge)	ve7iyb92-11-15*
Jim_Sollows@mindlink.bc.ca (Jim L Sollows)	ve7jls92-10-16
jmorriso@ee.ubc.ca (John Paul Morrison)	ve7jpm 92-12-
19*	
gjernes@mpr.ca (Murray Bryan Gjernes)	ve7mbg 92-6-
31	
walmsley@mdivax1.MDI.COM (Stephen G Walmsley)	ve7sgw91-12-12
Lyndon.Nerenberg@unbc.edu (G Lyndon Nerenberg)	ve7tcp/ve6bbm
92-12-24	
lyndon@unbc.edu (G Lyndon Nerenberg)	ve7tcp/ve6bbm
93-1-25	
canada!Lyndon.Nerenberg@cs.ubc.ca (G Lyndon Nerenberg)	ve7tcp/ve6bbm
92-9-19	
rockwood@kean.ucs.mun.ca (Art Augustus Rockwood)	volax 92-2-12
jcraig@kean.ucs.mun.ca (Joe Donald Craig)	volna 92-10-8
mnewton@kean.ucs.mun.ca (Micheal Clive Newton)	volok 91-10
SEELER@upei.CA (Dr David Charles Seeler)	vy2dcs92-10-10
## AUSTRALIA VK	
gro@csc.canberra.edu.au (Geoff Rozenberg)	vk1co 92-5-16@
mbk113@rsphy7.anu.edu.au (Marek Kaminski)	vk1kam92-7-14@
skcm@echo.canberra.edu.au (Carl R Makin)	vk1kcm91-10
skcm@ise.canberra.edu.au (Carl R Makin)	vk1kcm 91-12-
9	
makinc@hhcs.gov.au (Carl R Makin)	vk1kcm93-1-18

sserve.cc.adfa.oz.au!hhcs!makinc (Carl R Makin)	vk1kcm92-10-8
Lawrie.Brown@adfa.oz.au (Lawrie Brown)	vk1klb 92-11-
5@	
pgc@csadfa.cs.adfa.oz.au (Phil Clark)	vk1pc 91-10@
wkt@rodos2.cs.adfa.oz.au (Warren Toomey)	vk1xwt91-10@
wkt@csadfa.cs.adfa.oz.au (Warren Toomey)	vk1xwt92-11-20@
wkt@sserve (Warren Toomey)	vk1xwt 91-10@
mark@runx.oz.au (Mark T Webster)	vk2bak93-1-14
michael@vk2bea.UUCP (Michael G Katzmann)	vk2bea/nv3z 92-1-
17	
opel!vk2bea!michael (Michael G Katzmann)	vk2bea/nv3z 91-12-
9	
awesley1@gara.une.oz.au (Anthony E Wesley)	vk2bgq92-1-25
boyd@prl.enet.dec.com (Boyd C Roberts)	vk2bhr 91-12-
6	
terryd@extro.ucc.su.OZ.AU (Terry J Dawson)	vk2ktj92-1-26
alan@frey.newcastle.edu.au (Alan Hargreaves)	vk2kvf92-11-15@
glenn@physics.su.OZ.AU (D Glenn Geers)	vk2ela 92-1-
13	
pe91dani@techno.nepean.uws.edu.au (Daniel Godden)	vk2jdg91-12-9@
steve@fawlty.towers.oz.au (Steve J Blanche)	vk2kfj92-12-31
dave@ips.oz.au (Dave I Horsfall)	vk2kfu92-10-10
dave@eram.esi.COM.AU (Dave Horsfall)	vk2kfu 92-10-
11	
dave@esi.COM.AU (Dave Horsfall)	vk2kfu 92-10-
11	
pj@towers.oz.au (Peter A Jackson)	vk2khz92-3-4
terryd@extro.ucc.su.OZ.AU (Terry J Dawson)	vk2ktj92-2-4
alan@frey.newcastle.edu.au (Alan Hargreaves)	vk2mgl91-12-9@
s8604880@mackay.mpce.mq.edu.au (Steve Derry Edward Pullan)	vk2qz 91-12-9?
richardm@runx.oz.au (Richard P Murnane)	vk2sky 93-1-5
cheese@runx.oz.au (Mark Cheeseman)	vk2xgk92-11-1@
csmall@amdahl.ccsd.uts.edu.au (Craig Small)	vk2x1z91-12-9@
CCDRW@cc.newcastle.edu.au (Dave)	vk2xpx93-1-27@
ddavidso@gara.une.oz.au (Dean J Davidson)	vk2zid91-12-9
jtanner@grivel.une.edu.au (John H Tanner)	vk2zxx91-12-9
vk3ave@csource.OZ.AU (Peter Hallgarten)	vk3ave 91-12-
20	
vk3ave@vk3rpa.ampr.org (Peter Hallgarten)	vk3ave92-3-9
raven@csource.oz.au (Bryan L Weeks)	vk3blw92-5-29
ash@mlacus.oz.au (Ashok Nallawalla)	vk3cit91-10
ash@syacus.acus.oz.au (Ashok Nallawalla)	vk3cit92-12-29
djewell@rhea.trl.OZ.AU (David Jewell)	vk3daj 91-10@
drw@matilda.vut.edu.au (Don Watson)	vk3dpi91-12-9@
devos@mundil.cs.mu.OZ.AU (Stuart John de VOS)	vk3eql91-10@
tyers@rhea.trl.OZ.AU (P J Tyers)	vk3kts91-10
gja@mullian.ee.mu.oz.au (Grenville Armitage)	vk3xmw91-10@
wayne@solwarra.gbrmpa.gov.au (Wayne Amisano)	vk4jcu/vk4kt92-10-
6	
vk4jcu@gbrmpa.gov.au (Wayne Amisano)	vk4jcu/vk4kt
92-10-6	
vk4kt@gbrmpa.gov.au (Wayne Amisano)	vk4jcu/vk4kt92-10-
6	
wayne@gbrmpa.gov.au (Wayne Amisano)	vk4jcu/vk4kt92-10-
6	
joyce@qut.edu.au (Andy Joyce)	vk4kiv 92-3-
9@	



xtasc@levels.unisa.edu.au (Rob Mayfield)	vk5xxx92-5-1@
e2grwill@snap.cats.adelaide.edu.au (Grant Willis)	vk5zwi91-12-9@
grwillis@teaching.cs.adelaide.edu.au (Grant Willis)	vk5zwi91-10@
samp@DIALix.oz.au (Sam J Pascoe)	vk6ksp91-12-9
gary@antlia.uwa.oz.au (Gary Carroll)	vk6xq 92-2-6@
nmurrayr@cc.curtin.edu.au (Ron J Murray)	vk6zjm91-10
## HONG KONG VR2	
ee_hflo@uxmail.ust.hk (Michael Lo Ho Fung)	vr2yjr93-1-14@
ee_hflo@stu.ust.hk (Michael Lo Ho Fung)	vr2yjr 93-1-
14@	
mlo@nyx.cs.du.edu (Michael Lo Ho Fung)	vr2yjr 93-1-
14@	
michaelo@gnct.com (Michael Lo Ho Fung)	vr2yjr 93-1-
14@	
## INDIA VU	
rvenkate@rodan.acs.syr.edu (Ravi Venkatesh)	vu2ev 91-10
lucky@ece.iisc.ernet.IN (Lakshman [Lucky] Bijanki)	vu2lbw92-11-18
ik24@sol.acs.unt.edu (Belathur Prashanth)	vu2nik92-6-11@
niki@unt.edu (Belathur Prashanth)	vu2nik92-6-11@
## INDONESIA YB-YC	
owpurbo@norton.uwaterloo.ca (Onno W Purbo)	yc1dav/ve3 92-9-
4@	
yc1dav@ve3.yc1dav.ampr.org (Onno W Purbo)	yc1dav/ve3 92-9-
4@	
## NICARAGUA YN	
theo@uni.ni (Theo Vlaar)	yn1tv 92-11-2@
theo@nicarao.apc.org (Theo Vlaar)	yn1tv 92-11-2@
theo@disp.uni.ni (Theo Vlaar)	yn1tv 92-11-2@
## El SALVADOR YS	
ulloa@maccs.dcss.mcmaster.ca (Jorge Ulloa)	ysluj 91-10@
## YUGOSLAVIA YU	
YU3FK%CATHY%yubgef51.BITNET@cunyv.cuny.edu (Iztok Saje)	yu3fk 91-10
yu3fk@ijs.ac.mail.YU (Iztok Saje)	yu3fk 91-10
IZTOK%DAMA%yubgef51.BITNET@pucc.princeton.edu (Iztok Saje)	yu3fk 91-10
## NEW ZEALAND ZL	
crookb@mof.govt.nz (Brian W Crook)	z11akc92-6-4
crookb@remof.mof.govt.nz (Brian W Crook)	z11akc92-6-4
psyxsgp@otago.ac.nz (S G Pearce)	z11any91-10
Steve_Wright@kcbbs.gen.nz (Steve Wright)	z11bhd92-5-24@
charlie@mof.govt.nz (Charlie R Tetenburg)	z11bjq91-12-10
Garth_Robinson@kcbbs.gen.nz (Garth Robinson, L E Trigg in CB)	z11tue
91-11-21?	
richard@nacjack.gen.nz (Richard Vowles)	z11utf 92-5-
16@	
lance@lancea.actrix.gen.nz (Lance M Andrewes)	z12ajh92-5-16
G.Moretti@massey.ac.nz (Giovanni S Moretti)	z12boi92-11-20
news@massey.ac.nz (Giovanni S Moretti)	z12boi 92-11-
20	
wk@frc.maf.GOVt.NZ (Wilbert Knol)	z12bsj92-10-22@
swain_i@kosmos.wcc.govt.nz (Ian Swain)	z12ias 92-11-
27@	
jane@z12tnm.gp.co.nz (Jane Atkinson)	z12qo 91-11-27
jane@toyvax.z12tnm.gen.nz (Jane Atkinson)	z12qo 92-2-4
don@z12tnm.gp.co.nz (Don Stokes)	z12tnm91-12-22@
phillipsa@skyfox (M Andre Phillips)	z13aw 92-12-20
phillips@skisas.usask.ca (M Andre Phillips)	z13aw 92-12-20
bruce@cpsc.ucalgary.ca (Bruce A MacDonald)	z13oa 91-10

P.Dalliessi@massey.ac.nz (P J Dalliessi)	z14ms	92-7-8
## AMATEUR RELATED ADMINISTRIVIA		
70524.2272@CompuServe.COM (Dave Cowdin, Amsat Postings)	AMSAT	92-12-28
pschleck@unomaha.edu,bowen@cs.buffalo.edu (Archive)	ARCHIVE	92-12-17
2155052@mcimail.com (American Radio Relay League)	ARRL	92-8-8
elmers-request@unomaha.edu (Ham Radio Elmer List)	ELMER	92-9-25
hamradio-faq@uts.amdahl.com (Ham Radio FAQ)	FAQ	92-12-24
pschleck@unomaha.edu,jmaynard@oac.hsc.uth.tmc.edu (Guide Coordinators)	GUIDE	92-12-17
listserv@knuth.mtsu.edu (KA9Q Unix List Administrivia)	KA9Q-UNIX	93-1-25
ka9q-unix@knuth.mtsu.edu (KA9Q Unix List Postings)	KA9Q-UNIX	93-1-25
tkelso@afit.af.mil (TS Kelso, Keplerian Postings)	KEPS	92-8-8
nos-bbs@hydra.carleton.ca (NOS BBS List)	NOS	92-1-17
nos-bbs-request@hydra.carleton.ca (NOS BBS List)	NOS	92-1-17
repeaters@wattres.sj.ca.us (Repeater Mapping Project)	REPEATER	93-1-12
ted@tedb.demon.co.uk (Edward Batts, RSGB contact)	RSGB/GB2RS	92-10-31
70247.3516@Compuserve.Com (George Wood, SCDX Bulletins)	SCDX	92-9-15
elements-request@telesoft.com (Shuttle Elements List)	SHUTTLE	93-1-14
oler@rho.uleth.ca (Cary Oler, Solar Reports)	SOLAR	92-8-8
oler@beta.uleth.ca (Cary Oler, Solar Reports)	SOLAR	92-8-8
dx@mosbos.msk.su (Gateway to SU.HAMRADIO Fido echo)	SU.HAMRADIO	92-12-3
tapr@wb7tpy.ampr.org (Tucson Amateur Packet Radio)	TAPR	92-1-1
tapr@tapr.ampr.org (Tucson Amateur Packet Radio)	TAPR	92-10-10
SMTP@gordon-profs.army.mil (Mail News Gateway)	rec.radio.amateur.misc	92-9-13
MAILER@cunyvms.cuny.edu (Network Mailer Digest)	rec.radio.amateur.misc	92-9-13
packet-faq@uts.amdahl.com (Packet-Radio FAQ)	rec.radio.amateur.packet	92-9-13
hams-on-usenet@ve6mgs.ampr.org (USENET Amateurs List)	Hams-List	92-12-28
rec-radio-request@ve6mgs.ampr.ab.ca (rec.radio.info moderator)	rec.radio.info	93-1-20
rec-radio-info@ve6mgs.ampr.ab.ca (rec.radio.info postings)	rec.radio.info	93-1-20



Subject: Mac HamStacks for Exams

LATEST VERSIONS: Novice v3.3, Technician v3.5, General v2.3,  
Advanced v2.3, Extra v2.3

This is another announcement about the MacIntosh HamStacks which I have created. If you are not interested, press 'n' now.

I have created five HyperCard stacks to help people practice for the written Amateur Radio tests. There is one stack for each of Novice, Technician, General, Advanced and Extra questions. Each stack is an interactive multiple-choice test, created from the entire question pool for that class of license. The test is randomly generated, using the algorithms provided for each of the tests from ARRL, so this is a real-live simulation of the tests you will get in front of a VE. There are some print capabilities (you can print a test with a separate answer key, but it's slow. you can also print your results of how well you did, along with the accompanying correct answer key) and at the end of each test, it will tell you how well you did, allow you to review the missed questions, and allow you to take another randomly generated test. If you can consistently score over 90 on the tests, it's almost a sure guarantee that you will be able to take and pass the VE proctored test.

Note that these stacks will only work on a MacIntosh computer. HyperCard version 1.2 or later is required; they were generated with HyperCard version 1.2. Because HyperCard data is NOT stored in any ASCII form, there is no way that this data can be used on other computers, including IBM PCs, so please don't ask for the impossible. Also, I do NOT have access to email these stacks over the computerwaves, nor do I have ftp capability. There are a couple of sites which are supporting these stacks via ftp, as follows:

These stacks are supported by ftp by Charley Kline, c-kline@uiuc.edu. To access the files, type "ftp uxc.cso.uiuc.edu", log in as "anonymous", with your email address as the password. Type "binary" at the prompt, then type "cd pub/ham-radio". The five hamstacks are (eg): novice-v3.2.hqx.Z, technician-v3.3.hqx.Z, general-v2.2.hqx.Z, advanced-v2.2.hqx.Z, and extra-v2.2.hqx.Z (or similar names). To retrieve one of the files, (for example, the Novice one), type "get novice-v3.2.hqx.Z". When you're finished retrieving all the files you want, type "quit" to exit ftp. Each file must be uncompressed before moving it to the Mac: "uncompress novice-v3.2.hqx.Z". You need to use Kermit to transfer the files to the Macintosh. The files must then be un-binhexed by UnStuffit, then unstuffed by UnStuffit.

The latest versions of the stacks are shown below, and are compressed with Stuffit Classic. UnStuffit is included on the diskette. These versions include modifications for NoCode (very minor changes from v3.0 or v2.0).

- Novice version 3.3
- Technician version 3.5
- General version 2.3
- Advanced version 2.3
- Extra version 2.3

If you wish to receive these PUBLIC DOMAIN stacks from me, please send me a SASE (self addressed STAMPED envelope - 2 ounces postage = .52) and 800K diskette. I will no longer send out the stacks unless the envelope has sufficient postage for return mail (in general, that means .52-.98, depending on size of envelope) and for those who send a standard business envelope, I

take no responsibility for the condition of the diskette through USnail.

Thank you for your attention.

Diana L. Syriac  
49A Meadow Pond Drive  
Leominster, MA 01453



Subject: Handicapped/disabled exemptions  
for the Amateur Radio 13 or 20 words-per-minute  
Morse code examination requirements as permitted by  
FCC Rules Section 97.505(a)(5)(i)(ii):

Dear applicant:

It is the intent of the FCC's allowance for exemption/credit of the FCC's Morse code examination requirement for the General, Advanced or Amateur Extra class license, that you are permitted to apply for exemption/credit if you are not able to pass the 13 or 20 WPM Morse code examination due to the severity of your handicap or disability. The FCC will not exempt you from the initial 5 WPM Morse code requirement, however.

To begin, the FCC provides guidance to you and your Physician within the enclosed FCC Fact Sheet.

Taking the FCC's guidance into account in considering the exemption/credit option, we hope that you have at least attempted to pass the examination using the new, more flexible, examination procedures announced by the FCC, which include:

1. Where warranted, we may now offer you a sending test (instead of a receiving test).
2. Where warranted, we may pause the tape for you to allow you to speak out what you have copied. Or, we can allow you the necessary time to write down what you have copied by pausing the tape after phrases/sentences; or in groups of words; or by individual word, or in extreme cases where warranted letter-by-letter.

In most cases, the above flexibility will allow you to pass the Morse code examination on your own--therefore not requiring an exemption of the Morse code requirement because these procedures may have accommodated your severe handicap or disability.

Attached is a Physician's Certification of Disability and Patient's Release form. After it is completed, you must submit this document directly to a VEC accredited VE Team (this may be the team who is administering your written exam[s]). As required by the FCC, you must currently hold at least a Novice license, or a license which conveys credit for having passed a Morse code examination element, and you must already have earned credit for the necessary written exams for either the Technician (Element 3A) plus the General (Element 3B), Advanced (Element 4A) or Amateur Extra class (Element 4B).

In order for your Physician's Certification to be accepted for exemption/credit by a VE Team, we recommend that you review the following check list to ensure that your certification will be acceptable:

- \* The Physician's Certification must be completed by both your Physician as well as by you.
- \* The completed Physician's Certification (made by Medical Doctors or Doctors of Osteopathy, only!) contains an original Physician's signature in original penmanship. The signature is not a signature stamp, nor is it a photocopy.
- \* The certification must be dated by the Physician.
- \* You already hold, or intend to take at the session, the necessary written

elements required toward an upgrade.

If your Physician's Certification meets the above requirements, then your request must be presented to an ARRL/VEC VE Team with a check or money order in the amount of \$5.25 for 1991 or \$5.40 for 1992 (our standard processing fee). Only VEC-accredited VE Teams may process your request because they must provide you with a CSCE indicating that you have been given Element 1C exemption/credit for presenting your correctly-completed Physician's Certification.

If you have any questions, please feel free to contact the ARRL/VEC. The number is: (203)-666-1541. Our address is: ARRL/VEC, 225 Main Street, Newington, CT 06111.

73,

Bart J. Jahnke, KB9NM  
Manager, ARRL/VEC

ARRL/VEC 11/91

#### INSTRUCTIONS TO THE DOCTOR

You have been presented with these instructions and certification form for the purpose of certifying to the Federal Communications Commission (FCC) that the patient under your care will not be able to pass the required 13 or 20 words-per-minute Amateur Radio Morse code examination because the patient suffers from one or more severe handicap(s) in accordance with Section 97.505(a)(5)(i)(ii) of the FCC Rules.

Since you may not be aware of what the examination entails, here is a description of the examination and the allowable procedures for examining someone who has one or more severe handicaps or disabilities. (See also the attached FCC Fact Sheet).

The Morse code is usually presented via audio as a series of dot and dash sequences sent at a particular speed. Other types of presentations include flashing lights and/or a tactile pad. The dots/dashes translate into individual characters of the alphabet; numbers 0-9; punctuation involving the period, comma, question mark, fraction bar (/); and three procedural signs made up of two-letter combinations. For example, the letter "A" in Morse code is dot-dash; the number "1" is dot-dash-dash-dash-dash and the period "." is dot-dash-dot-dash-dot-dash.

The applicant is required to communicate to the examiners information regarding the content of the Morse code message that is presented in the examination. The reasons a person might not be able to pass the test include audio/visual input processing disorders, the inability to communicate the information which has been comprehended, or other similar difficulties. On the preceding page is an FCC Fact Sheet which will provide you with additional information.

The FCC makes flexible procedures available to the examiners in order to allow the patient to convey the translated Morse code information to the examiners. The examiners may write for the patient--if the patient cannot do so. The examiners may allow the patient to send the Morse code (in dot dash sequences) instead of having the patient listen and translate [this is especially helpful for hearing impaired patients]. The examiners may pause the Morse code exam audio tape recording so that the patient may keep up with the pace of the exam--where warranted the tape may be paused in groups of words, sentences or



phrases; or after each word; or after each character.

We are looking to you as the expert to certify that the patient will not be able to participate in the examination process. Be aware that medical information as it pertains to the handicap or disability must be made available to the FCC upon their request as authorized by the patient's signed release.

Note that you may only make this certification if the duration of your patient's handicap will extend for more than 365 days beyond the certification date.

Only this format is acceptable by the FCC, so please complete (fill in the blanks) this form as indicated.

Your certification must be returned to the patient who will present it to the examiners so that it may be forwarded to the Federal Communications Commission.

Thank you for your assistance in this matter.

Sincerely,

American Radio Relay League  
Volunteer Examiner Coordinator Office

ARRL/VEC - 225 Main Street - Newington, CT 06111 (203) 666-1541 ext. 251  
11/91

PHYSICIAN'S CERTIFICATION

TO: Applicants seeking exemption for the Amateur Radio 13 or 20 words-per-minute Morse code examination requirements as permitted by FCC Rules Section 97.505(a)(5)(i)(ii):

The following Physician's Certification and Release form must accompany your FCC Form 610 license application when you attend a VEC test session. This fill-in-the-blank format was provided by the FCC.

This certification must be made by your physician. The Physician's signature must be made in original penmanship. The signature may not be a copy or signature stamp. If the certification is not completed following these instructions, the application will be returned to the applicant.

---

PHYSICIAN'S CERTIFICATION OF DISABILITY

Physician's Name \_\_\_\_\_

Physician's Address \_\_\_\_\_

\_\_\_\_\_

Office Telephone Number ( \_\_\_\_\_ ) \_\_\_\_\_

I certify that \_\_\_\_\_ is severely handicapped, the duration of which will extend for more than 365 days beyond the date of this certification. Because of this severe handicap, this individual is unable to pass a 13 (or 20) words per minute telegraphy examination for an amateur operator license.

I am licensed to practice in a place where the amateur service is regulated by the Federal Communications Commission as a doctor of medicine (M.D.) or a doctor of osteopathy (D.O.).

WILLFUL FALSE STATEMENTS ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S. CODE TITLE 18, SECTION 1001.

\_\_\_\_\_ (M.D. or D.O.)                      Date:

\_\_\_\_\_  
(Signature of Physician) Stamp unacceptable

\_\_\_\_\_  
Physician's name (typed or printed)

PATIENT'S RELEASE

Authorization is hereby given to the physician named above, who participated in my care, to release to the Federal Communications Commission any medical information deemed necessary to process my application for an amateur radio license.

\_\_\_\_\_  
(Applicant's Signature)

\_\_\_\_\_  
Applicant's Name (typed or printed)

\*EOF



Subject: Summary of Data from QST Reviews of Amateur HF Transceivers  
 Version 4 16 Dec 1992

Rig	QST Review IMD DR Issue dBm	Harm. 3rdO Icpt dBpep	Xmtr Spurs dBpep	IMD dBpep	Rcvr Min Sig dBm dB	BlkRng dB
-----						
Yaesu:						
FT-ONE	08/83 N.L.	-53	-65	-38	-133 N.L.	N.L.
FT-77	11/83 -1.5	-	-54	-35	-139.599	92
FT-101E	09/76			-34	-141 108	81
FT-101Z	12/79 -22	-45		-38	-139 112	78
FT-102	10/83 +18	-44		-40	-127 N.L.	96.5
FT-107	04/81		-47	-32	-133 N.L.	82
FT-301	10/77	-55	-68	-40	-133 100	75
FT-707	06/81 -12	-60	-49	-34	-126 N.L.	76
FT-747	08/89 -1	-54	-60	-32	-136 109.5	90
FT-757	12/84 -5		-58	-33	-137 N.L.	89
FT-767	09/87	-62	-56	-40	-131 115	85
FT-901	11/78	-46	-57	-38	-137 114	85
FT-980	11/84 N.L.	-56		-37	-137 N.L.	N.L.
FT-890	09/92 +1	-50	-50	-30	-137 127	92
FT-1000	03/91 +5	-60	-45	-36	-136 137	94
Icom:						
IC-701	04/79	-45	-60		-133 120	87
IC-720	08/82 +13.5	-58	-63	-28	-132 N.L.	92
IC-725	03/90 -2	-56	-56	-35	-137.5N.L.	90.5
IC-730	11/82 +4.0	-50	-60	-40	-140 N.L.	96
IC-735	01/86 -1	-65	-65	-33	-133 N.L.	88
IC-740	09/83 -0.5	-57	-63	-30	-141 125	94
IC-745	09/85 -3	-65	-65	-35	-140 115	92
IC-751	01/85 -5.5	-60	-60	-33	-138 N.L.	91
IC-765	12/90 +2	-64	-64	-40	-142 146	96
IC-761	09/88 2.5	-56	-65	-37	-139 122	95

IC-781	01/90 4.5	-63	-63	-37	-140	132.5	97
Ten-Tec:							
ArgntII	01/92 -16	-53	-53	-30	-135	109	82
Argosy	10/82	-48	-54	-31	-133	98	64
Centy22	05/85 -6.5	-54	-46		-128	109	81
Corsar2	08/87 -4	-60	-45	-29	-124	117	80
DeltaII	01/92 -0.5	-52	-47	-33	-129	104	88
Omni D	01/80 -4	-65	-48	-30	-128	115	90
Omni V	11/90 6.5	-62	-48	-33	-135	135	95
Paragon	05/88 12.75	-56	-61	-33	-137	136	101
Collins:							
KWM-830	10/82 N.L.	-59	-60	-34	-131	N.L.	N.L.
Cubic:							
Ast 102	12/81 -3	-50	-49	-28	-125	N.L.	84
Drake:							
TR7/DR7	05/79	-46	-52	-33	-133	120	84
Swan:							
Astr150	7/80 -1	-44	-55	-29	-127	114	84
Heathkit:							
HW-9	07/85 4	-42	-42		-128	122	88
HW-104	12/76			-40	-125	94	71
HW-5400	10/84 -12.0	-48	-56	-30	-133	110	82
SB-1400	10/89 +1	-53	-56	-30	-135.5	112.5	91
SS-9000	02/84 -4.5	-55	-60	-29	-138	118	88
Kenwood:							
TS-120S	02/80 -26.5	-60	-49	-36	-139	108	75
TS-130	07/81 -19.5	-55	-45	-38	-138	109	78
TS-140	06/88 -0.5	-46		-30	-137	114	91
TS-180S	05/80 -14.5	-50	-70	-38	-139	112	82
TS-430	03/84 -2.75		-51	-31	-137	N.L.	90

TS-440	12/86	-65	-43	-28	-139	111	89
	-6.5						
TS-450S	04/92	-50	-50	-35	-138	108	70
	-35	(Note 3)					
TS-520	05/78				-133	104	69
TS-530	03/82	-42	-68	-28	-135	112	88
TS-680	10/88	-45	-65	-32	-139.5	106.5	92
	-1.5						
TS-690S	04/92	-50	-50	-35	-138	108	70
(Note 3)							-35
TS-820	09/76	-45		-39	-136	114	85
TS-830	05/81	-45	-62	-32	-136	129	82
	-13						
TS-850S	07/91	-64	-64	-28	-141	138	108
	+15.5						
TS-930	01/84	-50	-50	-35	-139	N.L.	86.5
	-7.8						
TS-940	02/86	-54	-65	-37	-139	138	93
	-0.5						
TS-950	01/91	-55	-55	-42	-142	138	99
	+5.5						
TS950SDX12/92			<-40	-35	-137	131.5	93
	+0.5						
Japan Radio							
JST-135	03/92	-63	-63	-30	-128	117	91
	+4.5						

Test Results of some older transcievers  
(by Sherwood Engineering)

Drake:							
TR-4c					-124	105	74
Atlas:							
350-XL					-131	117	81
210/215X				-120	123	76	
Heathkit:							
SB-104					-123	92	79
Ten-Tec:							
Omni-B					-136	129	87
Corsair					-131	130	93

N.L. = Noise Limited  
dBpep = dB below PEP output power.

Notes:

1) When receiver values were given for preamp on/off, the preamp on numbers were used here. (or IPO/AIP off)

2) When values for more than one HF Amateur band are given, the worst numbers were used. (example: general coverage receiver numbers for 1.0 MHz were not considered, if a rig covers 50MHz, those numbers were not considered.)

3) Dynamic Range and 3rd order intercept numbers for the TS-450S and TS-690S do not indicate performance as bad as such numbers would usually warrant. Although 3rd order products appeared at the MDS level at a fairly low level, they did not increase in amplitude with rising input signal level as rapidly as one would normally expect. See the QST review for more details.

References:

"Using QSTs to Choose an Old HF Rig", QST, Feb 1987. Includes a table similar to the one above.

"The Product Review Process", QST, Dec 1985. Describes the tests that generate the numbers in the table, and how to interpret them.





From moodyblu@buhub.bradley.edu Fri Apr 26 18:31:19 1991  
Date: Fri, 26 Apr 91 17:30:52 CDT  
From: Matthew Weisberg <moodyblu@buhub.bradley.edu>  
Subject: HT Comparisons

It was suggested that I send the following digest of HT info to you.  
Let me know if there are any problems with it, etc.

Matt Weisberg

-----  
Since several people have asked me to forward them replies to my recent  
questions about HT's, I decided to post a summary of responses:

-----  
In ham radio, you absolutely get what you pay for. I suggest looking  
for a used Icom 32-AT if you want a dual bander.--

-----  
Welcome aboard Matt! --

For what its worth, I'd suggest you avoid used Santec and  
used Azden H/Ts. It's tough finding parts and accessories  
for them, not to mention service.

However, there are good used H/Ts available that can usually  
be had reasonably (\$100-\$175 depending on age/condition/accessories  
etc). Icom 2ATs (thumb-wheel freq selection, no scan) are widely  
available, rugged, and battery packs, speaker/mics, etc are easy to  
come by (some guys just refuse to sell when it comes down to the wire,  
they like this little radio so much!). Kenwood 7300's are a little  
more sophisticated, but some would say not as rugged as the Icom 2AT.  
Older Yaesu are around as well. As I said before, just avoid the  
off-brands, and you'll likely be ok.

For new rigs, if you are so inclined, don't overlook Alinco. I'm  
very happy with my DJ-160 2-mtr, and lot's of folks have commented  
favorably on the Alinco dual-bander. Right now, the previous models  
of Kenwood and Icom dual banders are widely available at "sale"  
prices as they clear stock to make way for the newer, smaller, more  
bells-and-whistles models.

Lot's to choose from, so enjoy the quest! 73 -- Have fun Hamming!

-----  
Congratulations on your license!

I have a Yaesu FT-23R (2-meter), which set me back \$270. I was looking for  
something used, but used HTs are rare, at least around here. The FT-23 lacks  
some features which would occasionally be nice (i.e., sub-audibles and DTMF),  
but which I don't miss. You can add these features later, but it's cheaper  
to the next model up, which has them built in.

My favorite thing about the Yaesu is it's small enough to carry with me almost everywhere. When I'm rich & famous, and can afford to get another HT, I'll keep this one as a backup, and for those times when I want the small package. For now, this is my only 2-meter rig--base, mobile, and hand-held all in one.

Whatever you get, get a decent antenna. I only use the rubber duck when the telescoping would be too much in the way. I've got a 3/8-wave whip, and it makes a BIG difference in reception and ability to hit the repeater. 1/2 wave would have been better, but I'm not sure the difference between the 3/8 and 1/2 would be as dramatic as between the 3/8 and the duck. Probably the best \$10 I spent on gear.

Hope this helps.

--Mike

-----

If I were money-constrained right now, but wanted a good dual-band HT, I'd buy a used IC24AT. There will be a number on the market at good prices, since the IC W2 is now out, and is even neater. The '24 is a very nice rig.  
73, doug

-----

I just purchased an Icom IC-24AT. Below is the chart I put together while looking for a HT. Icom has just announced a new model (the IC-W2 or something) and the prices on the 24 have dropped. Hope this helps.

Phil

=====  
Comparison chart of 2m/70cm dual-band HTs -- 26 Mar 1991

[ Please Note: I added the info on the Alinco DJ-560T - Matt Weisb e

Radios included:

Alinco DJ-560T, DJ-500T  
Kenwood TH-77A  
Icom IC-24AT, IC-32AT  
Yaesu FT-470, Reviewed in Sept 90 QST

Radio	DJ-560T	DJ-500T	TH-77A	IC24-AT	IC-32AT	FT-470
RxCov	130-174		136-165	138-174	138-174	130-
180	400-520		438-450	440-450	440-450	430-
450						
RxSens				0.18	0.25	0.158
TxCov	144-148		140-150	140-150	144-148	
450	440-450			440-450	440-450	430-
FDX	Yes	Yes	Yes	Yes	Yes	
X-Band	Yes	Yes	Mod			
DualDsp	Yes		Yes	Yes	No	Yes

CTCSS	Yes	Yes	Opt	Yes	Yes		
ToneSq	Yes	Yes	Opt	Opt	Opt		
MemCh	20x2+2	20	42	40x2+2	20x2+219x2+2		
DTMFmem			10x15	4x15	None	10x15	
FacPwr	2.0	2.5	2.5	5W	2.3W		
PwrSet			2	4	2	2	
Scan			BM	BSML	BML	BML	
Clock				Yes	No		
Saver	Yes		Yes	Yes	Yes	Yes	Yes
APO	Yes	Yes	Yes	No	Yes		
MSR				629	629	576	
RCUSA	380			464			
HRO	400		519	474			
AES	400	520	480	549			
EEB				560	580	399	
Acc	Charg		Charg	Charg	Charg	Case	
	BeltClp	BeltClp	BeltClp	BeltClp	Charger		
		KbCov		BeltClp			

#### Features:

- Scan: B - band
  - S - skip during band scan
  - M - scan memory channels
  - L - Lock out memory channels during scan
- APO: Automatic power off
- Saver: Battery saving monitor mode
- Tone Sq: DTMF operated tone squelch
- Mem Chan: channels x freq/channel + calling channels
- FDX: Cross-band full duplex
- X-Band: cross-band repeat
- DualDisp: Dual frequency Display
- FacPwr - Transmit power from factory, all of these units are 5W with 13.6V
- PwrSet - Number of transmit power settings
- MSR - Manufacturer's Suggested Retail
- RCUSA - Radio Center USA
- HRO - Ham Radio Outlet
- AES - Amateur Electronics Supply
- EEB - Electronic Equipment Bank

#### Other features:

The following information is based on things I have seen on the net and may not necessarily work. I have also put comments that don't fit in the chart in this section.

- Kenwood TH-77A
  - 2m section is modifiable for MARS/CAP
  - can be modified for 118-165MHz Rx
  - dual UHF receive
- Icom IC-24AT
  - A diode will extend UHF transmit range to 410-485
  - A diode will extend VHF transmit range to 138-168
  - Keyboard entry can enable 100-1000MHz Receive (diode has to be removed on older models).
  - A diode can be removed to allow cross-band repeat
- Icom IC-32AT
  - Simple mods for RX on 138-168 and 418-458. Tx on those ranges with a bit more work.

- Yaesu 470

There is a mod for transmit on 140-174

Several people have mentioned that the backlit keyboard is a nice feature.

Phil Benchoff  
benchoff@groupw.cns.vt.edu

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In rec.radio.amateur.misc you write:

>Being a new Ham (still waiting for license!), I was looking around at  
>getting an HT. There seems to be a lot of them out there and many

I like my Alinco DJ-560 dual bander. Alinco is very competitive on price and has good quality stuff.

-----

Well I do like the DJ-560T very much. Can't think of any problems other than those I inflicted on it myself by dropping it... It does not suffer much from overload which has been a major criticism of the FT-470... I waited a long while for this one I read the Japanese ham mag CQ Ham Radio and waited several months for it to be marketed in the USA.

Very wide out of band coverage on both VHF - UHF something like 130 -170 and 410 - 510 .. don't remember exactly. The major strike against against Alinco is poor documentation or translation of documentation. But if you don't use too much fancy stuffDDD

-----

Hello again Matt,  
First, thanks for your reply. I cannot speak exhaustively concerning the background of Alinco as a company, although my meager understanding is that they have been active in Japan for quite a while successfully before moving into the American market. I have been on the newsfeed for about a year, and all Alinco products have been basically positive. Two issues do come up: Manuals written in Japiglish and Accessory availability. I personally found their manual translations to be better than a lot of equipment I've purchased, although (and here's the real rub as far as Ham's go) the technical explanations of non-obvious features are not very clear. The dialer instructions in my version of the 160 manual were particularly crazy in my view. (Worse, I couldn't discover any way to slow down the autodial pulses, which are too fast for the local repeater controller to handle! - Not that punching a telephone number in is very difficult a chore :-)) (P.S. Even Kenwood gets knocked on about manuals!) As far as accessories go, when I first bought my 160 the local Candy Store didn't have any shell packs (to allow me to use alkalines or my own nicads to power the H/T) and they didn't have any headset mikes either. I bought a spare regular rechargable pack at that time, and put my name on the list to eventually buy the shell pack, which did come in later. Headset/mikes are now in stock. In general, I believe the supply is finally reaching the

demand.

I'll admit (unlike some pundits :-)) that I bought basically on the price point. If it had looked like a piece of junk when I examined it in the store, I was prepared to buy around it (even though it was vacation money I was spending HI). It turned out to look and feel as well built as any of the other H/Ts, was smaller than all but the expensive "micro" radios, and had a TWO year warrenty (next closest just one year, another brand only had a 6 month H/T warrenty!). I've operated that DJ-160 for almost a year now, including (for all practical purposes) daily use. It is on my belt or in my briefcase all the time. Yesterday I worked my seventh (?more?) major public service event with it (MS-150 Bicycle tour). I've dropped it (bought the case after the first drop reminded me it can happen to ME, and keep it in the soft case always, which doesn't interfere with operations). I often power it via the external DC-in, with no headaches. I weekly check in to net operations using the 160 while I walk our two dogs. I use it! Lot's of other Ham's do the same things using the major brands - but I think that's my point. I use it in the same rugged fashion other H/Ts are used with no problems. I don't believe you could ask for more from your radio regardless of price! You should shop around. You should handle the radios you can lay hands on. But don't dismiss Alinco from your list till YOU decide so (some folks are highly biased toward a particular brand, and all others are trash to them, particularly newcomers like Alinco). My wife has a Yaesu 2-mtr dual-bander (almost never uses the 440!). We have both Icom and Kenwood mobile 2-mtr rigs. My Alinco DJ-160 holds its own and then some! Good luck with whichever way you chose to go!

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Hope that was of some help. I am seriously considering an Alinco DJ-560T, so if anyone has any caveats, please let me know. Thanks again for everyone that replied.

Matt Weisberg (7 weeks and counting!...ugh!)



From ralph@mtunq.att.com Sat May 4 14:30:30 1991  
Date: Sat, 4 May 91 14:27 EDT  
From: ralph@mtunq.att.com (Ralph Brandi)  
Subject: Intro to scanning

Introduction to Scanning  
by Bob Parnass, AJ9S

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This introduction is intended for people new to the scanning hobby. It tells where you can buy your first scanner, what features it should have, how to get frequency information, and mentions a few scanner clubs worth joining.

Why Scanning?

Every day and night, scanner hobbyists are entertained by what they overhear on their radios. Police cars, fire engines, ambulances, armored cars, trains, taxis, airplanes, and buses are all equipped with radios and you can listen to them. You can monitor the local sheriff and fire departments to hear about events "as they happen," before the news reporters hear about them. Hostage dramas, bank robberies, car crashes, chemical spills, tornado sightings are all fair game. In a single afternoon, you can hear a high speed police chase, Drug Enforcement agents on a sting operation, and undercover FBI agents as they stakeout a suspect.

How about listening to a presidential candidate discuss strategy with his advisor from a 415 MHz radiophone in Air Force 1, or a team of G-men protect him while transmitting in the 167 MHz range?

Listen to your neighbors deal drugs over their cordless telephone, or as their conversations are picked up and transmitted over the airwaves by their sensitive baby monitor intercom. Yes, it's legal to listen, and it's all there in the 46 and 49 MHz ranges.

Stay ahead of road conditions by listening to highway road crews, snow plows, and traffic helicopter pilots.

Take your scanner to sporting events and listen to race car drivers, football coaches, etc., in the 151, 154, and 468 MHz ranges.

Listen to airline pilots as they talk with air traffic controllers and their companies between 108 and 137 Mhz.

Monitor the everyday hustle and bustle of businesses, from cable TV repair crews tracking down pirate descrambler boxes, to security guards at your nuclear power plant or mall security guards chasing a shoplifter.

You can even listen to the order taker's wireless microphone at the local McDonald's restaurant on 154.6 and 35.02 MHz!

### Is Scanning Legal?

In the United States, scanning from your home or at work is perfectly legal in most situations. The Electronic Communications Privacy Act of 1986 made it illegal to listen to mobile phones, and a few other types of communication, but many scanners cover these frequencies, and it's clear that Americans still listen to whatever they want in the privacy of their own homes despite the ECPA.

Speaking of privacy, federal law also requires you to keep what you hear to yourself and not use the information you hear on your scanner for personal gain.

Be aware that California, Florida, Indiana, Kentucky, Michigan, Minnesota, Nebraska, New Jersey, New York, North Dakota, Oklahoma, South Dakota, Tennessee, and Vermont have laws pertaining to scanning while in your car. Indiana restricts some portable scanners. You can find out about these restrictions in a 39 page paperback, ANARC Guide to U. S. Monitoring Laws, compiled by Frank Terranella, available for \$7.50 from ANARC Publications, P.O. Box 462, Northfield, MN 55057.

### What Scanner Should I Buy?

Radio Shack, Uniden (Bearcat and Regency brands), and Cobra offer a wide choice of scanners. Personally, I don't recommend AOR brand scanners.

Scanners are available in two varieties: crystal controlled and programmable. The crystal controlled models are cheaper, but require the user purchase and install a \$5 crystal for each frequency of interest. Programmable (synthesized) units don't require crystals and usually have a keypad that permits you to store frequencies into channels. Programmables are now so cheap it doesn't make sense to buy a crystal unit as your main scanner unless you get it for under \$45 or so.

You can get a battery operated hand held scanner, a bigger "base" scanner which is powered from an AC outlet, or a mobile scanner which connects to your auto's electrical system.

Make sure your first scanner:



1. has a "search" feature, which allows it to search all the frequencies between two frequency limits of your choosing. The lowest cost programmables can't search.
2. covers the 800 MHz band unless you live in a very rural area where this band is not used. Usage of the 800 MHz band is growing by leaps and bounds.

If you're not sure whether you'll like scanning, don't want to spend much money, a 16 channel radio will do. In general, the more channels and banks, the better.

Deluxe scanners can be controlled by a personal computer, although this feature isn't important to most scanner owners.

Currently, the more popular scanners include the Uniden/Bearcat 760XLT (a/k/a 950XLT) and Radio Shack PRO-2004 and PRO-2005 base/mobiles, and the Uniden/Bearcat 200XLT (a/k/a 205XLT) and Radio Shack PRO-34 portables.

All scanners come with a built in antenna, permitting reception up to about 20 miles or so. Outdoor antennas can extend reliable reception to 100 miles or more.

#### Where Can I Buy A Scanner?

Almost every community has at least one Radio Shack store, and you can find scanners there. Discount chain stores like Service Merchandise sell scanners, but carry just a few models. Department stores, like Sears and Montgomery Wards, sometimes offer scanners, although at high prices.

The best deals on new scanners are from reputable mail order firms like Grove Enterprises (Brasstown, NC), Scanner World (Albany, NY), or National Tower Company (Shawnee Mission, KS). Many ham radio dealers, like Amateur Electronics Supply (Milwaukee, WI), also sell scanners. See the shortwave "welcome" article for the addresses of other scanner suppliers.

Used scanners may be found at hamfests, flea markets, or listed in the classified advertisement section of your newspaper.

#### Where Can I Obtain Frequency Information?

To avoid chaos, the FCC licenses two-way radio users and assigns them specific frequencies. Groups of frequencies are allocated to specific types of users, so you won't usually find fire departments using the same frequencies as taxi drivers, for example.

Scanner enthusiasts can obtain frequency information from several sources, including books, government microfiche records, or other listeners.

Books: The most convenient source of fire, police, and local government frequencies is the Police Call Radio Guide, published each year in 9 regional volumes by Hollins Radio Data, and sold at Radio Shack and larger book stores for about \$7.

I also recommend Richard Prelinger's 1985 book, Monitor America, published by SMB Publishing, and available from Grove Enterprises for about \$15. Although somewhat out of date, this single edition contains 582 pages of police, fire, local government, news media, sports, national park, and commercial broadcast frequencies for all 50 states. It contains detailed communications system profiles and precinct maps for major metropolitan areas. Police and fire radio codes and unit identifiers unique to local agencies are listed for several cities. This differs from Police Call, which gives a more sterile, but uniform treatment of licensees, listing even the smallest of towns.

Uniden has published several regional directories using the "Betty Bearcat" name, although there are much better directories available from Scanner Master (Newton Highlands, MA) for some regions.

The most readily available source of sensitive US government frequencies is still Tom Kneitel's 168 page Top Secret Registry of US Government Radio Frequencies. Published by CRB Research, the 6th edition is available from Grove Enterprises for about \$19. Kneitel's book contains frequency listings for NASA, military, FBI, Secret Service, DEA, IRS, Border Patrol, arsenals, ammunition plants, missile sites, and others in the 25 to 470 MHz range.

Magazines: Although national in circulation, local frequency information is sometimes available in Grove's Monitoring Times and Kneitel's sensationalistic Popular Communications. The best frequency lists are often found in club publications, discussed later.

Government Records: Every year, the US Government sells FCC license information, in the form of microfiche, floppy disk, and magnetic tape, to the public through the US Department of Commerce National Technical Information Service (NTIS). The high cost of buying government records limits their appeal to hardcore enthusiasts. You can write for a catalog of FCC Master Frequency Database items to the NTIS, 5285 Port Royal Road, Springfield, VA 22161.

#### Do Your Own Frequency Detective Work

When you try listening to a frequency for the first time, you'll want to know who you're hearing.

Although FCC rules require radio users to identify their operations with their assigned call letters, most ignore

the regulation. This often makes it difficult to know who is transmitting.

There is a challenge in deriving new spectrum usage information on your own. Sometimes it requires several days of listening, taping, and compiling fragments of information. Other times, the frequency information is there for the taking - without hassle.

You can approach from two directions:

1. Listen first: Monitor a frequency or frequencies, and try to determine who's transmitting and what purpose the channel serves. Once you identify the user, log the information.
2. Compile first: Take advantage of opportunities, such as examining the frequency label on a guard's radio, or reading the FCC license hanging on the "radio room" wall, to compile frequency lists, then monitor the listed frequencies to confirm that they are really in use. Readers are urged to abide by the rules of good taste and local laws in the quest for frequency information. Don't trespass, wait for an invitation.

Most listeners use a combination of both approaches.

You can examine the FCC license on premise. I have found the actual FCC radio license, complete with frequency assignments, hanging on the walls of places like the mall security office or company guard shack. You can examine the labels on radio equipment. Frequency information is engraved on labels on the back of many walkie-talkies, or inside the battery compartment, like in the Motorola HT220 model. Most pagers have labels on the bottom or inside. Like passwords taped onto terminals, it's not uncommon to find Dymo tape labels embossed with frequencies or call letters glued to the front of base stations.

You can make your own opportunities for eyeing the equipment or take advantage of "open house" events. If information is displayed publicly, then a reasonable person could assume it's not government secret. Hobbyists are urged to exercise a modicum of restraint and good judgement, however.

#### How Can I Use Equipment to Uncover New Frequencies?

If you don't know the exact frequency, but have a general idea of the range (e.g. 150 - 152 MHz), use your scanner's "search" mode. Most programmable scanners afford the ability to search between two frequency limits set by the user. Three models, the ICOM R7000, Bearcat 250, and Regency K500, have the ability to automatically store active frequencies found during an unattended search operation.

To find the frequency of a hotel communications system, one fellow installed his Bearcat 250 in his car and parked in the hotel lot, leaving the scanner in the "search and store" mode. He left the antenna disconnected so the scanner would only respond to a transmitter in the immediate vicinity.

Aside from a scanner and antenna, the most useful piece of equipment for sleuthing is a voice actuated (VOX) cassette tape recorder. You don't need a high fidelity model or anything fancy, a Radio Shack CTR-75 or CTR-82 will do. It's best to use a shielded cable to feed the scanner audio into the recorder rather than relying on the recorder's internal microphone.

VOX recorders allow one to compress a whole day's worth of monitoring onto a single tape. I often leave a recorder "armed" and connected to a scanner at home while I am at the office or doing something else. When call letters are mumbled, I can play and replay the tape until I hear and understand them.

Test equipment can aid in the quest for new frequency information. I've used a spectrum analyzer connected to an outside antenna, and a frequency counter for close-in work.

#### Are There Any Scanner Clubs?

One of the best parts of the hobby is sharing it with other radio buffs. Trading information with other hobbyists about frequencies, communication systems, and receiving equipment is more valuable than any pile of magazines.

The world's largest scanner club is the Radio Communications Monitoring Association (RCMA). Founded in 1975, the RCMA is the "first national and international organization of monitor radio listeners." There are several regional chapters which hold regular meetings. Club dues are \$18.50 per year, which includes a monthly newsletter of about 95 pages. Although the focus is on VHF and UHF ranges, there is coverage of HF utility stations below 30 MHz.

Inquiries about RCMA membership should be sent to RCMA General Manager, P.O. Box 542, Silverado, CA 92676, USA.

A smaller club is the All Ohio Scanner Club. Its bimonthly publication, The American Scannergram, is about 60 pages long. Although concentrating on Ohio, there is frequency information from other states, and plenty of good product reviews and scanning tips.

Annual dues are \$15 and more information is available from All Ohio Scanner Club, 50 Villa Road, Springfield, OH 45503.





Subject: TV Twin-lead J-pole design

The following is a description of a J-Pole antenna made from 300 ohm TV twin-lead. They have quite a few advantages which include improved performance for HTs, portability, and low cost.

```

| | do not short this end.
| | (when trimming for vswr, cut both sides)
| |
| |
3/4 | | Technically-speaking, this is a 1/2
wave | | wave end-fed antenna with a 1/4 wave
| | matching section.
| |
| | 1/4" gap
| | (trim for vswr _below_ gap)
| | 1/4
| | wave
| |
coax ctr conductor=>* *<= coax shield
1 1/4"-| |
-**- solder the twin leads together at bottom
```

For a center frequency of 146 MHz:

1. Start with @54" of TV twin lead (flat, NOT foam core)
2. Strip 1/2" of insulation at bottom and solder wires together.
3. Measure 1 1/4" from soldered wires and strip insulation on both sides. This is the solder point for a coax feedline.
4. Measure 16 3/4" from coax shield solder point and cut out 1/4" notch.
5. Measure 50 1/3" from coax center conductor solder point and trim off twin lead at that point.
6. Feed with a length of RG58U coax. Tape coax at feedpoint to the twin lead for strength and seal coax for weather protection.

To get the best possible match, in step three above simply MARK the "solder points" and measure from the mark for step 4 and 5. Now solder straight pins to your conductor and your shield. Insert the pins at the marked point and test for VSWR at the design frequency (146MHz). If necessary, probe up or down till you reach 1:1 (close as possible). Solder at the best points. To try this, you may want to start with the twin lead a little long and trim down to resonant length - note: you'll need to trim in a 3:1 ratio to maintain the 3/4 to 1/4 wave.

It has been noted that this design can lead to rf coupling onto the feedline. To avoid, put ferrite beads on the coax at the feedpoint, or use 3-5 turns of coax (1"-2") taped together at the feedpoint.

You may attach an alligator clip to the plastic on the top of the antenna in order to easily hang it. Alternately, punch a hole near the top and use a length of fishing line to hang.

This design appears on many BBSs, in club newsletters, and in books; the earliest reference that I know of is a Jan. 1984 D.A.R.C. antenna article by James Burks, KA5QYV. This antenna is relatively broad-

banded

and will be more than adequate if simply built as noted in steps above.

FYI, the 1/4 wave sections for other center frequencies are:  
144 MHz =17 inches, 145 =16.88, 146 =16.75, 147 =16.65, 148 =16.54

I usually just go ahead and solder the coax in place and trim down to as close to 1:1 vswr as I can get. I use the MFJ vhf antenna analyzer and a frequency counter then afterwards test with a radio and in-line swr/power meter. When done, the antenna should also present 1:1.2-3 vswr in the center of 444MHz band as well (demonstrated on my dual-band meter and Alinco DJ-580).

--

Ed Humphries  
N5RCK

Texas Instruments, Inc. 512-250-6894  
Internet ed.humphries@hub.dsg.ti.com





From: brian@ucsd.edu (Brian Kantor)  
Newsgroups: rec.radio.amateur.misc  
Subject: Re: Safety of auto battery for power?  
Date: 3 Oct 1992 13:27:12 GMT  
Organization: The Avant-Garde of the Now, Ltd.

[reposted from a few months ago. No, this does NOT belong in the FAQ]

I've been doing some research on lead-acid batteries with an eye towards using them to provide power for our ham radio repeater site.

Our site is difficult to get to, and the commercial AC mains power goes away at times. Everything in the site runs off a nominal 12 volts DC. During idle periods, the equipment may only draw a few amperes, but most of the transmitters can draw up to 10 to 15 amps each. A maximum drain of 100 amps isn't out of the question, although it would probably be only for a few minutes at a time. Some systems (such as the digital communications equipment) key on and off quite regularly, with perhaps as much as a 50% duty cycle, whilst others may not key for hours and then stay on for as long as an hour or two (voice repeaters during drivetime). We do not want there to be any interruption of power when the mains fail. We don't believe that most of the outages are of a duration that a generator will be necessary - a few hours is sufficient.

It is clear that a good solution to our problem is a bank of lead-acid batteries capable of supplying the peak current, floating across a supply that can recharge them and supply the standby and perhaps one or two transmitter's demand.

Ok, that's the problem. Here's what I've found.

Lead-Acid batteries commonly available today can be roughly grouped into three categories by construction and intended use:

1. Automotive starting
2. Traction
3. Stationary

Automotive starting batteries are formulated with thin pasted plates and are designed to supply high peak currents for brief periods of time whilst cranking an engine. They are not expected to be discharged to more than perhaps 75% of capacity, and are expected to be recharged immediately after discharge. If used in deep-discharge or float service they will not last long. (I.e., the capacity of the battery will diminish fairly quickly. While it will still act as a battery, it will not be able to supply its rated capacity soon after being placed in the wrong kind of service.)

Traction batteries are made with thick pasted plates and have very rugged separators between the plates to make the battery more immune to physical shock and vibration, and to reduce the chance of failure due to dendritic growth during recharging. These batteries are sold for use in electric forklifts, golf carts, marine trolling motors, and RV power. They are designed to be discharged nearly fully each day, and recharged each night. Because there is some tradeoff in battery life by using the pasted plate construction to keep the size and weight of

the battery down, they are not used in applications where extremely long life is required. The commonly-available Deep Cycle Marine batteries are of this general type.

Stationary batteries are made with thick solid plates. They are designed to be used as standby power, supplying minimal power and kept in a state of nearly full charge until needed. They can take deep discharge. Because of the solid plate structure, they are bigger and heavier, but their lifetime is much longer. One source suggests that 10 years is not unusual. Some photovoltaic storage batteries (for solar-powered homes and such) are of this type.

The best battery for our application is the Stationary battery, but they are not commonly available. Much more readily obtained are the Marine/RV batteries, at about \$50 apiece.

Charging and discharging these batteries is a big question. I posted a query to the net and received about a dozen replies, most of which contradicted each other in one or more points. However, there is some consistency in the information available in our library, and I'll try to summarize it below.

Note that all the voltages given below are for batteries at working temperature - typically 80F (27C).

#### DISCHARGE:

Batteries are rated at an Amp-Hour capacity at a specific rate. For traction type batteries, this is typically a five hour rate, so a fully-charged 100 Ah traction battery in good condition can supply 20 amps for 5 hours before it is exhausted. Stationary batteries are usually rated at a 10 hour rate, and automotive (if rated in Ah at all) are given for a 20 hour rate. The discharge curve is NOT linear; if you double the current drain, you will get less than half the time. Similarly, if you halve the drain, you will get more than twice the time.

Each type of battery has a specified voltage at which it is considered completely discharged. If discharge continues below this voltage, the battery life may be considerably shortened, and repeated abuse of this kind can result in a battery which cannot practically be recharged. Each battery manufacturer specifies this voltage; in general, the final voltage for the three general types of batteries are

automotive	1.75 v per cell
traction	1.70
stationary	1.85

Thus a typical 12 volt marine battery with 6 cells should not be discharged below about 10.2 volts.

Another way of looking at it is that no cell should be discharged more than about .3 v below its full-charge rest voltage.

A typical cell will show the following voltages:

fully charged, open circuit, at rest with no charge/discharge for at least 12 hours	2.12 v/cell
---	-------------

As soon as load is applied (internal v-drop)	2.00
fully discharged, under load	1.70
fully discharged, open circuit	1.99
beginning of charging	2.10
70% to 80% charge (gassing begins)	2.35
full charge	2.65

#### CHARGING:

Liquid-electrolyte lead-acid batteries can be recharged at any rate that exceeds internal and surface discharge rates, and which does not cause excessive gassing (liberation of oxygen, hydrogen, and steam).

In non-float service, there are several simple chargers.

A single-rate (constant-current) charger limits its charge rate to about 7% of the Ah capacity of the battery; for a 100 Ah battery, it would charge at a rate of 7 amperes. Since the battery will start at about 2.1 v per cell, and finish at about 2.7 v per cell, the charger must be able to vary its voltage over this range. For a "12 volt" battery with 6 cells, the charger will need to supply between 12.6 and 16 volts over the duration of the charge. Charging is complete when the battery reaches 2.65 to 2.7 volts per cell.

A simple taper charger is a constant-voltage source set to 2.8 volts per cell with a series ballast (typically a resistor, but a choke or the internal resistance of the supply can be used) that limits the output current to 7%C when the battery is started charging at 2.1 v/cell. Again, charging is complete when 2.7v/cell is reached.

Trickle-charging of a fully-charged battery can be done to keep it charged. This is done by supplying .5 to 1 mA per Ah capacity. Trickle charging should be discontinued when it has continued for at least 24 hours and the battery has reached 2.25 v/cell. Typically, trickle chargers are set to run perhaps once a week. Because of their thin plate construction, automotive-type batteries will deteriorate if trickle-charged for more than perhaps six months.

An interesting research result was that using pulsating rectified AC or superimposing a small AC current on pure DC charging current increased battery life by up to 30%. Apparently the mechanism is that it reduces gassing and leads to a more porous lower-resistance plate, and lessens the tendency to form dendrites during charging.

In float service, where the battery is in parallel with the mains supply, the supply voltage must be set to 2.15 to 2.20 v/cell. This will charge the battery, and avoids excessive gassing, but does not serve to "freshen" the cells - there is not enough gassing activity to move electrolyte around and clear the beginning of deposits from the surfaces of the plates. It is recommended that batteries in float

service occasionally (perhaps once a month) be charged to 2.65 v/cell to freshen and equalize the charges. In large installations, this is done by switching parts of the battery banks out of service in rotation. In smaller systems that can tolerate the voltage excursion, it can be done by simply boosting the output of the mains supply.

Charging inevitably leads to some water loss due to gassing; 100Ah of a gassing charge (2.4v or more per cell) will yield about 1.2 oz of water loss. Hydrocap Corp [975 NW 95th St, Miami Fla, (305)696-2504] makes a replacement filler cap that contains a catalytic material that recondenses emitted steam, and recombines the hydrogen and oxygen gasses into pure water that then dribbles back into the cell, greatly reducing the required maintenance. With the available flame arrestor option, they sound ideal for unattended battery systems, and should greatly reduce the danger of fire and explosion from liberated hydrogen. They're about \$5-\$10 per cell.

To read further:

Smith, George. Storage Batteries, including operation, charging, maintenance, and repair. ISBN 273 43448 9, TK2941.S57 1968

Aguf, I.A. and M.A. Dasoyan. The Lead Accumulator (translated from the Russian by S Sathyanarayana). Calcutta, 1968

Longrigg, Paul. Rapid charging of lead-acid batteries for electric vehicle propulsion and solar energy storage. DOE/NTIS 1981.

Aren't libraries wonderful?

- Brian



From: jfw@ksr.com (John F. Woods)  
Newsgroups: sci.electronics,rec.radio.amateur.misc  
Subject: List of Mail Order Electronics Companies  
Date: 21 Jan 93 10:51:23 EST  
Sender: news@ksr.com  
Organization: Kendall Square Research Corp.  
Lines: 598

[ \$Revision: 2.11 \$; last updated December 1992 ]

Here is my list of companies which will sell electronic components in small quantities. Most of these places I have bought from, a couple I haven't. Being a ham radio operator, I am most interested in RF components, and in particular, air variable capacitors, which tend to be scarce (and tend to be used or surplus even if I've otherwise labelled the seller as "NEW"). I apologize in advance for disparaging remarks about what happens when parts suppliers start selling computers, but anyone who has watched Jameco over the years will know just what I mean (though their latest catalog hints at possibly returning to selling parts).

Categories are:

NEW COMPONENTS                   Distributors and sellers of new components, or "new and some

used" in a couple of cases.

SURPLUS ELECTRONICS           Usually overstocks, occasionally used equipment.  
Ideal for stocking the junkbox, usually have dependable stock

lines

of resistors, capacitors, and some semiconductors, but won't have those LCD modules forever... An invaluable resource, don't shy

away

from them.

SPECIALTY COMPONENTS       In particular, crystals and toroidal cores.

KITS                   Ham radio kits, random electronic kits, whatever they have.

LITTLE GUYS           Separated out because of some twisted sentimentality,  
I suppose. Intended to honor one or two ham spare-bedroom  
operations.

PUBLICATIONS           Two publications which are essentially all want-ads,  
plus

the address for SAMS PHOTOFACTS because everyone always asks about it on sci.electronics.

Note on shipping costs: I don't always update these frequently enough, and they're generally for continental US unless otherwise mentioned.

NEW COMPONENTS:

Ocean State Electronics

P.O. Box 1458

Westerly RI 02891

(800)-866-6626 (orders)

(401)-596-3080

(401)-596-3590 (FAX)

Minimum \$5, S&H \$4, free catalog. Wide array of RF parts, especially air variables and B&W coils.

Radiokit

(store is located at:)

P.O.Box 973  
Pelham NH 03076  
(603) 635-2235

169 Jeremy Hill Rd.  
Pelham NH 03076

No minimum (\$3 service charge if under \$20), many kits, lots of J. W. Miller chokes & coils, B&W coils, RF switches, Millen variable capacitors, lots of parts in general. Send \$1 for the catalog (but note that they are currently (12-June-92) out of catalogs and it will probably be months before the next one is ready).

Circuit Specialists Inc  
P. O. Box 3047  
Scottsdale AZ 85271-3047  
(800) 528-1417

No minimum with check or money order, \$15 otherwise. \$3 S&H.  
New electronics, good RF assortment, increasing infestation of computers.

Mouser Electronics	Mouser Electronics	Mouser Electronics
11433 Woodside Ave.	2401 Highway 287 North	12 Emery Ave.
Santee CA 92071	Mansfield TX 76063	Randolf NJ 07869

Mouser Electronics  
370 Tomkins Court  
Gilroy CA 95020

Catalog Subscriptions: (800) 992-9943 (Continental US only)  
Sales & Service: (800) 34-MOUSER (800-346-6873) (US, Puerto R., Canada)  
Very complete catalog of brand-new components (though no air variables).  
Usually quick service, \$20 "minimum" (\$5 charge under \$20). When ordering, you may want to be sure to ask about availability and shipping locations; they have several warehouses, and frequently orders will get sent from several warehouses (which drives up the shipping costs).

Digi-Key  
701 Brooks Ave. South  
P.O.Box 677  
Thief River Falls, MN 56701-0677  
1-800-DIGI-KEY

No minimum, \$5 handling under \$25, free and very complete catalog, very nice indeed. Prices aren't always the best, but rarely excessive. Weak on RF specialty parts (though they now have the ever-popular NE602N), but they do have blue LEDs.

Active Electronics	237 Hymus Blvd
11 Cummings Park	Pointe Claire, Quebec, H9R 5C7
Woburn MA 01801	

(800)-677-8899 (US)  
(800)-363-6592 (Canada) [Not listed in current catalog, try US number]  
\$25 minimum, \$5 S&H UPS, catalog has a "\$10 Suggested retail price" but they sent mine for free. They have 8 stores in the US (Santa Clara CA; Chicago IL; Baltimore MD; Woburn MA; Detroit MI; Mt. Laurel NJ; Long Island NY; Seattle WA)

and 10 stores in Canada (Quebec City; Montreal (2); Ottawa; Mississauga; Winnipeg; Calgary; Toronto; Edmonton; Vancouver BC). Lots of stuff, oriented more toward supplying last-minute requirements of companies than hobbyists, but perfectly happy to take your money in small doses (stores have no minimum order). The \$25 minimum for certain items is no longer explicit, but they note that some items will "ship in factory minimum package quantities", which might be worse.



Newark Electronics

Send catalog requests to:  
Newark Electronics  
ATTENTION CATALOG DEPARTMENT  
4801 N. Ravenswood Ave.  
Chicago IL 60640-4496  
(312) 784-5100

They don't have a single mail address or phone; instead, one is supposed to call the closest of three pages worth of branch offices. I don't feel like typing in the entire list (it's copyrighted, anyway :-), so send email for your "local" distributor, or call their administrative offices at the number above. They have a \$25 minimum order; they are a Real Distributor, but accept small orders (over the minimum, of course). Their catalog currently 1248 pages; they are very complete (except, of course, for my favorite scarce item, the air-variable capacitor). Note that the catalog prices tend not to match reality all that often, so order by phone rather than by mail; prices tend to be higher than other places, but they have a lot of things that are hard to find from other outlets.

Arrow Electronics, Inc.  
Catalog Division  
1860 Smithtown Ave.  
Ronkonkoma NY 11779  
(800) 93-ARROW

Catalog requests to:  
Catalog Division  
25 Hub Drive  
Melville NY 11747-9828

Minimum \$25; they no longer have a catalog. They are a Real Distributor, but also didn't mind my placing a personal order (a couple of years ago).

MCM Electronics

650 Congress Park Drive  
Centerville OH 45459-4072  
(800) 543-4330

Minimum \$20 (\$25 for charge cards, and they don't take personal checks), handling \$1.95 + shipping. Oriented toward repair technicians, really heavy on VCR parts and somewhat overpriced doodads, lots of useful stuff not easily found elsewhere.

Fordham Radio Supply

260 Motor Parkway  
Hauppauge NY 11788-5134  
(800) 695-4848

Tools for technicians. One or two items are not outrageously overpriced.

Jameco

1355 Shoreway Road  
Belmost CA 94002  
(800) 831-4242  
(800) 237-6948 (FAX)  
(415) 592-8097

\$30 minimum order (was \$50), >\$5 shipping & handling. Their most recent catalog may have reversed a long trend of abandoning parts in favor of PC compatibles, or it may not; one can always hope.

JDR Microdevices

2233 Branham Lane  
San Jose CA 95124

Orders: 800-538-5000  
Cust. Service: 800-538-5001

No minimum, \$5+ shipping. Mostly computers now, but they haven't yet decided to abandon components; indeed, they recently dropped their minimum order requirement entirely.

Johnson Shop Products

P.O.Box 160113

Cupertino CA 95016

(408)257-8614 (408)996-3240

Catalog \$1. No minimum. Shipping charge is based on UPS; very small orders that can be sensibly shipped in a first-class letter, include money for first-class postage. New and some used electronic parts.

DC Electronics

P. O. Box 3203

Scottsdale AZ 85271-3203

(800) 423-0070 (orders)

(602) 945-7736 (stock/price checks)

\$15 minimum charge order, no minimum for checks, \$3 min. shipping&handling. Wide array of ICs, good assortment of electronic components.

EasyTech Inc

2917 Bayview Drive

Fremont CA 94538-9932

(800) 582-4044 (orders)

(510) 770-2345 (customer Service)

Apparently a brand new company, "dedicated to serving the Electronic Enthusiast/User." \$10 minimum, UPS shipping is 5% of order ( $\geq$  \$3).

International Components Corporation

1803 NW Lincoln Way

Toledo OR 97391-1014

(800)325-0101 (US & Canada)

(503) 336-4400 (FAX)

Cabinets&Enclosures; Capacitors; Diodes; ICs; Potentiometers; Resistors; Sockets; Transistors; Books. No minimum order, \$2 handling under \$25.

Kelvin Electronics

7 Fairchild Ave.

Plainview NY 11803

(800) 645-9212

(516) 349-7620

(516) 349-7830 (FAX)

Minimum order \$20; S&H 5% of order (\$5 minimum, extra for large stuff, overnight, export (like to Hawaii :-), and etchant; based on UPS charges). Lots of electronic parts & tools, some robotics supplies, model rockets.

H & R Company (Herbach and Rademan)

18 Canal Street, P.O.Box 122

Bristol PA 19007-0122

(800) 848-8001 (Orders)

(215) 788-5583

(215) 788-9577 (FAX)

Minimum order \$25 (\$5 processing charge under \$25), shipping \$4.75 under \$30; Most items are new overstocks, much regularly stocked stuff as well. Tools, electrical supplies, motors, mechanical components, robotic components.

SURPLUS ELECTRONICS:

All Electronics Corp.  
P. O. Box 567  
Van Nuys CA 91408-0567  
(800) 826-5432  
\$10 minimum, \$3.50 S&H. New and surplus electronics.

Alltronics  
2300 Zanker Road  
San Jose CA 95131  
(408) 943-9773  
(408) 943-9776 FAX  
Surplus electronics. \$12 minimum, shipping per UPS.

American Science and Surplus (formerly JerryCo)  
601 Linden Place  
Evanston IL 60202  
(708) 475-8440  
Surplus. \*The\* surplus place. Lots and lots of surplus. WWII gun cameras, velcro, laser disk chassis, 6 volt VW wipers motors, LEDs, rubber brains, you name it, they've had it. Catalogs are a really good time.  
\$12.50 minimum order (which includes the \$4 shipping charge).

BCD Electro  
P. O. Box 450207  
Garland TX 75045-0207  
(214) 343-1770  
\$1 for 1-year subscription to catalogs, no minimum, \$0.95 for under \$30, \$2.90 shipping (extra for Alaska & Hawaii). Surplus electronics, pretty random looking assortment.

Fair Radio Sales  
P. O. Box 1105  
1016 E Eureka St.  
Lima OH 45802  
(419) 227-6573  
Surplus electronics. Heavy on parts for old Collins gear.

Hosfelt Electronics  
2700 Sunset Blvd.  
Steubenville OH 43952  
(800) 524-6464  
No minimum, \$3.75 S&H. Surplus electronics.

HSC Electronic Supply (Halted Specialties Co.)  
3500 Ryder Street  
Santa Clara, CA 95051  
(800) 4-HALTED Orders only  
(408) 732-1573 inside California and outside US  
Surplus (new) electronics; new and used test equipment. Minimum order \$10 (\$2 handling charge under \$20), plus UPS shipping cost. Has three stores, of which 3500 Ryder Street is one.

Marlin P. Jones & Assoc.  
P.O. Box 12685  
Lake Park FL 33403-0685  
(407) 848-8236

No minimum (\$1 fee for under \$10), shipping per UPS. Surplus electronics.

R&D Electronics

1224 Prospect Ave.

Cleveland OH 44115

orders: (800) 642-1123 (tues - fri 9am-4pm sat. 9am-3pm EST)

info: (216) 621-1121

\$10 minimum. Surplus electronics.

"Also known to stock many components, but this is not discussed in the catalog.

Local store, a cleveland institution, is called Electronic Surplus, Inc., and has been there since '48. Third generation now runs it." -- wb8foz

Surplus Sales of Nebraska

1502 Jones Street

Omaha, Nebraska 68102

(402) 346-4750

(402) 346-2939 (FAX)

New and surplus radio electronics. Wide selection: air variables.

Catalog \$3 (free with order, refundable with \$25 catalog purchase).

Tucker Surplus Store

1717 Reserve St.

Garland TX 75042

(800) 527-4642 extension 135

Surplus electronic gear; oscilloscopes and signal generators from the days when dinosaurs with vacuum tubes roamed the earth (some solid state gear, but all well used). Prices seem relatively high, and you'll be shocked to learn how much it costs to ship a 75 pound oscilloscope by motor freight...

[Steve Brown, N8HFI:

In defense of Tucker, they have a broad selection, repair facilities, and they certify the used equipment to meet the original specification and warranty it for 90 days. Not every source does this:]

Davilyn Corp.

13406 Saticoy St.

North Hollywood, CA 91605-3475

1-800-235-6222 (Ex. CA)

1-818-787-3334 (CA)

1-818-787-4732 (FAX)

Surplus electronic gear.

[has much better prices [than Tucker], but sells used equipment as-is. -N8HFI]

SPECIALTY COMPONENTS:

JAN Crystals

2341 Crystal Drive

P.O. Box 06017

Fort Myers FL 33906-6017

(800) JAN-XTAL (Monday through Thursday)

They make crystals. Minimum order is \$10, which might be one crystal, or might be two.

Crystek Corporation

2351/2371 Crystal Drive

P.O. Box 06135

Fort Myers FL 33906-6135

(800) 237-3061 (M-F)

They make crystals too. They were the cheapest last time I ordered, but I don't have an up-to-date price list. It took about 4 weeks, and they had said it would take 6.

ICM (International Crystal Manufacturing Co., Inc.)

701 W. Sheridan

PO Box 26330

Oklahoma City OK 73126-0330

(800) 426-9825

More crystals. They were more expensive, but they have lots of pre-made crystals for various rigs, so they would probably be faster.

Amidon Associates

2216 East Gladwick Street

Dominiguez Hills, CA 90220

(213) 763-5770

(213) 763-2250 (FAX)

Toroid cores and related things. Very fast service. Now takes MC/Visa and phone orders.

Palomar Engineers

Box 455

Escondido CA 92033

(619) 747-3343

Toroid cores and shielding beads.

K2AW's Silicon Alley

175 Friends Lane

Westbury NY 11590

516-334-7024

Free catalog, \$10 minimum order. Semiconductors, in particular high-voltage diodes.

Small Parts, Inc.

[ New address and phone, 23 Dec 91 ]

13980 NW 58th Court

P.O. Box 4650

Miami Lakes, FL 33014-0650

(305) 557-8222 Order department

(305) 557-7955 Customer Service (ask for Mirta)

(305) 558-1255 Catalog (ask for Elizabeth)

(305) 557-8004 Custom-made Parts (ask for Ziggy)

(305) 557-8005 Non-standard Sizes  
of catalog parts (ask for Eric)

(800) 423-9009 Toll free FAX line

\$12 minimum. Mechanical parts, metal stock, Teflon(R) sheets, tools, wire-size drill bits (as in #61 size for PC board holes).

KITS:

(The terse "Note:" descriptions are from the ARRL Kit List courteously supplied by Ed Hare and Mike Gruber at the ARRL.)

624 Kits

171 Springlake Drive

Spartanburg SC 29302

QRP kits (including some designs from W1FB's books) and some parts.

A&A Engineering  
2521 W. LaPalma, Unit K  
Anaheim CA 92801  
(714) 952-2114  
Kits, some components, some books. S&H \$4.50, catalog is free with SASE (2 oz postage).

Antique Electronic Supply  
6221 S. Maple Ave.  
Tempe, AZ 85283  
(602) 820-5411  
Note: Broadcast receiver kits

Circuit Board Specialists  
P. O. Box 951  
Pueblo CO 81002  
(303) 542-4525  
As the name implies, they specialize in circuit boards; they have circuit boards for a variety of QST articles and ARRL Handbook construction articles. They also have partial kits for most of their boards. The catalog is free, but I had to request it a couple of times.

C.M. Howes Communications  
Eydon, Daventry,  
Northants NN11 6PT  
England  
Phone: +44 327 60178  
QRP, transmitters, receivers, misc. "The Heathkit of England", though with assembly manuals not as detailed, also without the intricate mechanicals of Heathkits.  
[Carried by Townsend Electronics (at least) in the US]

Communications Concepts Inc.  
121 Brown Street  
Dayton, Ohio 45402  
(513) 220-9677  
kits for Motorola Applications Notes (amplifiers and the like), small assortment of components (chip capacitors, transistors).

Down East Microwave  
Box 2310, RR#1  
Troy, ME 04987  
(207) 948-3741  
Note: Microwave preamps

FAR Circuits  
18N640 Field Court  
Dundee IL 60118  
Printed circuit boards for articles in the usual ham magazines. SASE for list. \$1.50 shipping and handling per four boards.

Hamtronics, Inc.  
65 Moul Road  
Hilton, NY 14468-9535  
(716) 392-9430  
Note: Amateur, general interest

John Langner WB2OSZ  
115 Stedman St.  
Chelmsford, MA 01824-1823  
(508) 256 6907  
Slow Scan Television for IBM PC.

Lake Electronics  
7 Middleton Close  
Nuthall  
Nottingham NG16 1BX  
England  
Note: Amateur

Mercury Systems  
15 Lakeside Dr.  
Marlton, NJ 08053  
1-609-596-3304  
Note: the ARRL Kit list didn't say what they carry; I don't (yet) know either.

Penntek Electronics  
14 Peace Dr.  
Lewistown, PA 17044  
(717) 248-2507  
Note: The Neophyte Receiver, QST

Ramsey Electronics  
793 Canning Parkway  
Victor NY 14564  
(716) 924-4560  
Amateur radio and hobby kits. The ham kits are all pretty simple and pretty inexpensive, and you get about what you pay for. Their new VHF transceiver kits (144, 220, 440) look pretty interesting. Many have complained about the quality of their kits, though.

Townsend Electronics, Inc.  
Box 415  
133 N. 1st Street  
Pierceton IN 46562  
(800) 944-3661 (US only)  
(219) 594-3661  
(219) 594-5580 (FAX)  
C. M. Howes Communications kits. Radio mounts. RSGB and ARRL publications.  
\$1 for catalog. \$4 shipping & handling.

[See also RadioKit, Oak Hills Research]

LITTLE GUYS:

Oak Hills Research  
20879 Madison St.  
Big Rapids, MI 49307  
Send \$1 for a flyer. Some parts, QST article kits, transceiver kits, QRP stuff in general (they inherited the stock from Small Parts Center when they closed).

KA7QJY Components

Danny Stevig  
Box 3893  
Logan UT 84321  
(801) 753 5961

Send a business-size SASE for a current list of parts. RF parts, including vernier drives and air variables. \$2.75 shipping, no minimum. Fast service, lots of satisfied customers.

R&R Associates  
3106 Glendon Avenue  
Los Angeles, CA 90034  
(213) 474-1315 (res)

[ Richard Rathburn, KB6NQ ] "I mainly sell pc boards from QST, Radio Electronics, etc., and a few of in-house design. I also sell IC's, etc." Send a SASE every now and then for his most recent flyer. He also has boards for some Motorola Application Notes.

MANUALS:

Eico Electronic Instruments Co., Inc.  
363 Merrick Rd  
Lynbrook NY 11563

Note: No current kits, EICO manuals and schematics only

PUBLICATIONS:

NUTS & VOLTS MAGAZINE  
430 Princeland Court  
Corona CA 91719-9938  
1-800-783-4624 (subscriptions)  
1-714-371-3052 (subscribe by FAX)

All advertisements magazine (though they've just publishing small projects). Issues are \$2.00 (at least, that's the price on the cover), subscriptions are (third class mail, USA:) \$12/1 year, \$21/2 years, \$60/life, (first class mail USA) \$20/1 year, (Canada/Mexico) US\$22, (other foreign, air mail) US\$55. A subscription also entitles you to one free classified ad of 40 words.

Ham Trader Yellow Sheets  
PO Box 15142  
Seattle WA 98115

"SUBSCRIPTIONS: U.S.: 24 Issues(1 yr) \$16.50 50 Issues(2 yrs + 2 issues) \$32. 75(3 Yrs + 3) \$48. CANADA & MEXICO: 24/\$20. 50/\$39. 75/\$58. FOREIGN: \$38 a year sent Airmail. Published 2 ISSUES A MONTH sent 1st Class Mail... NO LONG WAIT FOR AD CIRCULATE! NOTE: A \$4/4 issue MINI-SUBSCRIPTION may be ordered by potential subscribers, or WITH AN AD to qualify for the Special Subscriber Ad Rates given below:" Non-subscriber ads \$1/[word,number,group] per insertion; subscribers: businesses or other for-profit sales \$0.75 per word; ads involving items solely from or for your own use \$0.35 a word; hamfest ads \$0.35. Ads and ads with subscriptions should be sent to POB 10253 Sarasota FL 34278 during the winter; spring through fall they go to POBox 2057, Glen Ellyn IL 60138.

Howard W. Sams & Company  
P.O. Box 7092  
Indianapolis, IN 26207-7092  
(800)-428-SAMS

Publishers of SAMS PHOTOFACTS and many other electronics books. There is an Annual Index of SAMS PHOTOFACTS whose cost I have forgotten. In-print



Photofacts run between \$14.95 to \$39.95 (for computer Photofacts); they will photocopy out-of-print Photofacts for \$11.95 + \$2.50S&H for one page, plus \$.55 per page thereafter.

RF Design Magazine  
P O Box 1077  
Skokie IL 60076-9931  
(312) 762-2193

A magazine for professional RF designers. Subscriptions are \$38 per year in the US, \$48 in Mexico and Canada, \$51 elsewhere, unless you appear to be a "qualified subscriber" (i.e. are in serious danger of convincing your company to buy a \$12,000 spectrum analyzer based on an ad) in which case it's free. Heavy on theory, and even the advertisement articles are educational.

Electronics Now (formerly Radio Electronics)  
Subscription Service  
P.O. Box 51866  
Boulder CO 80321-1866  
1-800-999-7139

A magazine for thumb-fingered electronics hobbyists. Subscription rate on the bingo card in the November issue (the latest I was able to dig up) was \$19.97 per year.

Popular Electronics  
Subscription Department  
P.O.Box 338  
Mt. Morris, IL 61054-9935  
1-800-827-0383

Like Electronics Now. \$18.95 according to the latest bingo card I see.

NOTES:

This file, and many others, are available for anonymous ftp from ftp.cs.buffalo.edu. It is also available from another anonymous ftp site, toxicwaste.mit.edu:/pub/archive/sci.electronics/Mail\_Order\_Companies. (Contact warlord@athena.mit.edu to offer things to the latter)

CHANGES FOR \$Revision: 2.11 \$

Add Townsend Electronics.  
New street address for Surplus Sales of NE.  
Elektor Electronics is gone :-(.  
Add Pop. El. and El.Now.



From adam@nynexst.com Tue Jan 26 09:37:25 1993  
Subject: Mototola & GE Manuals  
Date: Tue, 26 Jan 93 9:38:49 EST

For Motorola service manuals, call Motorola Parts-ID at 708 538-0021 with the part number of your radio. Parts-ID will be able to give you the part number for the service manual. (Motorola has an excellent Parts-ID service, although they recently lost cross reference data for some of the 20 and 30 year old models). You can then call 800 422-4210 to order the service manual based on its part number. Although they sometimes waive this rule, there is a \$25 minimum for credit cards. Manuals are generally less than \$25.

For GE service manuals, call 800 528-7711 from a touch-tone phone and follow the prompts. The procedure is much the same as that for Motorola, but you do not have to go through Parts-ID first. Have the part number of the radio ready, and go directly to the "Order Service Manuals" option. Cost for GE manuals is often under the minimum for which you will receive a bill. (In other words, they are often free).

In both cases, the procedure is much the same for ordering replacement parts.

-Adam (N2DHH)



Subject: Ham gear manufacturers addresses and phone numbers

Submitted by: George Katsimaglis SV1BDS

- =====
- Note that all phone numbers with the '+' symbol have been verified.  
(ex. (310)826+7790 ).
  - The following is provided as an information resource only and is not intended as an advertisement, endorsement, or recommendation regarding the manufacturers, products, or services. (am I covered?)
  - This is a volunteer list, i.e., nobody got paid to compile it. Remember that you get what you pay for (or at least, you pay for what you get!) Although an effort is made to keep this list as accurate as possible, no guarantees are made as to its content.
  - Please submit corrections and additions to RLWEST@FLOPN2.CSC.TI.COM
  - Thanks to KC5NG and WD5N for the original list.
- Good luck, de Bob WA8YCD

1. YAESU U.S.A. SERVICE DEPT. (213) 404-4884  
17210 EDWARDS RD SERVICE TURN-AROUND RUNS 8-10 WEEKS.  
CERRITOS, CA 90701 LITERATURE (800) 999-2070  
(213) 404+2700 CHIP MARGELLI, V.P. CUSTOMER SERVICE  
PARTS DEPT. (800) 633-4455 LABOR RATE (GET THIS) IS \$50.00 PER HOUR. \*\*  
FAX (213) 404-1210 PARTS (213) 404-4847
  2. FOX TANGO PARTS (COMPANYS NEW OWNERS IRCI)  
747 S.MACEDO BLVD 3804 South U.S. # 1  
PORT ST.LUCIE, FL 34983 Ft. Pierce, FL 34982  
(407)879-6868 (407)489+0956  
FAX (407)878-8856 FAX: (407)464+6386
  3. ICOM AMERICA, INC. PARTS: BELLEVUE, WA (206) 454-8155  
3150 PREMIER DR. DIG THIS: ICOM = \$55 PER HR \*\*  
IRVING, TX <ZIP?> 2380 16th Ave. N.E.  
(214)550-7525 Bellevue, WA 98004  
LITERATURE (800)999+9877 SERVICE: (206)454+7619  
FAX: (206)454-1509
  4. TRIO-KENWOOD COMMUNICATIONS INC. SERVICE DEPT. 213-639-7140  
1111 W. WALNUT STREET MASAKAZU "MICKEY" HATORI, SERVICE MANAGER  
COMPTON, CA 90220 SHIPPING ADDRESS FOR SERVICE DEPT:  
voice (213) 639-9000 KENWOOD  
FAX (213) 609-2127 P.O. Box 22745  
2201 E. DOMINGUEZ ST.  
LONG BEACH, CA 90801-
- 5745
5. MFJ ENTERPRISES  
"MAIL BOX" "PLANT SITE AND SERVICE"



17. BUTTERNUT Electronics Co. Service (512)398+7117  
P.O. Box 1234  
Olmito, TX 78575
18. CUSHCRAFT Service (603)627-7879  
P.O. Box 4680 Info (603)627+7877  
48 Perimeter Rd. Fax (603)627+1764  
Manchester, NH 03108 Telex 49+49472
19. ETO Service (719)260+1191  
4975 N. 30Th. St. Info (719)599+3861  
Colorado Springs, CO Fax (719)260+0395  
80919
20. HY-GAIN Rotor Parts (402)465-7021  
Antenna/tower parts (402)465-7022  
Technical assistance (800)328-3771
21. JRC Service (212)355-1180
22. TELREX Service (201)775-7252  
(210)775-7252
23. TEN-TEC Office (615)453+7172  
1185 Dolly Parton Parkway Service (615)428+0364  
Sevierville, TN 37862 Order (800)833+7373  
Fax (615)428+4483





Subject: NASA SELECT rebroadcast frequencies

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-
Town/City   State      2m          70cm        Source
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---
AMSAT OSCAR                145.945     -
                          145.955     -
-----
--
Kitchener,Ont.      Ca      146.865     445.760
jtrimble@undergrad.math.uwaterloo.ca
-----
---
Birmingham, AL      145.380     -
                          145.150     -
Huntsville, AL      145.100     -
                          147.100     -
Phoenix, AZ          -           448.975
                          -           449.000
Tucson, AZ          -           448.625
Los Angeles, CA      145.320     445.400
                          145.460     445.425
                          224.040     -
                          224.940     446.575
                          -           447.000
                          -           447.025
                          -           447.400
                          -           447.475
                          -           448.375
                          -           448.500
                          -           448.650
                          -           449.000
Monterey, CA        -           443.300
Mountain View, CA   145.585     -           fariss@kronos.arc.nasa.gov
Pasadena, CA        224.040     -
Sacramento, CA      147.195     444.750     chandler@beagle
                          147.404     443.925     chandler@beagle
San Diego, CA       146.640     443.400
                          -           449.450
                          -           448.625
                          -           448.675
San Francisco, CA   145.585     444.775     trop@hls.com
                          -           443.300     trop@hls.com
San Jose, CA        145.585     443.300     trop@hls.com
Santa Barbara, CA   145.585     -           449.000
Santa Cruz, CA      145.585     -           444.300     trop@hls.com
Ventura/Oxnard, CA  146.655     -
Connecticut, CT     146.655     -           448.425
Washington, DC      147.450     -
Cape Canaveral, FL  146.940     -
Jacksonville, FL    147.120     -
Melbourne, FL       145.170     -           Sorry, can't make
out address
Merritt Island, FL  146.940     -
Vero Beach, FL      145.130     -

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Atlanta,	GA	146.655	-	
			147.345	-
Ashburn,	GA	147.285	-	
Forsyth,	GA	147.915	-	
Champaign,	IL	146.880	-	jtg0707@uxa.cso.uiuc.edu
Chicago,	IL	145.210	-	
			145.350	-
Downers Grove,	IL	145.350	-	
Cedar Rapids,	IA	146.400	444.300	
York,	ME	224.840	-	
Portland,	ME	146.925	-	
Mpls/St.Paul	MN	145.150	-	person@geom.umn.edu
			147.120	-
			149.200	-
Waseca,	MN	147.450	427.250	
South Brunswick,NJ	-	443.400	kb2ear@kb2ear.ampr.org	
Southern NM,	NM	-	448.625	
			448.650	
			448.675	
			448.975	
			449.000	
Las Vegas,	NV	-	449.000	
Albany,	NY	146.820	-	
Kings Park,	NY	145.430	-	
popovich@adam.cs.columbia.edu				
Akron,	OH	147.330	-	macy@fmsystem.ncoast.org
Cleveland,	OH	147.195	-	macy@fmsystem.ncoast.org
Dayton,	OH	145.110	-	
Greenville,	OH	416.790	-	
Dallas,	TX	146.600	448.750	dwd@doel.uta.edu
El Paso,	TX	-	448.650	
Ft. Worth,	TX	145.310	448.750	dwd@doel.uta.edu
Houston,	TX	146.640	-	
			171.150	-
Wausau,	WI	146.820	-	
			147.060	-
Salt Lake City,	UT	-	448.625	
Cedar City,	UT	-	448.650	

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Thanks for all the replies.

The list above is what I have after some digging.  
I have to assume these frequencies are current and functioning until being told otherwise, as I have no real way of verifying them.

I have also receive some informations on the video retransmissions and SSB/HF retransmissions. I've decided not to include them at this time due to time constraints and concentrated mainly on 2m and 70cm bands. There are some non-amateur band frequencies that I've decided to include as part of the list; you may find them useful if your HT can receive them.

AMSAT OSCAR may be very useful. I can't receive anything on those frequencies. A local ham informed me that I need a very high gain antenna to receive anything from satellites.

If you do get something from OSCAR, or any other 2m/70cm rebroadcasts from satellites, please drop me a note. I am sure many people outside USA will be very interested in your setup.

If you are interested in HF/SSB, there is another list available from N8QLT from compuserve. His email address is 70534,227 on compuserve. N8QLT's list consists of large collections of aviation band, NASA contractor, HF/SSB, and 2m/70m frequencies. There is a large overlap between N8QLT's list and this list. ( Not too surprising!)

I think there is a small list of the HF/SSB frequencies that may already exist in the rec.radio.amateur.misc FAQ. Email ikluft@uts.amdahl.com if you want know more.

Finally, if you are satellite capable, you can receive NASA SELECT video direct from GE SATCOM F2R, transponder 13, C-band, 72 degrees west longitude. The transponder frequency is 3960 MHz. The audio sub-carrier is at 6.8 MHz. Vertical polarization.

NASA operates a BBS called NASA SpaceLink with some interesting information on it. The phone number is 202-267-5697. The IP address for the BBS is 192.149.89.61 for those who prefer internet access.

This list is a compilation from personal emails, local lists, HAM BBS files, and words of mouth. You may reproduce and/or distribute this list in any form for non-commercial purposes only. All rules in amateur radio do apply.

Keep sending the frequencies and I'll keep updating the list.

jtg0707@uxa.cso.uiuc.edu  
N9RRD  
4/15/93



Subject: NEWCOMER'S GUIDE TO AMATEUR RADIO EQUIPMENT

The following article is adapted from a piece by the editor of the Raleigh (NC) Amateur Radio Society's EXCITER. Permission is granted to copy for use in any Amateur Radio newsletter, provided proper credit is given.

If used, please send a copy of your newsletter to:

Vince Yakamavich, AA4MY  
220 Carriage Trail  
Raleigh, NC 27614

(I like to see what other papers look like -- I'll mail you one of mine in return!)

=====

#### NEWCOMER'S GUIDE TO AMATEUR RADIO EQUIPMENT

I recently overheard two fairly new-to-the-hobby Amateurs discussing (bemoaning) the high cost of Amateur Radio gear, specifically HF transceivers. They were discussing top brands, and top-of the line models. (Sorta like two teenagers with newly-earned learner's permits, bemoaning the prohibitive costs surrounding Porsche 924's...) "You really can't get much for under \$1,000," said they. "Horse-feathers!" sez I.

Many new Amateurs mistakenly assume that they have no choice but to begin with a tired old used QRP CW transceiver, a wire dipole antenna, and perhaps a used handheld rig for VHF/UHF. This may be the case if you're simply flat broke and have no way to raise cash for a decent station, but there are many possibilities if you allow you creativity, determination, and logic to prevail. And you won't have to "homebrew" your entire station (unless you want to)!

Over the past 10 years, there has been a virtual explosion in electronic technology. The technology of "yesterday" (tubes, and linear VFO's) have been replaced with ultra-sophisticated, computerized, marvels of engineering and packaging technology (for which, we pay most dearly). But let's look seriously at some of those "antiques" of the late 70's and early 80's (which are now in the \$400 - \$800 range). Did they work? Most assuredly. How well did they work? Many a DXCC and 5 band WAS earned, with untold millions of hours of enjoyment, to boot!

Unfortunately, newcomers won't find ads for the "antiques" in today's Amateur Radio mags. All they see are the ads for the new, (multi) kilo-buck transceivers from Japan Inc.

After reading some of the spec sheets on the new rigs, a newcomer to the hobby will probably think I'm off my rocker when I say most of the "features" found on the new HF rigs in the kilo-buck range are USELESS!

Just for an example, lets talk about "digital VFO's" and "memories". A "digital VFO" is in actuality, a frequency synthesizer. Synthesizers are characterized by extreme frequency stability (a very desirable trait), on the order of 20 Hz or less per hour (based on thermal changes in the crystal time base). But let's look at some of those "antiques". They, too, can boast of frequency stability. Like 100 Hz or so per hour. "But," you say, "that's FIVE TIMES WORSE than what a new rig can do!" And you're absolutely correct. But the key question is: "Will you notice 100 Hz per hour drift?" Using a tight CW filter, yes, you would--after perhaps a FULL HOUR QSO. On SSB, you'd probably want to touch the frequency knob after about 2 HOURS of rag-chewing! Yes, those older rigs sure made Amateur Radio operating rough...

"But the new rig offers 100 "memories", while some of the "antiques" don't even offer a digital display!" Yup, you're right again! But remember, unlike the VHF/UHF FM spectrum, HF is not "channelized". HF stations will be scattered randomly on the band--NEVER will you find them exactly where you programmed your memory for yesterday!. Net operation?? "Plus or Minus QRM" is often heard on many an HF net preamble. Your HF "memory" will NEVER get you exactly on the frequency of your favorite net. You'll always be tuning up and down the band anyway. Unless you plan to make heavy use of autostart RTTY, HF packet, or AMTOR, I doubt you'll ever need a memory on HF.

Keyboard entry of frequency? Perhaps good to get you in the desired band segment, but not much more.

Digital display? Impressive to look at, and perhaps nice to have. But crystal calibrators (about \$20 to build, if your "antique" doesn't already have one built in) and mechanical displays have been the frequency reference for years--and yes, the new rigs' high-tech synthesizers have to be calibrated against WWV, just like the \$20 calibrator...

Solid state finals versus tubes. No doubt about it, tubes are getting more difficult to find. But they CAN be found. "Tubes are expensive!" Yes they are--but YOU can replace them. Ever try to get 4 matched RF type transistors? Ever changed a set mounted in a heat-sink buried within the bowels of a tightly packed maze where even Japanese-sized fingers fear to go? More likely than not, the average Amateur wouldn't even ATTEMPT to replace the finals in a solid state rig (IF he could find a matched replacement set!), while changing a tube presents little, if any, problem. Tubes have other advantages, too. They're infinitely more forgiving when it comes to that "ideal" 50 ohm resistive match we Amateurs are always seeking, but seldom attain. At 2:1 SWR, a tube will work just fine--a newer rig will probably go into a limited "foldback" to protect the transistors. Three to one?? Tubes are still perkin' along...Transistor? Forget it!

One disadvantage though: You will have to learn to peak the

grid, and dip the plate. Hand-eye coordination. Watch the meter--twist the knob. Yup, those "Amateurs of olden days" sure had it rough...

Speech compressor? Some DXers swear by 'em. Most rag-chewers swear AT 'em! If you need one, they exist as after-market devices for the older rigs, not to mention the "build your own" method.

Suffice to say, a lot of the features on the newer rigs amount to high priced, useless frills.

What newcomers in quest of a good HF rig REALLY need to do is seek out an EXPERIENCED Amateur who has knowledge about the older rigs. Ask what kind of rig they use. Ask what they like or dislike about it. Most Amateurs are delighted to show off their shack, and give you hands-on exposure to their setups.

I'd recommend any of the following, as they were the "standard of performance" in that "classic" age of 10 or more years ago. Most can be found in ham-fests or in trader publications for around \$200 - \$600. Collins KWM-2A, Drake TR4-C, & TR-7 transceivers; Collins S Line, Drake T4C, R4C (separate Receiver & transmitter). Again, these were the "Cadillacs" of 10 or so years ago. Solid, proven performers, and parts still readily available.

Be cautious though--not all the rigs in this era were gems. Although some of their rigs were winners, manufacturers such as SWAN, National, EICO, et al., have had models that left a sour taste in the Amateur community. Until you're more knowledgeable about the ins and outs of specific models, stick to the "Cadillacs" like Collins & Drake.

Got a little more to spend? Icom 745 (my current HF rig), Kenwood TS-830, TS-430. \$600 - \$800 range. SOLID performers (even if they ARE transistorized!).

Just for fun, let me play devil's advocate. Lets assume that you, Joe New Ham, just HAS to have that kilo-buck+ special. It's a steep price to pay, no argument. But the thing you have to keep in mind is that the cost of this hobby is mostly "up-front money." In the long run, Amateur Radio is NOT that expensive when you look at dollar cost versus hours of enjoyment.

Let's compare it to some other hobbies: Bowling--pretty inexpensive, eh? After you buy your equipment (about \$75 or so), you can look forward to dropping an additional \$10 or so every time you visit the lanes for a couple hours of fun. A couple times a week, over the course of a SINGLE YEAR, you've already paid MORE than that new transceiver costs! Do you enjoy going to the movies? Add this up: \$5-\$6 admission, \$2-\$5 for refreshments, that's \$7-\$11 per film, and if you go just once a week it works out to \$350-\$550 per year...add a date and double it...about an hour and a half of entertainment each week for perhaps \$1,000! And don't forget the hassles of parking, waiting in line, etc. What about golf? You pay greens fees, and you're limited to daylight and (for

all but the fanatics) fair weather. Not so with HF Amateur Radio. Twenty-four hours a day, rain or shine, you can sit down and enjoy your INVESTMENT, making new friends, learning about faraway places, and perhaps helping others in life-threatening situations.

Compare your Amateur Radio hobby. Say you spend even \$5,000 on a transceiver, antenna, tower, tuner, power supply, coaxial cables, rotator, and miscellaneous accessories for the shack. Let's say the setup lasts five years (conservatively) before you want to make any major changes. Five grand works out to \$1,000 a year, or \$20 a week for unlimited hours of operating and providing a valued public service. Even if you add more extras, like a good keyer, handheld VHF radios, club dues, magazine subscriptions, reference books, tools, license upgrade preparation tapes, packet TNCs, backup power generators, mobile gear, and a cheap computer, it's still a fairly inexpensive hobby over the long haul. No to mention the fact that you'll probably recoup 30-50% (or more) of your investment if you decide to sell your equipment used at a later date. So, for a net outlay equivalent to maybe \$10-\$25 a week, you can be a "complete Amateur."

If you're still doubtful about the hobby, seek out an experienced Amateur to consult and/or go shopping with, and go for one of the "classics" of recent time. Get on the air. It won't take you long to become hooked on HF operating. It's day and night compared to VHF repeater operation. Besides, you'll always be able to sell it at a hamfest if you ever lose interest. But if you're convinced that Amateur Radio is for YOU, then go ahead and look at those kilo-buck+ specials, visit your friendly Credit Union if necessary, and GO FOR IT!

73 de Vince Yakamavich, AA4MY





Subject: Packet Note Usage Guidelines

For all new, and old users of packet, A Maryland PBBS sysop by the name of Pete, KA3RFE, put together this quite straightforward and easy-to-read guide. It's recommended reading for all.

What motivated Pete to do it? Well, one major reason was all the TNC's with "PK-232" in their callsign field after the X-mas holidays, usually loading down the Northern Virginia LAN on 145.07. Pete determined that the "PK" prefix used to belong to the Dutch West Indies. We wrote to the ARRL to determine if we could get DXCC credit. So far, no response :-).

However, the last straw was seeing the following beacon:

JOE HAM IS NOT IN, MAKE NO ATTEMPT TO CONNECT TO HIS STATION

(Well, the last one didn't really happen, but it's still funny).

Please keep the following in mind:

1. Pete, KA3RFE, is the author and is solely responsible for its content.
2. All questions, comments, and criticisms should be sent to Pete via AMPR KA3RFE@KA3RFE.MD.USA.
3. Pete doesn't mind if you disseminate it, just make sure that it's not for commercial gain and that Pete is ALWAYS given proper attribution.
4. Requests for garbled, lost, or expired-on-your-news-server issues should be sent to me.

73, Paul W. Schleck, KD3FU

ACMNEWS@zeus.unomaha.edu uunet!unocss!zeus!acmnews 137.48.1.1

ps67@umail.umd.edu uunet!mimsy!umail!ps67 128.8.10.28

\*\*\*\*\*

MSG # TR SIZE TO FROM @BBS DATE TITLE  
4673 B# 3444 ALL KA3RFE MDCBBS 910106 ATT: New Packeteers  
Forwarding path: W3IWI N4QQ N2GTE KA3RFE

This is for those of you got new tncs for Christmas and are just starting out in the Wonderful World of Packet. There are some things you should know that your tnc manual may not have mentioned.

Some terms which get people confused:

- 1) Home BBS: A "home BBS" does not refer to the mailbox program which your tnc may have in it's guts. It refers to a full-service BBS which handles personal mail, bulletins, and file transfers. Your "home BBS" would be a full-service BBS which you might check into often to read bulletins and to pick up any personal mail which might be held for you. If you

have arranged for a full-service BBS to forward your personal mail to your mailbox, your home BBS still remains that full-service BBS.

This term is important as several BBS programs will ask you to enter a "home BBS" the first time you connect to it.

- 2) Node: You can figure a "node" to be something of a packet switchboard which has the ability to operate on several frequencies. A node differs from a digipeater in the sense that it handles all of the packet housekeeping chores within its program. Most nodes have more than one operating frequency and they can shuttle packets back and forth via any number of intermediate nodes. The benefit of using a node over a digipeater is that the node will find the quickest way to make the connection whereas a digipeater will only try to connect you to the station you tell it to connect to, regardless of whether the digipeater can hear it or not.

You cannot send mail to a node. It is not a mailbox or a BBS.

- 3) Network BBS: A network BBS is a full-service BBS which is operating under a special node-compatible software program. Network BBSs will show up in node broadcasts and can be connected to over the node network by entering a connect request to the network BBS alias.

Generally, a network BBS will have an alias in which either BBS or BB is part of the alias. For example: ANNBBS is the alias for KA3RFE BBS in Annapolis; BWIBBS is the alias for WB3V BBS in Severn. BBJ9X is the alias for AJ9X's tcp/ip BBS in Westminster.

The network BBS alias is ONLY FOR CONNECTING. You should not use the network BBS alias as an entry for "home BBS" when you are asked to enter your home BBS. Use the callsign of the BBS and not its alias as your home BBS when asked to enter it.

The same goes for sending mail to a network BBS. If you enter a message to KA3RFE @ ANNBBS, the message will never get there since ANNBBS is only an alias for use in connecting to it over the node network. If you enter a message to KA3RFE @ KA3RFE, the message will be forwarded without much hassle.

I strongly suggest that you thoroughly read your tnc manual and also suggest that you get a copy of "Your Gateway to Packet Radio" from somewhere. It's the best book yet written on the ins and outs of packet radio.

73, Pete, sysop KA3RFE (ANNBBS)  
Annapolis, Md.

```
MSG # TR  SIZE TO      FROM    @BBS  DATE      TITLE
 4813 B#  1760 ALL    KA3RFE MDCBBS 910110 Att New Packeteers pt.2
Forwarding path: W3IWI N4QQ KA3DXX WA7NTF KA3RFE
```

This bulletin is being re-sent at the request of several people:  
"GARBAGE CHARACTERS"

You may see some very strange-looking characters flitting across your monitor's screen from time-to-time. Those funny-looking things are symbols for binary data being transmitted. There are several sources which use binary data instead of text. Net/Rom nodes use binary data in their nodes broadcasts. The purpose of the node broadcasts are

to inform other nodes within range what nodes they can connect to.  
The data is binary for reasons of accuracy.

Another source of garbage characters is binary file transfers from a BBS to a user. These transfers are generally executable programs which the BBS might have stored for downloading by users. These differ from text files in that the binary code contains control characters and computer programming commands which cant be sent as text files.

A third source of garbage characters is tcp/ip packets being sent between two stations using that protocol to exchange files or mail. Tcp/ip is a protocol which has several different layers to it and can be used to interface with some of the major computer networks such as those used by colleges and government computers.

So, if you see funny-looking symbols on your monitor, dont panic, its just binary traffic going bye.

73, Pete KA3RFE @ KA3RFE BBS

```
MSG # TR  SIZE TO      FROM  @BBS  DATE    TITLE
 4766 B#  3742 ALL    KA3RFE MDCBBS 910108 ATT: New Packeteers pt 3
Forwarding path: W3IWI KA4USE N4QQ N2GTE KA3RFE
SENDING MAIL/BULLETINS
```

Most BBS programs use the same commands to send mail and bulletins. One of the most common mistakes in sending messages of any type is the confusion between what is mail, and what is a bulletin. The issue gets further confusing when trying to determine how to send a bulletin meant for all BBSs is a given bulletin distribution scheme.

Generally, there are three commands for sending mail and bulletins:

A) S.....Most BBS programs treat the S command as a command to send a PRIVATE message. For instance: entering S KA3RFE will send a private message to KA3RFE...but only on the BBS you enter the message on. If KA3RFE does not use the BBS you are entering the message on, the BBS program will try to forward the message to KA3RFE...but ONLY if that BBS has KA3RFE listed in its forwarding file.

If you try to send a bulletin using S alone, the BBS will still treat that message as a private message. So, entering a bulletin using "S ALL @ MDCBBS \$" will result in a private message to NOBODY at MDCBBS except for SYSOPS, because a private message to "ALL" could only be read by sysops or a ham who's callsign is "all". Since "all" is not a legal callsign, nobody else can read the message

Did you notice the "\$" in the example above? To send a bulletin out to other BBSs, the address has to include the \$. This tells the BBS that the bulletin should be forwarded out to other BBSs. So, you must include that \$ if you want the bulletin to be sent to other BBSs.

B) SP.....The SP command means "Send Private". This tells the BBS that the message you are sending is "eyes only" for the addressee. The sysop will be able to read that message but no one else will be able to read it. This is the same command as the

plain S command. To avoid confusion, you should always send your private messages to another ham using the SP.

- C) SB.....This command means "Send a Bulletin". There are two types of bulletins you might send. One type would be only for users of the same BBS you are entering the bulletin on. If you were connected to KA3RFE BBS and you sent a bulletin reading "SB ALL", the BBS will treat it like a local bulletin and it will only stay on KA#RFE. If you sent a bulletin titled "SB ALL @ MDCBBS" the bulletin will still be considered a local bulletin on KA3RFE. Why????? To send a bulletin which you want forwarded to "ALL @ MDCBBS" you have to tell the BBS you want it forwarded.....THATS WHAT THE "\$" IS FOR. So, if you want your bulletin sent to every BBS which accpets the MDCBBS distribution scheme, you have to add that \$. The correct way is "SB ALL @ MDCBBS \$".

So, to sum up....use S and SP for PRIVATE messages. ("Mail"), and SB for BULLETINS. Dont forget the "\$" in the address if you want your bulletin to get forwarded.

Try it out! Send me a private message to KA3RFE @ KA3RFE.md. If it gets here, I'll send you a reply.

73, Pete KA3RFE sysop KA3RFE BBS

MSG # TR SIZE TO FROM @BBS DATE TITLE  
4894 B# 1594 ALL KA3RFE USA 910113 Att: New Packeteers pt 4  
Forwarding path: W3IWI W3ZH N4QQ N2GTE WB3V KA3RFE  
In Part 3 I stated that a dollar-sign symbol must be appended to any bulletin which you want to have forwarded out from the BBS you entered it on.

I've gotten information that entering the dollar sign is not required on CBBS and RLI bbs systems for the forwarding-out to take place. At this point, to the best of my knowledge, the dollar sign is required on MBL, MSYS, and REBBS systems. There are other systems which may not require the dollar sign.

Your best course of action is to ask your sysop if you need to append the dollar sign to your bulletins for them to be forwarded-out.

Those of you who are sysops: I want to make this series helpful, so correct me if I dont have it correct! I dont know how BQE's system handles bulletins, nor FISBBS, and maybe I'm wrong with MSYS and AA4RE...(I ran both MSYS and AA4RE, but I've forgetton and dont have the docs any more...getting senile...)

The dollar-sign IS required for the WA7MBL bbs and with another BBS system being beta-tested in Anne Arundel County MD called "GTEPMS".

Part 5 will deal somewhat with tnc settings....look for it soon!

73, Pete KA3RFE @ KA3RFE.md.usa

MSG # TR SIZE TO FROM @BBS DATE TITLE  
4968 B# 3405 ALL KA3RFE MDCBBS 910114 Att: New Packeteers pt 5  
Forwarding path: W3IWI WA3ZNW NB3P KA3RFE

## SETTINGS:

Nothing generates more frustration than trying to set up a tnc to operate effectively when you dont understand the language. This is a short run-through of the more important parameters which enable your tnc to work properly with minimum hassle.

**FRACK:** FRACK is short for FFrame ACKnowledge. It is the timer which tells the tnc how long to wait for an acknowledge frame from the other station before re-sending a frame. Typically, tncs come with a default value of 4, which is adequate. However, if you are operating on a very busy channel, you may want to increase FRACK to 6, or even 8. A short FRACK value can lead to retrying-out, so dont set it below 4 or so.

**RETRY** RETRY tells the tnc how many times to keep sending a packet that does not get ACK'ed by the other station. This usually defaults to 10 from the factory. After the 10th retry, the tnc "times out" and the connection is broken. A value of 10 is just fine. Some people say a shorter value is better but 10 will do. If you set your tnc retry value to 0, the tnc will NEVER time-out! This is NOT a good idea!

**DWAIT** DWAIT enters a pause in-between transmitted packets to let digipeaters to transmit first. This is usually set by local agreement. Ask around to find out what your DWAIT should be.

**TXDELAY** This determines how soon the packet will be transmitted after the tnc keys the radio. The purpose of TXDEAY is to insure that the first few parts of the packet dont get chopped off by a slow-keying transmitter. You will have to set this based on what sort of transmitter you are using. Good values range from around 30 to 50. Longer TXDELAY values just take up air time.

You can figure that TXDELAY works the same way that you do on voice....you wait a second or so after keying the mic before you start talking....well, thats TXDELAY!

There are more settings which control your tnc, but the above are the ones that make the difference. There are also two settings for your RADIO which are important:

**DEVIATION:** W3IWI reccomends a deviation of no more than 3 percent for optimum packet operation. A too-wide deviation will reult in lots of retries and timing-outs.

**VOLUME:** Your volume-control is the most important setting on your radio insofar as receiving packets is concerned. If you have the volume too loud, the tnc will not be able to decode the packets, and, of course, if the volume is too low, the tnc wont hear the packets. The best method of setting your volume control is to open your squelch and increase your volume control until you see the DCD light on the tnc come on. That's your setting.

MSG # TR SIZE TO FROM @BBS DATE TITLE  
5029 B# 4630 ALL KA3RFE MDCBBS 910116 Att: New Packeteers Pt 6  
Forwarding path: W3IWI KA4USE N4QQ WA3ZNW NB3P KA3RFE  
SETTINGS CONTINUED

There are two more setting which you must consider when setting up your tnc. These settings have much to do with how well your RETRY rate is.

PACLEN: PACLEN is short for PACket LENGth. It tells the tnc how many letters, numbers, and spaces should make up the length of the packet your tnc sends out. Most people use a PACLEN of 128 characters, which is ok under most circumstances, I suppose, but that depends highly upon how good the path is between stations, how crowded the channel is, and a couple other factors. On my BBS and node ports here, I use a PACLEN of 80 on my UHF port (when its operating....) as I dont have all that great of a path to the more distance stations, while my 2 meter port has a PACLEN of 180 and my 220 port runs a PACLEN of 120. The differences are due to channel loading, distance, and radio/antenna performance factors.

BY THE WAY: PACLEN is NOT a substitute for inserting carriage returns in your transmitted signals. All PACLEN does is tell the tnc to transmit a packet after X number of characters have been inputted. If you make up a long message on a word processor and dont insert any carriage returns in the text, the message will scroll right off the screen of anyone trying to read the message! I am inserting carriage returns as I type this message. If I didn't, you wouldnt be able to read the bulletin! I put my carriage returns at the end of each line I type. When this bulletin gets forwarded out, the PACLEN setting will send X characters out, carriage return and all, and the finished product when you read it, will be exactly as I typed it.

MAXFRAME: This is the last setting you need to worry about right now. MAXFRAME works with PACLEN to determine how much information your tnc will send out at any one time and will consult with RETRY to give you the bottom-line total thruput. (Thruput? ....all thruput means is how fast the job it getting done... when packets are just zipping along and being acked real fast, that's high thruput...)

MAXFRAME means how many packets you want to have out un-acknowledged before more packets are sent. On a nice quiet channel where you are in within spittin distance of the station you are communicating with, MAXFRAME can be as high as 4 or 5. However, hardly anyone is on a nice quiet channel, so your MAXFRAME setting has to be set to reflect conditions. If the channel is real crowded and noisy, or if you time-out a lot with a high MAXFRAME, you might want to consider setting a MAXFRAME of only 1 or 2.

On my UHF port, the channel is both busy and I have a poor-to-fair path to most of the stations I connect to. So, I set a MAXFRAME of 1. On my 2 meter and 220 ports, I set MAXFRAME to 2. I probably could get away with a setting of 4 on 2 meters and 220, but the channels are busy.

## A NOTE ON THE "\$" IN SENDING BULLETINS

I've heard from many sysops and two BBS software authors on the use of the dollar sign in sending bulletins which are to be forwarded out from the BBS you're entering it on. The info is being passed on here, somewhat modified to reflect the possibility that you may not know which sort of system you are using.....

The WA7MBL BBS requires that you send bulletins to be forwarded out in this manner:

```
SB ALL @(USA, etc) $
```

Other BBS systems dont require it, but if you are not sure which type of BBS you are using, you can enter the \$ with no harm done. In fact, it may be a good idea to use the \$ anyhow. It wont hurt, and wont make any difference if the BBS does not need it.

(Thanks to all you sysops who sent me the info I needed to clear that up, and a special "thank you" to the two BBS software authors who were kind enough to respond.)

```
MSG # TR  SIZE TO      FROM  @BBS  DATE    TITLE
 5026 B#  2411 ALL    KA3RFE MDCBBS 910116 Att: New Packeteers, pt 7
Forwarding path: W3IWI KA3T WA3ZNW NB3P KA3RFE
THE DIFFERENCE BETWEEN MAIL AND FILES
```

When you log onto a full-service BBS, there are two separate things you can get into: Mail and Files. Some people get confused about what the two of them are. I know I did when I first got on packet. I thought a file was a file, whether it was a file or whether it was that long list of messages you get when you enter an "L" command.

Well, as I found out, they aint the same animal.

When a BBS refers to a "file", it's talking about a separate entry which is being stored apart from "mail".

I guess I better define "mail" before I get into "files"....its easier.

"Mail" means messages from one ham to another, or bulletins which the BBS has open. If ham A sends ham B a message, that's "mail". If a ham sends a message to be read by many people, that's called a "bulletin" but the BBS still calls it "mail".

A "file" is not mail, nor is it a bulletin; although some bulletins might be converted to files by the sysop. A file is a permanent part of a BBS. The file might contain text, or it might be a binary file. (WHAT? I THOUGHT EVERYTHING IN PACKET WAS BINARY!) Not to worry...everything packet-ized is binary, but there is a difference in how the information is kept in the BBS.

Binary files are those which are actually executable programs which can be downloaded from the BBS. These files require that you have a compatible binary file downloading program in order to get them from the BBS.

Text files are those which are plain text and you can download them without needing any sort of special file downloading program. In most BBSs you



can get into a text file area in which the documentation is kept with all the commands used by the BBS.

So, MAIL is stuff from ham A to ham B, bulletins are from ham A to a selected audience, but still MAIL. FILES are the more permanent information on a BBS and come in two flavors: text and binary. Text files are sent in simple plain old English, while binary files look like the BBS has got the runs.

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.USA

\*\*\*\*\*

For those that thoroughly enjoyed the previous 7 chapters of the KA3RFE "Attn New Packeteers" Guide, here are the latest 3 installments. As you can see, they touch on many sore issues that have worked their way to the surface of the ham community in the wake of the "WA3QNS" citations by the FCC. Those that would enjoy the infamy of their callsigns being remembered with "the Titanic", "Adolf Hitler" and "Pontious Pilate" (not to mention the FCC's "Harden and Weaver Rule") are advised not to read these posts.... ;-)

As always, they are written by a Maryland packet BBS sysop, Pete KA3RFE, and all comments or criticisms should be sent to him via:

AMPR KA3RFE@KA3RFE.MD.USA

Requests for lost installments due to Usenet barfs should, of course, be sent to me.

73, Paul W. Schleck, KD3FU

ps67@umail.umd.edu

\*\*\*\*\*

MSG # TR SIZE TO FROM @BBS DATE TITLE  
5733 B# 2923 ALL KA3RFE MDCBBS 910215 Attn New Packeteers pt8  
Forwarding path: W3IWI KA4USE N4QQ N2GTE N3ETI KA3RFE  
MORE ON BULLETINS

OK, now you know that there are local bulletins and flood bulletins. So what? Well, you also need to keep in mind what's appropriate for which category.

With flood bulletins, there are local floods, regional floods, and national floods; each of which has a designated function and audience. A local flood bulletin would be one going to a very limited distribution area such as one city, or one county. A regional flood would be sent to a wider area, such as a state, or an ARRL region, or an FCC region. A national flood bulletin goes to BBSs throughout the country.

Which flood header you choose to use should be appropriate to the purpose of your bulletin, and to the most logical audience.

Example: Your club is going to hold a picnic and wants to invite hams from other clubs. What flood header do you use? National? No. Regional? Maybe. Local? Yes. (Why? If the picnic is to be held in Upper Lidville NY, nobody in Lower Coax MD cares...but someone in Middle Lidville NY might be interested.)

Example: You have a Deluxe Gee-whiz Whizbang Antenna Gizmo which you want to sell. You paid \$20 for it, and want to sell it for \$10. Which flood header to use for this? National? No. Regional? No. Local? Yes. (Why? If you use the national or regional floods, the shipping charge to send the thing to anywhere will be almost as much as the asking price...so any buyer for it will want to pick it up, and probably won't want to drive more than 30 minutes to get it.)

With "for sale" bulletins, you should keep in mind that the item MUST be ham-radio-related for it to be legal under part 97.113. You should also keep in mind that there are many sysops who refuse to carry or forward "for sale" bulletins. You should check with your sysop about this prior to entering the bulletin, or download his "Info" text, where many of them keep their bulletin-forwarding policy.

Example: Your club will be holding a hamfest. You want to send a bulletin out to announce it. It's a one-day affair with no programs. Which header do you use? National? No. Regional? Yes. Local? Yes. (Why? The information is of regional interest, but not of national interest. Nobody in California is going to travel to a one-day hamfest in Maryland.)

So, you see that the content of your bulletin will determine which header to forward it to. You need to exercise some judgement and common-sense in addressing the bulletin.

(more in Part 9)

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.UA

```
MSG # TR  SIZE TO      FROM  @BBS  DATE  TITLE
 5730 B# 2328 ALL    KA3RFE MDCBBS 910215 Attn New Packeteers pt9
Forwarding path: W3IWI KA4USE N4QQ WA3ZNW NB3P KA3RFE
THE NATIONAL FLOODERS
```

There are several varieties of National Flood Headers, all of which do the same thing: They go nation-wide. Three of the most common headers are "USA" "ALLUS" "ALLBBS". There are others, but those three show up more often than the others.

What bulletins are appropriate for nation-wide forwarding? This question is continually debated among users and sysops alike. Ask 100 hams and you get 100 different answers. We CAN however use some judgement and common sense and come up with useful criteria.

Many bulletins sent via the national floods are inappropriate in one sense or another. It's not unusual to see hamfest announcements going out nationwide, and it's obvious that a national audience is not appropriate. It's also common to see someone selling some small piece of gear nationwide. As pointed out earlier, it makes little sense to

put a national bulletin out to sell something small. The same also holds true for real big things, like towers. If you send a national bulletin out selling a tower, you'd better be prepared to package it for shipping...and wouldnt you rather the buyer pick it up?.

Another point, with "sale"-type bulletins: it's common to see bulletins advertising stuff for sale which is in no way ham-related. FCC part 97.113 clearly states the item being sold MUST be ham-radio-related gear. Also, you must ask yourself if the bulletin could in any way be construed as "business" comms.

You should check with your sysop to see what his policy is regarding national flood bulletins, since almost every sysop has differing criteria.

If you exercise good judgement and common sense in sending national flood bulletins, you can't go wrong.

Oh, one last thing....If you are unsure of the legality of your bulletin, its best not to send it at all.

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.USA

MSG # TR SIZE TO FROM @BBS DATE TITLE  
5734 B# 1881 ALL KA3RFE MDCBBS 910215 Attn New Packeteers pt 10  
Forwarding path: W3IWI N4QQ WA3TAI WA7NTF KA3RFE  
HOW TO GIVE YOUR SYSOP ULCERS

- 1) Never kill your mail. Let your read-but-not-killed messages accumulate on the BBS.
- 2) Assume (wrongly) that the sysop will kill your messages for you.
- 3) Never read or download the documentation for the BBS.
- 4) Dont pay any attention to your sysop's messages telling you how to use the BBS and continue along your merry way with your mistakes.
- 5) Assume (wrongly) that any message you enter in error will be corrected by the sysop.
- 6) Complain long-and-loudly when the BBS goes down, but never, ever offer any support for system upkeep...momentarily or sweaty. (The majority of BBS systems are operated by individual hams, not clubs...and support for those systems usually are borne by the individual hams themselves with no help from the users...so, if you want to see the system stay up, HELP OUT!)
- 7) Never learn how to correctly enter NTS traffic on a packet BBS. Send traffic any old way....regardless of whether its sent in the right format or not...then bitch when the traffic never gets delivered at the end point because the traffic handlers cant figure out where it goes.
- 8) Send illegal bulletins. Eventually you will be caught, and you and your sysop will get fined. Your sysop will not appreciate that and

he will lock you out of the BBS, might bomb your shack, and will be sorely tempted to put pins through your coax. This is known as the "WA3QNS EFFECT".

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.USA

\*\*\*\*\*

Here are the latest (and last, according to Pete) installments of the Attention New Packeteers Guide. For those that desire all 15 parts, they are available as one crudely merged, unformatted ASCII text file (hey, I've got a job, a life, and a girlfriend too, you know!) from me via E-mail.

If I get mondo requests (i.e. >> 20 or so) I may consider a repost in a month's time or so.

As always, the Guide is not my creation, it is that of Pete, KA3RFE, and all questions/comments/criticisms should be directed at him via AMPR KA3RFE@KA3RFE.MD.USA. Enjoy!

73, Paul W. Schleck, KD3FU

ACMNEWS@zeus.unomaha.edu uunet!unocss!zeus!acmnews 137.48.1.1

ps67@umail.umd.edu uunet!mimsy!umail!ps67 128.8.10.28

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MSG # TR SIZE TO FROM @BBS DATE TITLE  
5766 B# 1678 ALL KA3RFE MDCBBS 910217 Attn New Packeteers pt11  
Forwarding path: W3IWI WA3ZNW NB3P KA3RFE  
BEACONING

It seems like the first thing a new packeteer does is send out beacons announcing to everyone that his/her packet station is on the air. That's understandable, but not a very nice thing to do. Beacons from private mailboxes just take up air time and on a busy channel, they just choke the frequency so badly that thruput gets very, very, slow.

The best thing to do if you leave your station up for mailbox connects, is just keep the radio and tnc on without beaconing it. Why? What's the best way to see if a station is on the air?? Try to connect to it! What can be simpler? Leave the beacons turned off.

Back in the early days of packet when there were not many stations, a beacon made sense. Now, however, all a beacon does it take up air time, especially if the beacon is being digipeated from various nodes or digi's. A while back, I observed a beacon from one digipeater being digipeated by 3 nodes and 2 digis. That's going overboard.

I watched one digipeater being repeated by 4 other digipeaters each of which could hear each other. An utterly useless application of digipeating which only grabbed air time which coulda been used by other stations.

So, the bottom line on beaconing is that its not all that of a good use of air time and it's sometimes abused.

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.USA

MSG # TR SIZE TO FROM @BBS DATE TITLE  
5794 B# 2613 ALL KA3RFE MDCBBS 910218 Attn: New Packeteers pt 12  
Forwarding path: W3IWI N4QQ N2GTE WB3V KA3RFE  
DIGIPEATERS AND NODES: Pt 1

A digipeater is a packet station which can repeat packet signals on the operating frequency the station is on. You use a digipeater by entering it's call in the connect request when you enter a message. For example: "C W3XYZ V K3LID". The "V" tells the tnc to connect to W3XYZ "via" K3LID digipeater. The digipeater can only work correctly if it can hear both your call and the destination call, and all the stations must be on the same frequency. Although its possible to use up to five digipeaters in a path, it's not a very good idea to use more than two digipeaters to reach your end-destination station. Why? Channel loading. Each packet your station sends out will be repeated by each digipeater until it reaches the destination station, and each ACK packet from the destination station will have to be repeated by the digi's until it reaches your station.

If you use two digipeaters to reach another station, the channel will get three packets to reach the other station, and three packets back to your station from the destination station. (Three? yeah...your original packet, a packet from digi #1, another from digi #2 equals three packets...the original packet from the destination station gets repeated by digi #2, then digi #1, which equals three more.) So, if you send a message over 2 digi's, the channel will wind up handling SIX packets round-trip. This takes up a lot of air time, not to mention the time it takes to get the round-trip finished...and that's only for ONE packet and assuming no retries!

Digipeaters can only work well if they can hear the other stations on each side of the link. If a digi can hear your station, but cannot hear the station identified in the "via" address, nothing will work, and air time has been taken up for no good purpose.

Digipeaters are "dumb". They cannot shift frequencies or attempt to establish a connect on a different frequency path from the one it is working. The digi is stuck on that one frequency and can only send on what it hears. If the destination station cannot be heard by the digi, nothing happens, except that lotsa air time has been taken up by lotsa retries, leading to channel loading and QRM.  
(more)

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.USA

MSG # TR SIZE TO FROM @BBS DATE TITLE  
5820 B# 1877 ALL KA3RFE MDCBBS 910219 Att: New Packeteers pt 13  
Forwarding path: W3IWI N4QQ WA3ZNV NB3P KA3RFE  
DIGIPEATERS AND NODES pt 2

## NODES

What's a node, anyhow? How does it differ from a digipeater?

A node is something like a switchboard - that's not a very good analogy, but its close. A node takes signals from one station and "ports" those signals to another station. Sounds like a digipeater, doesnt it? In contrast to a digipeater, however, the node handles the ACKs between itself and the stations on each end, cutting down the number of housekeeping packets going over the air. The difference is that the connect from station A to the node is one link, and the connect from the node to station B is another link. It looks like this:

```
Station A: => Node - Node => Station B (one link)
Station B: => Node - Node => Station A (second link)
```

or:

```
Station A <==> Node <==> Station B
```

The arrows indicate the ACK and traffic paths. The signal goes to the node, where it is ACKed by the node to Station A. The node then sends the signal to station B, where it must be ACKed by B. If B does not ACK the packet, the node keeps sending it until it exceeds its time-out value, then it breaks the link.

How does it make it better than using a digi? Instead of 6 packets round trip, going thru the node only requires 4 packets...so traffic should, theoretically, be faster.

This is only one aspect of using a node versus using a digipeater. Nodes can also do other things which make them very useful critters to have around.

73, Pete, KA3RFE

KA3RFE@KA3RFE.MD.USA

```
MSG # TR  SIZE TO      FROM    @BBS  DATE    TITLE
 5835 B# 2602 ALL    KA3RFE MDCBBS 910220 Att: New Packeteers pt 14
Forwarding path: W3IWI WA3ZNW N2GTE WA7NTF KA3RFE
DIGIPEATERS AND NODES pt 3
```

Other features of nodes which make them very valuable, are their ability to operate on more than one frequency and "port" signals between them, and their ability to automatically route traffic from an originating node and a destination node many miles away.

There are many different types of nodes, and while they all do essentially the same things, there are differences in command structure and features, so I'm not going to go into commands used by nodes, except to say that they all have a "help" command, usually in the form of a question mark or "H".

The ability of a node to operate on different frequencies means that traffic can be sent to a station far away and not on the same channel. If, for example, you are a Novice, you can legally get into a BBS on

2 meters by connecting to a node on 220. Of course the node must either hear that BBS directly or hears another node which can hear the BBS...and you have to know the destination node to get there.

Nodes interconnect with each other. Its possible to connect to a node 2 or 3 hundred miles away, the traffic goes into what most people call "the network". Each node has a list in its memory of the stations it can hear directly, and those which it can hear via another node.

The garbage characters you see on the screen from time to time is a node telling other nodes on the frequency what it has available. Its possible, for example to connect to a node in Annapolis, MD and enter a connect request for a node in Richmond, VA on an entirely different frequency...all of which will be handled by the "network" based on the lists kept in each node.

One thing you must keep in mind, each "hop" over the network results in a time-bite...it takes time to get the frames through, and the more hops it has to take, the slower the flow of traffic.

If you want to connect to a distant node, you do not have to specify the routing, nor do you need to manually connect to each node which is in-between. All you need to do is tell the node to connect to the destination node (assuming it knows about it...) and the network will route the request to the destination node using the best path.

73, Pete, KA3RFE  
KA3RFE@KA3RFE.MD.USA

```
MSG # TR  SIZE TO      FROM  @BBS  DATE    TITLE
 5834 B# 2630 ALL   KA3RFE MDCBBS 910220 Att: New Packeteers pt 15
Forwarding path: W3IWI WA3ZNW N2GTE WA7NTF KA3RFE
LAST, BUT NOT LEAST...
```

Feedback from users and sysops has been taken into account for this last (for now) part of the series. Here are some final thoughts:

Instead of beaconing your personal mailbox, put a local bulletin on your "home BBS" telling everyone you're up. If you feel that you ABSOLUTELY have to beacon, no matter WHAT anyone else says: use the "beacon AFTER X" command instead of the "Beacon EVERY X". This will let you beacon without adding to the channel loading and congestion. (If you dont know what the difference is, you should read your tnc manual.)

Choose ONE "home BBS" and stick with it. Multiple "home BBS's" just make your mail go into a ping-pong circuit.

Dont play "BBS DX'ing". Dont use the nodes tables to see how far you can go on the network by trying to connect to a network BBS. Just about all BBSs have the same bulletins on hand, so going thru a bunch of nodes to reach a certain BBS is a waste of air time and a bad use of network resources.

Dont try to download a long file from a BBS during peak traffic times. ( about 2100-2300)

Make sure you use the correct Hierarchical-routing designator when addressing mail to an out-of-state BBS. (.#local.State.National, and make sure the periods are there!)

Use the right bulletin header when sending bulletins. Keep in mind your intended target audience. Dont send club meeting announcements, novice class notices, hamfest information, and other items of stricly local interest via @USA or @ALLUS.

Make absolutely certain that your message is legal. Its been suggested by some sysops that your only quarentee of "legalness" is to keep your bulletins STRICTLY AMATUER-RADIO RELATED! A bunch of sysops got into hot water with the FCC over a bulletin sent by a now-imfamous user which had absolutely nothing whatsoever to do with Ham Radio.

Last of all: HAVE FUN! I hope these messages have been helpful to you. If you have any questions, feel free to send them to me. If I dont know the answer right away, I'll get it from somewhere ASAP. There are lots more areas I could cover, but this series was intended to get you up and running with basic packet.

73, Pete KA3RFE @ KA3RFE.MD.USA.NOAM





Subject: List of Ham Radio Related BBS's

The following is a list of some telephone BBSs that support Amateur Radio. Some of these are strictly for hams, while others support special interest groups for hams or have radio-related files or message sections.

Due to the increasing size of the list, it will only be distributed on the packet networks once or twice each year as a multipart bulletin. If you do not receive the complete list, please obtain it from one of the following sources; duplicate copies cannot be sent out on the packet networks.

Internet: wsmr-simtel20.army.mil - PD8:<MISC.HAMRADIO>HAMPHONE.92  
wuarhive.wustl.edu - /pub/hamphone.92.Z  
Phone BBS: K4NGC BBS (703) 680-5970 - HAMPHONE.92  
WB2COY BBS (914) 485-3393 - HAMPHONE.92  
Packet: KA2UGQ-4 BBS 145.01 MHz - GENERAL HAMPHONE.92

If you call a BBS on this list and find nothing to indicate it's relationship to Ham Radio or find that it has been disconnected, please let me know so I can archive it and clean up the list. I can't guarantee the accuracy of this list, but I do strive to keep it as up-to-date as possible. Please send any updates, changes, or comments to me. 73, Tom Brown KA2UGQ.

Packet: ka2ugq@ka2ugq.nj.usa.na  
Internet: twb0@ns.cc.lehigh.edu UUCP: ..!uunet!ns.cc.lehigh.edu!twb0  
BITNET: twb0@lehigh.bitnet ICBM: 40 40' 47" N, 74 25' 03" W / FN20TQ

Verification status (symbol after phone number):  
'\*' = verified, '+' = busy when called, '?' = questionable, ' ' = unknown  
'.' = new/updated number (since 7/91 list)

'Speed' codes are as follows:  
3=300, 1=1200, 2=2400, 9=9600, 0=19200, 8=38400+  
T=9600-19200 baud (Telebit/Trailblazer/Ventel modem)  
U=US-Robotics HST 9600-38400 baud  
V=Hayes V-series 4800-9600 baud  
>=PC Pursuitable

Phone-Number Name	SysOp	Location	
Speed			
=====	=====	=====	=====
=====			
201-332-6098*Edgelight Online BBS	KB2BLE	Jersey City, NJ	12
201-385-1693*Radio CMBS	?	NJ	12
201-387-8898*ROSE Switch Support	(login:rats)	NJ	12
201-423-4258+Computer Nookery	?	NJ	
201-694-8122*Sonnet Center	Jim Sonnet	Mountain View, NJ	312
201-785-1830*The Meeting House	N2CZF	NJ	12
201-941-3302*B.F.W.K.	KB2JXK	Cliffside Park, NJ	1U
203-236-3761*Bruce's Bar & Grill	Bruce Lomansky	CT	
203-261-6434*Trumbull Mini	WA1QKS	Trumbull, CT	312

203-431-4687+Source of Magic	B&J Sanders	Ridgefield, CT	
203-438-9908*Orions Nebula	N1CUI	CT	12
203-563-6455*Hart-Metro Opus	?	Whethersfield, CT	
203-665-0090*ARRL Field Service	W1AW	Newington, CT	
203-735-9328 The Draconis Combine	?	CT	
203-753-8351*CoCo Byte	David Yale	Waterbury, CT	
203-846-3522*NORAD	Bill Hurlock	Norwalk, CT	U
203-865-6960*EarthStation 101	KA9CRG	New Haven, CT	U
203-888-8375+Dave's Bar & Grill	KA1TFB	CT	
204-785-8518*Bill's BBS	VE2UB	Canada	12
205-758-5017*The Bulletin Board	W4WYP/WD4DAT	AL	3
205-853-6144*Bham Sperry, 60M	Jack Efird	Birmingham, AL	12UV
205-988-4816?Superboard	?	AL	31
206-237-3472 Bears BBS	WM7O	WA	
206-355-1295*The Precedent	N7NIP	WA	12
206-566-1155*AmoCat BBS	Rich Langsford	Tacoma, WA	U
206-637-2398+Seattle Software Exc	LeRoy DeVries	Seattle, WA	U
206-767-3223+Amateur Radio Supply	WB7EWO/W7PV (6PM-9AM)	Seattle, WA	3
206-774-9566*Briar Patch	?	WA	12
207-495-2490*I.A.R.N.	K1MAN	Belgrade Lakes, ME	
212-380-3864*Atari BBS	K2BSM	NY	
212-645-2176*Metro CPU	?	NY	
212-781-4723*Friends	WB2RSI	New York, NY	312>
213-370-4113+Long Island RB	?	CA	
213-374-7929*PC Heaven BBS	N6XQU	Redondo Beach, CA	12
213-376-9567*Beach Cities	KB6MND	Redondo Beach, CA	
213-420-9327:The QED BBS	KC6SCN	CA	
31290			
213-541-2503*GFRN RCP/M	WB6YMH	Palos Verdes, CA	312
213-761-8284+Kenwood Radio Inc.	?	CA	
213-761-8292?Kenwood Radio Inc.	?	CA	
214-394-7325 Dallas Rem. Imaging	DRIG	Dallas, TX	
214-394-7438*Datalink BBS-AMSAT	N5ITU	Dallas, TX	319V
215-244-3916+32 Bit BBS	?	PA	
215-273*2606:The Tech Connection	KA3TFM	Honey Brook, PA	312
215-568-2137*LBARA bbs (login:lbara, password:hams)		Philadelphia, PA	12
215-584-1412*System-2	?	Norristown, PA	
215-678-9334*File Cabinet	?	PA	UV
215-827-7689?K3DSM BBS	K3DSM	Malvern, PA	
215-948-0593?K3DSM BBS (?)	K3DSM	Malvern, PA	
216-237-8208*NOARS BARF-80 BBS	KB8NW	Cleveland, OH	312
216-349-4515*Infoguide	Josef Stiene	Cleveland, OH	U>
216-526-9480*AMCOM	Bill Poissant	Cleveland, OH	?>
216-526-9481*AMCOM	Bill Poissant	Cleveland, OH	?>
216-526-9482*AMCOM	Bill Poissant	Cleveland, OH	U>
216-526-9485*AMCOM	Bill Poissant	Cleveland, OH	U>
216-526-9489*AMCOM	Bill Poissant	Cleveland, OH	UV>
216-526-9490*AMCOM	Bill Poissant	Cleveland, OH	?>
216-545-0093*Steel Valley Opus	?	Girard, OH	
216-661-9065*Comstar	Roger Dye	Cleveland, OH	U>
216-777-4569?Connections II	Ryan Wilkins	Cleveland, OH	?>
216-867-6984+Buckeye Hamshack	?	OH	
216-942-6382+Hamnet	WB8APD	Cleveland, OH	U>
216-942-7516*Hamnet	WB8APD	Cleveland, OH	V>
216-951-4287*Eastlake	Ken Bayko	Cleveland, OH	U>
301-272-5313*Aberdeen Interface	?	Aberdeen, MD	31
301-388-1517*Dead Zone	?	Baltimore, MD	

301-551-6517*KA3DXX Hamshack BBS	KA3DXX	MD	12
301-574-1984?Berkshire Board	?	Essex, MD	
301-590-9629*3 Winks RBBS	W3INK	Gaithersburg, MD	31
301-593-9067*PC-Ham BBS	G3ZCZ	MD	12
301-599-7651*Mad Faces BBS	Kim Wells	Upper Marlboro, MD	
301-604-1589+The Earthstation BBS	?	MD	
301-621-9669*Around & About	WA3TKW	MD	
301-645-7964?Diamond Jims	?	MD	
301-670-9621*3 Winks Fido	W3INK	Gaithersburg, MD	31
301-725-1072*F.C.C. PAL Hotline	FCC	MD	
301-831-5954*WJ3P Exchange	Lucas Spiros	Mt. Airy, MD	12
301-831-9012?Thundr Bay Trad Post	WA3ZLB	MD	
303-497-5000*NOAA (propagation +)	NOAA	Boulder, CO	
303-497-5042*NOAA 3 line rotary	NOAA	Boulder, CO	
303-534-4646*The Comm-Post	Brian Bartee	Denver, CO	9
303-972-9600*Microlink	?	Denver, CO	9
305-325-8709+Medical Software Exc	?	FL	
305-382-6687+Right Connections	N4LDG	Miami, FL	
305-822-4673?Miami Infomatics BBS	?	FL	
305-828-7909*Telcom Central Fido	?	FL	12
305-836-0463*Head Start Fido BBS	N4ETS	FL	12
306-586-1551*Polestar Opus	VE5EK	SK	312
312-776-5561*N9CSA Ham & Hobby	N9CSA	Chicago, IL	12
313-291-2520+Genesis II	WB8ZPN	MI	
313-482-4436+Somewhere In Time	KE8JY/N8KJL	Ypsilanti, MI	
313-546-7045+Air Studio Fido	KA8NCR	MI	
313-649-6213?Blue Water TBBS	?	Birmingham, MI	
313-759-6569*Royal Oak RCP/M	W8SDZ	Royal Oak, MI	31
313-879-7387:The Blalck Hole BBS	N8MAX	MI	
314-837-5422*Cindex Tech Support	KB0FMQ	Florissant, MO	12
314-965-0477*Cat Box BBS	?	MO	12
315-695-4070*Phoenix High School	?	NY	31
316-943-6030+Wichita BBS	KE0TV	Wichita, KS	
317-353-9981*Someplace BBS	Mike Shepard	Indianapolis, IN	12U
317-535-9097+SouthSide Fido BBS	KB9BVN	Indianapolis, IN	U
317-654-6555?The Friendly BBS	Jason Seabolt	Frankfort, IN	
317-882-4454*IBM-Net Connection	Rex Hawkins	Indianapolis, IN	U
317-882-5575+IBM-Net Connection	Rex Hawkins	Indianapolis, IN	U
318-443-0271*Amer. Silver Dollar	WB5ASD	LA	12
318-688-7078+NoChange #2	Mike Berry	Shreveport, LA	31
318-797-8310*Net 380 Host	?	LA	12
319-351-8783?Opus Board	?	Iowa City, IA	
319-393-4499*Cedar Valley Datanet	?	Cedar Rapids, IA	
319-432-6586?US Amateur TV Society?		Mechanicsville, IA	
319-582-3235*Electronic Cottage	KA0FDI/KA0JAW	IA	12
401-521-2931*Telecom Central	?	RI	12
402-289-4658*Aksarben ARC BBS	WB0QPP	Omaha, NE	312
402-421-1963+Southwest Lincoln	?	Lincoln, NE	
403-295-7088*The Cameo Fido BBS	VE6TAK	AB Canada	12
403-464-5069+Alta Packet Info Net	?	AB Canada	
404-320-6202*AV Sync BBS	?	Atlanta, GA	
404-355-5625*Visions	Kevin Pierce	Atlanta, GA	U
404-363-1640*Hams Bulletin Board	WA4CBT	Forest Park, GA	31
404-487-1376+Star Trek Connection	Eddie Ferguson	GA	U
404-491-6365?Flagship Express	KC4ME	Atlanta, GA	12
404-763-4369+Scan Atlanta BBS	Bill Scruggs	Atlanta, GA	312
404-834-9097?Commodore Msg. Ctr.	KB4EUX	Carrollton, GA	3

404-929-0800*Atlanta Connection	?	Atlanta, GA	
404-964-5277?Greyhound Opus	John Miller	GA	
407-269-5188*Tech Talk	?	FL	12
407-338-8486?PC Logic Wildcat BBS	W4NVC	FL	
407-649-9834?EABBS Media Board	?	Orlando, FL	
407-879-4823*PCLogic	W4NVC	FL	12
408-253-1309+Digikron Systems BBS	N6OYU	CA	
408-298-7464*PD Software Exchange	?	CA	
408-395-1402*Saratoga Clone	WA6LYZ/WD5ICZ	CA	12
408-667-2256*Freq Scan	Tim Ames	Big Sur, CA	
408-674-5048?Elmer II	WA6LMM	Greenfield, CA	31
408-683-0338*S2C2 BBS	?	San Martin, CA	312
408-866-4933?MAC Science Fido BBS	Ray Terry	Campbell, CA	
409-838-3761?Lamar University BBS	WB5VNX	Galveston, TX	3
410-625-0817*Amateur Radio BBS	WB3FFV (login:bbs)	Middle River, MD	1298
410-625-9482*Amateur Radio BBS	WB3FFV (login:bbs)	Middle River, MD	1298
410-625-9663*Amateur Radio BBS	WB3FFV (login:bbs)	Middle River, MD	1290
412-226-7357*KA3NVP BBS	KA3NVP	Lower Burrel, PA	12
412-266-5947*Bridger	Ambridge Schools	Ambridge, PA	
412-573-0537?Rad Board	?	PA	
412-766-0732*Blinklink	William Wilson	PA	
413-256-1037+Pioneer Valley PCUG	?	Amherst, MA	9
413-443-6313*VETLink #1	?	Pittsfield, MA	
413-967-9541*Quaboag Valley Xfer	Gary Reardon	Ware, MA	12
414-282-4181+Midwest Communicator	?	Milwaukee, WI	
414-543-0988+Milwaukee City ARES	WB9YSG	Mil. City, WI	3
414-548-9866*Milwaukee Heath UG	KA9TGN	Milwaukee, WI	12
414-738-1219*Applegate	?	Appleton, WI	12
415-481-0252?No_Name Fido RBBS	N6MON	CA	
415-574-3663*Toad Hall	J Thaddeus	San Carlos, CA	
415-595-2427+Toad Hall	J Thaddeus	San Carlos, CA	
415-651-4147*Sonshine	?	Fremont, CA	
415-659-9169+RSVP BBS	?	Fremont, CA	
415-943-6238+Diablo Valley PCUG	?	Walnut Creek, CA	
415-961-7250?BBS-JC	K6LLK	CA	312
416-431-6836?Connection	?	Toronto, ON Canada	
416-598-1934*Boards Galore	?	Canada	12
416-827-0704*Amateur Radio BBS	VE3RD	Oakville, ON Can.	12
416-882-5525+Dits & Bits	VE3OY	Toronto, ON Canada	
501-442-8777*TRS7 BBS	?	AR	
502-267-7422*Deckman's Exchange	N4VEH	Jeffersontown, KY	
503-239-4960*Experimenter's Anon.	?	OR	12
503-285-0378+MicroBits	?	OR	
503-286-3855*The Rose Fido	?	OR	12
503-296-4328?Dog House BBS	?	OR	
503-370-9739+Purgatory Fido BBS	?	OR	
504-273-3116+HelpNet Baton Rouge	W5KGG	Baton Rouge, LA	
507-281-1989?Medical Software Exc	?	FL	
508-385-3427*Salt Air BBS	KQ1K	Dennis, MA	12
508-429-1784*CUL-DE-SAC Fido BBS	WA1YDL	MA	12
508-481-7147?Waystar BBS	?	MA	
508-688-1348?Pleasant Valley BBS	KA1MGO	Methuen, MA	U
508-949-3590+The Ham Shack	Don Eklund	Webster, MA	
508-960-2226*W1FW WWIV BBS	W1FW	North Andover, MA	12
509-276-6431*Touchstone	Susan Waters	WA	
509-534-6866?ANARC BBS	?	Spokane, WA	12
512-258-5528 Boardwalk Ham'n&Jam'n?		TX	

512-323-9111	Mind's Eye Fido BBS	?	TX	
512-359-1748	Electronic Avenue	KA5THB	TX	
512-444-1052*	Antenna Farm Fido	WD5HLS	Austin, TX	312
512-444-9908	Health Link Fido	KB5IN	Austin, TX	
512-653-7697	UCOM Premium BBS	Tom Cunha	San Antonio, TX	312
512-827-1025	The 128 PC Fido BBS	?	TX	
512-837-0953	Jimnet BBS	WA5VLZ?	Austin, TX	
513-253-2017	Ham Shack	Dave Shard	Kettering, OH	
513-258-0971	Traders Cove	Bill Kahler	Dayton, OH	U
513-547-3313	Light in the Darke	WA8RUO	OH	
513-548-5128	Light in the Darke	John Desmond	OH	
513-762-1115	KIC Fido BBS	N8KTW/K8CO/KA8AWY	OH	
513-777-1234	PME-FIDO BBS	WB8BFW	OH	
513-851-6454	Melnibonean Manor	?	OH	
515-961-3325*	W0RPK AMSAT BBS	W0RPK	Indianola, IA	312
516-226-3989	ICS Computing	Greg Carman	Long Island, NY	2
516-293-2283	Radio Electronics BB	R.E. Magazine	Farmingdale, NY	31
516-422-2215:	AfterImages "A"	N2MUO/N2NBZ	NY	312
516-561-6590	LICA LIMBS	WA2EXP	Long Island, NY	319
516-581-1896*	Ham Radio Sell. Post	Lenny Buonaiuto	Long Island, NY	31
516-661-3643	No Frills+ (SSARC)	WB2VOZ/KB2UR/K2TV	Long Island, NY	312
516-862-8764	Datalink BBS	KB2KUR	St. James, NY	312
518-374-5298	Radio Freq's	?	Latham, NY	
519-578-9314	Kitchner Waterloo AR	VE3MTS	Kitchener, ON Can.	
519-660-1442*	VE3GYQ BBS	VE3GYQ	London, ON Canada	312
601-896-3970	On-Line Systems	Rich Maddox/KF5MQ	Gulfport, MS	129
602-235-9653	Health Info-Com Net	(Usenet port)	Scottsdale, AZ	
602-495-1797	Neighborhood Net	KB7DJE	AZ	
602-742-1551	Bit Bucket	?	Tuscon, AZ	
602-991-5952	QRZ	AA7BQ	Scottsdale, AZ	
603-424-0923	VaxCat	Mark Buda	Merrimack, NH	
603-424-5497*	Stateline BBS	Bob Wescott	Merrimack, NH	31
603-525-4438	73 Magazine	KW1O	Peterborough, NH	
603-547-6485	InterVisioN	?	Francestown, NH	
603-783-4239	Info Biz	?	Canterbury, NH	
603-883-4466	The Legal Beagle	K1TCD	Nashua, NH	
603-888-6999	Access-80	?	Nashua, NH	3
603-924-9809+	73 Magazine	KW1O	Peterborough, NH	31
604-764-4672	The Grapevine Fido	?	BC Canada	
607-777-4333:	N2LZM BBS	N2LZM	Binghamton, NY	3129
607-777-4866:	N2LZM BBS	N2LZM	Binghamton, NY	3129
607-777-2821:	N2LZM BBS	N2LZM (request:bb)	Binghamton, NY	3129
609-652-4914	Stockton State Col	Tom McNally	Pomona, NJ	
609-652-4923	Stockton State Col	Tom McNally	Pomona, NJ	U
609-663-8203:	Masters Inn II	?	NJ	
609-667-5652:	Liberty Bell	?	NJ	
609-693-8849	Jersey Shore BBS	W2FJC	NJ	31
609-751-3847:	Memory Link	?	NJ	
609-859-1910*	Pinelands Fido RBBS	W2XQ	Vincentown, NJ	312
609-893-2152	Jersey Devil Citadel	K2NE	NJ	
609-894-4366*	N2EHM BBS	N2EHM	Pemberton, NJ	31
612-291-0567	Digital Newsletter	K0TG	St. Paul, MN	31
612-377-3469	PC Info Exchange	?	Minneapolis, MN	
612-426-0000	Digital Newsletter	K0TG	St. Paul, MN	
612-431-1149	HR Commodore Clique	WA0CQG	Apple Valley, MN	31
612-432-5348	TCRC Ham Radio Lib.	W0BU (TCRC)	Apple Valley, MN	
612-490-1187	Nick's Nest	Don Seiford	Vadnais Hills, MN	

612-571-6280	The Computer Lab	N0JVD	MN	
612-920-L5MN	NASA/ESA press rels.	L5 Society	Minneapolis, MN	312
613-542-9901	Dits & Bits	?	Kingston, ON Can.	
613-564-5672	Carleton U Opus	?	Ottawa, Canada	
614-267-5441	Hot CoCo BBS	?	Columbus, OH	
614-279-2327	Scientific Columbus	David Hinerman	Columbus, OH	
614-294-5314	MARDUK II	?	OH	
614-294-5336	Cross-fire Fido BBS	?	OH	
614-351-2274	South Parking Lot	?	OH	
614-457-4227?	Ham BBS (HBBS)	N8EMR	Columbus, OH	12T
614-895-2553+	Ham BBS (HBBS)	N8EMR	Columbus, OH	
614-927-3644	Alternative BBS	?	Columbus, OH	
615-443-2237	Lebanon Link Fido	N4SCT	TN	
615-690-5467	Volunteer	Ed Dial	Knoxville, TN	V
616-263-7454	ST Paradise	Steve Finzel	Traverse City, MI	
616-363-7360	The Edge	Kevin O'Malley	Grand Rapids, MI	
616-393-3262	Edge CBCS	?	Grand Rapids, MI	
616-457-1964	Consultant Connection	Daniel Wynalda	Jenison, MI	1T
616-457-9909	Consultant Connection	Daniel Wynalda	Jenison, MI	312
617-237-1511?	Wellesley BBS	Heath Users Club	Wellesley, MA	
617-277-5577	Jesse's BBS	Jesse Cheng	MA	
617-326-0259	Binex II	KB1S	Westwood, MA	
617-471-0542	Tom's BBS	KA1TOX	Wollaston, MA	
617-471-3009	Tom's Fido BBS	KA1TOX	Wollaston, MA	
617-545-6239	Garden Spot BBS	NS1N	Scituate, MA	
617-565-9136+	WB3ABN BBS	WB3ABN	Boston, MA	31
617-598-6646	Baystate BBS	Steve Ryback	Lynn, MA	
617-720-3600	Future Tech	Bud Napier	Boston, MA	
617-742-8822	K1HLZ BBS	K1HLZ	MA	
617-923-7605	MassHam BBS	K1OJH	MA	31
619-256-7250	The G3KFN Board	G3KFN	CA	
619-279-3921+	RADIOSPORT	WB6BDY	San Diego, CA	U
619-390-7328	Lakeside Wildcat!	N6CQW	CA	
619-549-3927	K3FWT BBS	K3FWT	San Diego, CA	
619-562-8758	Santee Experiment	Jim	El Cajon, CA	
619-692-1961:	AA6WS BBS	AA6WS	San Diego, CA	129U
701-746-4814	Shortwave Network	?	ND	
703-250-1837?	SMA Scanner BBS	?	VA	31
703-366-4299	Sparkie's Machine	KC4LWI	Roanoke, VA	U
703-435-0836+	Sterling Info Exch.	KF4GL	VA	3
703-528-7753	Longwave Database	?	Arlington, VA	
703-591-5744	Midnite Rider	Joe Reeves	VA	
703-648-1841	Virginia Connection	Tony McClenny	Reston, VA	U>
703-680-5970*	K4NGC Packet BBS	K4NGC (login:bbs)	Woodbridge, VA	
703-689-7156	KC3OL BBS	KC3OL	VA	
703-734-1387*	AMRAD BBS	K8MMO	McLean, VA	31
703-734-1796	Issue Dynamics Inc.	Sam Simon	Washington, DC	
703-791-6198*	Dos Spitzen Sparken	Dick Miller	Manassas, VA	31
707-545-0746	Sonoma Online	Don Kulha	Santa Rosa, CA	
708-234-8011+	Callbook BBS	Callbook Publishing	IL	31
708-394-0071?	Samson BBS	KB9DIP	Arlington Hts., IL	U>
708-491-2611	Chicago Business	?	Evanston, IL	
708-529-1586*	Elk Grove Repeater	(N9DKO?) G. Randles	Elk Grove, IL	U>
708-674-1638	Bill's PCBoard	William Knopp	Lincolnwood, IL	V>
708-790-0187+	Cope of Chicago	Steve Bonine	IL	
708-790-4688	The Generic BBS HST	?	Glen Ellyn, IL	
713-242-6041	KC5UP BBS	KC5UP	Houston, TX	312

713-280-8711	NASA Activities	NASA	Houston, TX	
713-483-2500*	Johnson Space Center	NASA (Enter#:62511)	TX	1
713-498-7996	Launch Pad	?	Houston, TX	
713-579-8979	Breakfast Club	Jimmy Vance	Katy, TX	
713-879-1448	ACOM II	Eddie Runner	Houston, TX	
713-937-9097	Broadcast Computer	David Armstrong	Houston, TX	V
713-955-7564	PCEVE	?	TX	
714-275-9094	N6KZB BBS	N6KZB	CA	312
714-636-2298	F.O.G.	Jim Ward	CA	
714-681-0731	Ham Radio West	John Warren	Riverside, CA	312
715-258-0986	Hamline	N9BKJ	WI	
716-544-1863*	RFCARC	WA2ZKD?	Rochester, NY	312U
716-694-0007	Real Programmers'	?	NY	
716-761-6460	Highland BBS	N2JYG	NY	
717-323-1645	Vaccumn Valley BBS	N3DQC	PA	
717-561-8145*	Tec Board BBS	KA3ADU	PA	
717-561-8150	Megaboard	?	PA	
717-876-0152	Northeast File Bank	Stuart Wilson	Jermyn, PA	U
718-268-2062	Apple Sauce BBS	?	NY	
718-268-3173	WB2SQM BBS	WB2SQM	NY	312
718-442-1056	New York Transfer	Bob Richards	Staten Island, NY	312
718-698-7875	Hamnet	?	New York, NY	31
718-761-5727*	Programmers Corner	David Snyder	Staten Island, NY	
719-390-5318	Colorado Springs BBS	WB0BLV	Co. Springs, CO	
719-637-1375	Dits & Bits	?	CO	
800-666-5698	The Idiot Box	?	CA	12U
800-766-1720	The Idiot Box	?	CA	12U
800-766-5698	The Idiot Box	?	CA	12U
800-866-5698	The Idiot Box	?	CA	12U
801-634-3655	The Mav Plus Fido BB	KB4YHB	UT	
803-650-9022	Periscope	Walt Mayo	Myrtle Beach, SC	
803-871-3076	The Byte Bucket BBS	N4PGN	Summerville, SC	3
803-871-3468	Tinbrain's BBS	?	Summerville, SC	3
804-249-8621	Diplomat BBS	?	Newport News, VA	
804-471-3360	Tidewater AR/CF	KF4GL	VA Beach, VA	U
804-550-3338	Flamethrower	Jeffrey Loughridge	Richmond, VA	U
804-591-0736	Felicia	?	VA	
804-622-9002	Tidewater Msg. Excg.	KA2YXH	VA	
804-796-6828	SCANVA	N4RVR	VA	
804-874-4698	Digit Technical BBS	K4UMI	VA	
804-930-9563	ODDX	WB8SCG	VA	
805-942-0329	Superbyte	NE6I	Lancaster, CA	3
805-947-4357	WB6FIU Fido BBS	WB6FIU	Palmdale, CA	312
805-967-0895	Compucations BBS	?	Santa Barbara, CA	
806-352-2482	The Radio Board	Ron Chase	Amarillo, TX	U
806-352-9365	The Radio Board	Ron Chase	Amarillo, TX	
807-345-3991	CITINET	?	Thunder Bay, ON	
808-533-0190	Small Biz Help Net	?	Honolulu, HI	
812-332-7227	Indiana On-Line	WB9LWQ/KC9HI	Bloomington, IN	312U
813-859-4800	DataLink	?	Lakeland, FL	
813-874-3078*	Pac-Comm, Inc. BBS	KC2FF/W1BEL	Tampa, FL	312
813-920-8820	Prof Data Exchange	K8WVH	Tampa, FL	U>
814-255-OPUS	Flood City's Opus	?	Johnstown, PA	
814-337-2021?	Magical Mystery Tour	Glenn Rudolph	Meadville, PA	U
816-241-1012	N0AJI BBS (a/c 314?)	N0AJI	St. Louis, MO	3
816-331-5868	Howard's Notebook	?	Raymore, MO	
816-331-7023	Online II Ham Radio	?	Belton, MO	3





011-046-05-8815	The Idiot Box	Switzerland	12U
011-0485-60368	?SSA Databus	Sweedan (?)	
011-1678-97018	The Idiot Box	Italy	12U
011-31-35-45395	*Radio Netherlands FIDO BBS	Hilversum, Holland	31
011-353-1-88-56-34	?Dublin Users BBS (Swdn Calling DX?)	Dublin, Ireland	312
011-44-707-52242	*RSGB Databox	United Kingdom	2
011-46-8-7564197	*Ham Systems Base	Stockholm, Sweeden	
011-46-8-7495826	?The Alley Cat	Stockholm, Sweeden	
011-47-2-267414	*The Ham Chat	Oslo, Norway	
011-47-34-59530	*Dasan BBS	Sandefjord, Norway	
011-478-6703	?B.E.S.T. (Mohamed Albatati)	Riyadh, Saudi Arabia	
011-54-1-51-9973	?Gateway (LU7ABF)	Buenos Aires, Arg.	
011-54-1-764-4189	*Telecom Net	Buenos Aires, Arg.	
011-06-022-8493	The Idiot Box	Netherlands	12U
011-0800-89-2698	The Idiot Box	United Kingdom	12U
011-8001-0656	The Idiot Box	Denmark	12U
011-852-0-459	?Hamnet Hub	Hong Kong	
011-852-0-581828	?HAMNET	Hong Kong	12
011-972-3-512-5396	Radio Amateurs Club (Shlomo Musaali)	Israel	312
011-972-4-378-299	The Miler House (4Z4RM)	Israel	12
011-9800-10143	The Idiot Box	Finland	12U

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Subject: ARRL Public Information Officer's Handbook

By Gene Pressler, W3ZXV

An ARRL Field Services Department Publication

#### ABOUT THE AUTHOR

Gene Pressler, W3ZXV, has been licensed since 1955. A newspaper reporter for some years early in his career, he is now retired as Senior Vice President/Human Resources for a major Pennsylvania bank.

Former president of several area radio clubs in southeastern Pennsylvania, he is currently President of the Telford Area Repeater Association (TARA) in suburban Philadelphia and a member of the Warminster Amateur Radio Club.

Gene Pressler is an Assistant Director for the ARRL Atlantic Division and Public Information Coordinator for the League's Eastern Pennsylvania Section.

He has been a contributor to the League's QST magazine and is the author of a number of articles and publications in his professional field.

#### TABLE OF CONTENTS

ONE	INTRODUCTION
TWO	THE ARRL PUBLIC INFORMATION OFFICER
THREE	THE MEDIA - AN OVERVIEW
	3.1 The Right Place
	3.2 The Right Time
	3.3 The Proper Form
	3.4 Needs of the Media
	3.5 Print Media
	3.6 Electronic Media
	3.7 Get To Know The Media
	QST reprint, "The Media Game"

FOUR	KNOWING AND USING YOUR RESOURCES
	4.1 Media Resources
	4.2 Amateur Radio Resources
FIVE	THE PRESS RELEASE
	Sample press releases
SIX	HOW TO HANDLE MEDIA INTERVIEWS
	6.1 Meeting The Press
	6.2 Damage Avoidance
SEVEN	GETTING YOUR NEWS PUBLISHED
	7.1 Preparation and Assessment
	7.2 Contacting Media Staff
EIGHT	HANDLING THE BIG STORY
	8.1 San Francisco Earthquake
	8.2 The Big Story In Your Backyard
	8.3 Guidelines
	8.4 Be Prepared
	8.5 News Gathering, the Media and Part 97
	8.6 ARRL On-The-Air Operating Guidelines
NINE	OTHER PUBLIC RELATIONS IDEAS
	9.1 Amateur Radio Public Awareness Day
	9.2 Club "Fact Sheet"
	9.3 Public Service Events
	9.4 Invite Local Officials To Field Day, Club Meetings
	9.5 Proclamations
	9.6 Recognition Awards
	9.7 Cable TV
	9.8 Other Organizations
	9.9 The Workplace

	9.10 Speakers Bureau
	9.11 Public Programs
TEN	RADIO AND TV
ELEVEN	ON RADIO AND TV TALK SHOWS
	11.1 Celebrities Only?
	11.2 Types Of Talk Shows
	11.3 How To Handle the Tough Interview
	11.4 How To Get Invited
	11.5 Conclusion
	11.6 Broadcast Industry Directories
TWELVE	WRITING FOR NON-HAM PUBLICATIONS
	12.1 Target Your Story To The Audience
	12.2 What Should and Shouldn't Be Included In Your Story
	12.3 Target Your Story To the Magazine
	12.4 How To Make Professional Submissions
	12.5 Article Ideas
THIRTEEN	WRITING LETTERS TO THE EDITOR

## Chapter One

### Introduction

You're proud of being an Amateur Radio operator, right? You recall how hard you worked to get there, aware of our proud record of technological development and public service. You feel sort of special, right? We all do.

And then what happens? Someone asks what kind of radio that is under your dashboard and you puff up and say, "I'm an Amateur Radio operator." How quickly do you deflate when that person responds with a blank stare or by confusing you with, say, a Citizens Band operator?

Have you ever introduced yourself as an Amateur Radio operator and had the other person respond by saying, "Oh, you're one of those people who messes up television reception."

Does your community have an emergency preparedness plan in place which doesn't include a role for Amateur Radio, probably because the people who planned it didn't know you existed?

How about that parade you watched downtown a while back? You know, the one you noticed really could have used radio as a means of helping its organizers coordinate its movements?

And did you ever call the local newspaper with what you thought to be a worthwhile story, only to find a deaf ear?

These are failures in the Amateur Radio community's public relations efforts, and, unfortunately, they are all too common. We need to correct those mistaken images and the way to do it is by improving the public's understanding of who we are and what we do. And we can do that best by doing what we do best, communicating. The problem is that we communicate mostly with ourselves and too little with the public.

This is what the American Radio Relay League's public information program is all about and the reason you chose to become a Public Information Officer or Coordinator. The purpose of this publication is to help you do the job.

## Chapter Two

### The Public Information Officer

Improving the public's understanding of Amateur Radio has to be an effort "from the grass roots up." Neither the League HQ nor any other body or group of individuals can do it alone. That's where you, the ARRL Public Information Officer (PIO) or Coordinator (PIC), come in.

By taking on the job of Public Information Officer, you've made a commitment to communicate Amateur Radio activities to the public. Grass roots public relations involves the regular and frequent publicizing of these activities through your local news media. But, even more than that, it should embrace a wide range of other activities including community service, school programs, presentations to local service clubs and organizations, exhibits and demonstrations and other efforts. The idea is to help improve the public's awareness of who we are and what we do and to create a positive image for Amateur Radio.

It's in our interest that we be perceived as performing vital public services, not just in times of communications emergencies but in our day to day activities: from training young people in electronics and communications to being good will ambassadors the world over. We don't want to be seen as troublesome nuisances or just as a group of people pursuing a little-known and slightly peculiar hobby interest. We have a public relations problem when the only times we are heard from is when we're protesting a restrictive antenna ordinance or are on the short end of an interference controversy.

You are not expected to do all of this by yourself, of course, but, as a Public Information Officer, you can and should be a critical part of this process and a key player in making it all work. Doing the job really well can be a great challenge, an exciting one and a source of great satisfaction.

The PIO qualifications are simple: you need to have (1)

the interest, (2) the ability to write simple declarative sentences and (3) membership in the League.

Following this chapter, you will find official ARRL job descriptions for the Public Information Coordinator and Officer positions. They contain additional, specific information on performance expectations and should be reviewed carefully.

## Chapter Three

### The Media -- An Overview

To be effective in your public relations efforts, you must get your message to the right place, at the right time, and in the proper form.

If any of these elements is missing, your message may not accomplish the desired results.

#### 3.1 The Right Place

If you are trying to publicize the election of officers at your local Amateur Radio club, for example, there is little point in sending a story about it to your local network-affiliated TV station because the station is unlikely to consider it as having enough significance. Try a community newspaper instead.

#### 3.2 The Right Time

Even if your story is one that does have substantial significance, there is usually no use in sending it after the actual event. By then, the opportunity for reportorial or photographic coverage (in cases where those may be appropriate) will have been lost. Get your story to the right place in a timely manner as set by the medium's own standards.

#### 3.3 The Proper Form

Always use the proper form for your submissions. For example, newspapers generally shun color photographs because they do not reproduce as well in that black and white medium. Unless you are really proficient with a camera, you are going to need all the edge you can get for a newspaper to consider your photos of high enough quality to use. So, the proper form for your submission of photographs is B & W film (except Polaroid, which is not of sufficient quality for this purpose).

Much of this may seem like common sense -- and it is -- but you would be surprised at how many times these basic considerations are overlooked. And, generally, when they are, it is at the cost of having the opportunity to tell your story lost.

There are guidelines for dealing with the needs of



various media which we will cover, but there are few hard and fast rules. For example, you might be considering how to approach a newspaper editor with a story. Should you make a request of him to send a reporter to cover an event or would it be better to send him a press release describing it? The truth is that some editors respond better to one approach while some prefer the other. Most editors will respond to either, however, depending upon how a particular story idea strikes him at the time.

Newspapers are generally considered to be print-oriented black and white news media but to stop there would be to sell them short. In addition to the news aspect, every newspaper has sections or articles devoted to things like neighborhood news, community events, feature articles and the like, some of it in color with handsome graphics.

If your article isn't big "front page news," don't be discouraged. Cast your story in a way so that the editor might find a place for it one of these other forums.

The story below appeared in a big metropolitan daily, The Philadelphia Inquirer. It is a homely story by "news" standards but it earned space in the newspaper's weekly Neighbors magazine which regularly carries a potpourri of local interest items like garden clubs, people, hobbies, women's groups, and civic activities.

#### HAM RADIO OPERATORS MARK DISCOVERY OF THE TELEGRAPH

-- MORRISTOWN, NJ (AP) -

About 30 ham radio operators gathered Sunday at the factory where Samuel F. B. Morse's telegraph was first publicly demonstrated to celebrate the 150th anniversary of the revolutionary technology.

Today is the anniversary of the day the telegraph sent the message, "Railroad cars just arrived, 345 passengers".

The ham radio operators sent a message around the world in Morse code and in voice to other hams to commemorate the occasion.

"Morse code is very important to ham operators," said Peter Glenn, one of the ham radio operators transmitting at Historic Speedwell, the 7.5-acre estate where Morse tested the telegraph.

Although it has been largely replaced by voice and data transmission, "Sometimes there may be times when the only type of message you can use is

one of Morse code," he said.

Those times include emergencies such as the Mexico City earthquake, when there is so much interference or the signals are so weak that Morse code is the only available form of communication.

The gathering of the ham radio operators was part of a year-long series of events to mark the telegraph's contribution to technological progress, said Sarah Haskins, executive director of Historic Speedwell, now a museum.

The museum formed a corporation to coordinate activities this year and, along with the New Jersey Commission on Science and Technology, was a co-sponsor of the weekend events, she said.

While Morse invented the telegraph, he was supported financially and technically by a Morristown family.

Alfred Vail, the son of a wealthy Morristown entrepreneur, was intrigued by a demonstration of Morse's telegraph and persuaded his father to invest \$2000 in the invention.

Ham radio operators Sunday celebrated the anniversary by transmitting this message: "We are commemorating the 150th anniversary of the first public demonstration of the electromagnetic ...

The point is that you should not be afraid to try to get your story across. Editors respond in different and very individual ways. What works in one instance may not work in another and there are no absolute, sure-fire answers.

There is really only one rule you should keep in mind and that is:

Not every effort you make will be rewarded with success but be sure to put your best into every effort you make.

### 3.4 Needs of The Media

Now that we have established that the footing here is a little spongy, what are some of the things we need to consider in getting our story out?

The media we are most likely to deal with include various print media such as newspapers and magazines, and electronic media, normally radio and TV. How do their needs differ and what do we need to know about those differences in order to deal with them effectively? Let's take a look at them, one at a time.

### 3.5 Print Media

This category actually includes quite a variety of slightly different printed media. You need to expand your thinking a bit to appreciate the array of options available.

Newspapers, for example, consist of a number of sections and cover everything from local to international news. Newspapers contain sports articles, feature stories, advertisements, want ads, editorials, letters to the editor, advice columns, "how-to" articles, obituaries, comics, puzzles, and more. Many of them, like The Philadelphia Inquirer mentioned above, contain supplements and magazine sections and publish Sunday editions.

The point is that newspapers are not monolithic wholes but consist of a great many parts, some of which present excellent opportunities for you to get your story in print in other than a straight "news" context, as discussed above.

The only item they have in common, of course, is that they all rely on the printed word. Because they do, you need to reduce your message to words, present it with a natural "angle" which makes it interesting and perhaps plan to supplement it with one or more photographs. Try to get your story there two or three days before the date when the event will actually occur.

### 3.6 Electronic Media

The electronic media are a lot more fickle. You should not plan to put all your efforts in one basket. Radio and TV stations work on schedules measured in seconds and a late-breaking, important news story can result in the need to cut out your most carefully-conceived and executed effort to get coverage of your story.

As with newspapers, you need to consider that the radio and TV media also consist of parts. Their news programs cover everything from international to local news and many "news" programs routinely include feature sections which present opportunities for covering a story on a local Amateur Radio event like Field Day. Some stations have "news magazines" which, like their print media cousins, offer similar opportunities. The advice on timing discussed in the print media section above, applies equally well to the electronic media, although here, because of the more cumbersome logistics involved in assigning camera crews, for example, two or three weeks' notice may work a lot better.

Editors tend to know a lot more about things like parades, bridge collapses, political campaigns, automobile collisions and the like than they do about Amateur Radio. Lace your efforts with some information educating them about

the basics of Amateur Radio.

In making your presentation, for example, you may want to supplement a Field Day story idea and request coverage with a good quality audio tape as possible background sound from the prior year's on-air operations to provide a "feel" for the event in the editor's mind. You could also consider adding "still" photographs to further help him visualize the story's potential and capture his imagination.

And, if you have not planned that far ahead, tape some current on-the-air activity and use that, along with some still photos of a few typical radio shacks.

### 3.7 Get To Know The Media

It is important to get to know the local media. If it is a newspaper, what sections offer the best opportunities for your story and, if it is a radio or TV station, where would a particular type of story "fit" best?

Try to think like an editor and, when you sit down to plan your approach, consider the "style" used in presenting similar pieces and try to cast your story in a similar mold. If you are calling an editor with a request for coverage, name similar stories you have seen him cover when you make your appeal.

The important thing to remember in considering the special needs of the media is not so much a set of rigid rules that should inhibit your efforts but that your target is pretty broad and can be approached from many different angles. With a little commonsense consideration of how the various media work, any of several possible approaches can be successful with the application of a little imaginative, intelligent and timely effort.

And, finally, remember the old adage, "Nothing ventured, nothing gained". Failure comes only from not trying.

We have been looking at the "big picture" in an overview of "public relations." As you can see, this covers a wide spectrum of means and techniques to communicate newsworthy things about your activities or your organization to others in our communities. It means developing an on-going relationship with various public media, including radio and TV and print publications up to magazines with wide readerships.

In the real world which nearly all of us inhabit, however, the possibility of our ever gaining access to the national media is both beyond our means and the intended purpose of this publication. That's a job for experts and not even they are always as successful as they would like to be.

Our actual possibilities are considerably more limited but the truth is that very few Amateur Radio organizations will ever even approach those limitations. Most of us, in fact, are not meeting the potential we do have and that is something on which we can realistically focus our efforts.

## Chapter Four

## Knowing and Using Your Resources

When a PR opportunity knocks, your immediate problem is to organize your resources quickly so that you will be able to use them and respond most effectively.

What do we mean by "resources"? What kinds are there and how do we use them? We need to think of resources on the Amateur Radio side as "sources" of information, while resources on the media side can carry that information for you to the public you want to reach. These media resources are the "purveyors" of news.

While your role may at times be that of a broker or middleman in the process of conveying information across from one side to the other, there are other times when you will yourself be the source of the story.

Let's look at the resources you have available to you as a public information specialist. How well you are able to use these resources will determine how effective you will be.

### 4.1 Media Resources

For most of us, learning the news business is not all that difficult. Most towns, except for the largest, have a local newspaper, possibly a radio station and maybe even a TV station. Getting to know who is who at each one is usually a simple matter of paying attention or making a phone call.

Newspapers list their editorial staffs on the editorial page. Individual reporters often have by-lines. Also, a simple phone call to the local radio or TV station will almost always produce this information easily. Unless you enjoy working under the handicap of a cold start, don't wait until a story hits to uncover that information and cultivate these resources whenever and however possible.

Picture yourself with a hot story, trying to explain it to an editor who has never heard of Amateur Radio. You will be expecting him to absorb a lot all at once and he is likely to think that it is all just too complicated and esoteric to catch his readers, listeners or viewers.

It is better to start earlier by feeding him articles whenever you can on more mundane things like the election of officers at your club, a ham flea market or an annual banquet. These will help open a channel of communication as well as establish yourself in his mind as a source of information. Then, when you need him, you will be able to call on a reservoir of knowledge and good will you have helped to build.

News people and editors are not strange gnomes hidden away in unapproachable recesses of their offices or studios. They cannot afford to be and, in fact, they probably need news sources like you more than you need them. Their livelihoods depend upon being able to tap knowledgeable and credible sources of information on a wide variety of subjects. The idea is to make yourself one!

What do you do if a reporter calls on you for information or even an interview? The answer probably

depends to some extent on the type of media involved and how much notice you get.

With a little notice, it is probably a good idea to prepare a statement or a press release in advance. This will give you a crutch to lean on during the interview and help channel your thinking, and the reporter's, so that you cover all the points you want to make. Reporters appreciate people who make their jobs easier by giving them handouts, especially on subjects about which they may have only an imperfect understanding.

If the reporter plans to bring along a photographer, he will usually tell you that in advance. If he does, dress for the occasion, clean up the shack or do whatever else is appropriate so that you will present yourself and Amateur Radio in the best light.

The same considerations apply to radio or TV coverage but the emphasis changes subtly. In radio for example, the focus is on voice timbre, vocabulary, elocution and the like, while on TV, personal appearance, expression and mannerisms are added dimensions.

Each is important and each should be considered carefully, even to the point of selecting spokespersons or settings whose images will be conveyed best in the particular medium.

The task of getting yourself known, and respected, is obviously simpler in a small town and it is not a bad idea to call at the local newspaper office to introduce yourself to the editor. Take along some information on Amateur Radio and explain what we do, who you are and the kind of activities you, your club or group conducts. Ask him for his support and how you can help him: He may tell you how he would prefer you to submit stories, what the paper's deadlines are and provide you with other information which could make both your jobs easier.

#### 4.2 Amateur Radio Resources

You need to develop your own resources, on the Amateur Radio side of things. This requires quite a bit of effort. Your experience and knowledge of other hams and clubs in the area will need to be tapped. A little attention here -- before an actual need arises -- can be a godsend when a story does break.

Years of experience do not necessarily invest any of us with all-encompassing knowledge. If a story were to develop involving packet radio, for instance, would your understanding be comprehensive enough to answer questions intelligently? If it is, how about other aspects of Amateur Radio such as UHF, space communications, DX or traffic handling? Could you speak with equal expertise on each?

Few of us are competent in all the diverse areas of Amateur Radio and, for that reason, you need to develop a list of resources available to you in covering the broad range of our interests.

There are a couple of ways to develop an "inventory" of experts. A good place to start is to prepare a list of subjects which you might be called on to cover. You can

proceed from there by trying to match each subject with the name of an individual who is expert in that area. At the same time, get the name of a backup to call on in case your first choice is not available. Develop a skills inventory list for members of your club.

Be sure to get telephone numbers and any other information you might need to work with your resource people so that you will be able to reach them on short notice. You may need quick access to your contacts at unpredictable times. Be ready.

Be sure to let the people you pick know that they are on your list of experts so they might be better prepared when a story develops and, just as importantly, to let them know of your interest.

Pick people who are knowledgeable, of course, but be mindful, too, that they may become spokespeople for Amateur Radio when a story breaks. Whenever possible, pick people who will be seen as articulate and responsible and who will be as agreeable-sounding and -appearing as possible.

Give some thought, too, to the settings used for your stories. Invite the media to meet with you at a well-organized, photogenic shack where the background is going to help you convey the image you want to project.

At first thought, it may seem that you cannot always control location but, even on a Field Day story, which is going to be set in whatever spot the group happens to have selected for the activity, there are a number of things you can do. You can clean up the site before the news people arrive, steer them to the best-looking setups and away from ones establishing new lows in unsafe wiring, which will probably show up with remarkable clarity in the background of any photos taken. (And clear out the beer cans, too. Same reason).

The whole idea here is to go about your task with as much prior preparation and as much professionalism as possible. The more work you do "up front," the easier it will be to react quickly and effectively when the need arises.

For most people, "meeting the press" is a stressful situation which is confronted seldomly in their lives and thorough preparation is a certain way to remove most of this stress from these encounters. If you can accomplish that, you will be able to deal more effectively with the opportunities presented and make the most of them. You will be shaping the reporting rather than simply being part of it.

## Chapter Five

### The Press Release

"Press Releases" are the most common ways of communicating information about our activities to the public and, fortunately, they are the easiest to master.

Newspapers are the most accessible of all the different types of media available to us; the best way to get your story into print in a newspaper is to do part or all of the

editor's work for him.

A newspaper's resources may be limited in the sense that reporters are not always available to cover every story. None are expert in every field of human endeavor. Particularly in cases like ours, where many of the stories are a bit esoteric, editors tire quickly of callers with lengthy explanations about their "news." Many also conclude quickly, perhaps too quickly, that if the story is all that complicated, the paper's readers will not be that interested.

News releases help solve these problems and, even more importantly, they help to assure that your story will be told the way you would like it to be told.

## 5.1 Structure

The press release consists of four parts: 1) the heading, 2) the opening sentence or paragraph, 3) the body of the story and, 4) the press contact.

The heading should simply communicate to the editor that the paper or papers he is holding constitute a press release, so the words, "Press Release" should appear right at the top of the first page. (Incidentally, whether you prepare your press release on plain paper, on a club letterhead or your personal stationery is not important).

You might follow that up with information on when it would be appropriate for the editor to use your release. Depending on the circumstances, you could say "For Immediate Release" or "For Release on (Date)."

It is not necessary but you might elect to give the press release a title which the editor might decide to use as the headline for your story, for example, "AMATEUR RADIO CLUB ELECTS OFFICERS".

The opening sentence or paragraph is the most important part of the press release because this is where you must catch the editor's (and the reader's) attention. Get this part right and the rest of the story will write itself. Let's give you an example and then work backwards to explain this:

"At its annual reorganization meeting on June 1 at the Hilton Fire House, the Hamrad Amateur Radio Club elects new officers for 1990-91."

This sets out the "meat" of the story and tells the reader what he can expect as he reads further. It tells "What," the annual meeting of the Hamrad club; "When," on June 1; and "Who," that it elected new officers.

In the opening as well as in the body of the story, you have to follow one of the most basic journalistic imperatives and that is to be sure your story covers the "Five W's" - Who, What, When, Where and Why. Some of these were covered in the opening of our story: The body of the story will deal with these in more detail. For example:

"The Hamrad club, comprising over 80 federally-licensed Amateur Radio operators in and around Amok County, elected



Mike Rochip, president; Farad Aye, vice president; Iona Sphere, treasurer; and Ann Tenna, secretary.

"All of the club's new officers are residents of Amok County and its members are active in the county American Red Cross disaster service.

"Incoming president Rochip said on Tuesday that he expects to continue the club's commitment to providing radio emergency communications to Red Cross".

In the first paragraph of our story, we name the Whos and Wheres while the second and third paragraphs elaborate and cover some of the Whys. The story covers the event - the club's election of officers - and provides an opportunity for us to tie in what happened with some human interest and public service angles.

Finally, the press contact is an easy but too often forgotten ending. [The contact can also be listed at the outset of the release]. It goes something like this:

"For Further Information, please contact Clark Kent, Hamrad Amateur Radio Club, 1234 Metropolis Street, Amok City. Telephone 555-5678."

The purpose, obviously, is to let the editor know whom he should contact for more information. A less well understood reason to include this information is so the editor will be able to check the authenticity of his source. Few editors will publish a story without being able to verify that the source of the story provided is reliable and that the information involved is accurate.

Well, there you have it, a complete how-to guide to writing a press release. As you can see, there is nothing mysterious about this, there are no skills you don't already have and it is all really pretty simple.

Now, take a look at the samples at the end of this chapter. They'll give you a head start on your own first release.

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(Sample release #13  
General interest  
Hams Honor Mayor

[The following is a type of release your club could use to highlight an award given to a city or emergency management official who, like our fictional mayor, has done something noteworthy deserving of recognition by your group. This news release could be expanded upon by mentioning other amateur organizations such as RACES or ARES, which may have been active in the flood emergency, individual members who contributed, or more background on the club itself.]

For Immediate Release

HAM OPERATORS HONOR AMOK CITY MAYOR

Mayor Lamont Cranston was honored this week by area Amateur Radio operators for his recent unveiling of the Amok City Disaster Plan.

City council adopted the plan at its meeting last month. The plan provides for the mobilization of various Amok City emergency service organizations in the event of a natural disaster.

Mayor Cranston's initiative in forming and leading a task force which led to the adoption of the plan was sparked by last year's flood. Occurring last May 11-12, the flood caused extensive damage in the Witch Hazel section of town along the Amok River.

The mayor received a framed certificate of appreciation from members of the Hamrad Amateur Radio Club at a meeting on Tuesday at the Hilton Fire House on Arson street. The club is made up of over 80 federally-licensed Amateur Radio operators in the city and surrounding Amok county.

In presenting the certificate to the mayor, club president Mike Rochip noted, "We should be better prepared to deal with future disasters now that we have a plan in place to deal with them.

"We thank Mayor Lamont Cranston for supporting these efforts and for his leadership", Rochip continued. "His active support helped produce this plan in a much shorter time than expected."

The Amok City Disaster Plan provides for the coordination of the community's emergency facilities and organizations including city officials; fire, police and rescue organizations; Amok Memorial Hospital; and others which might be needed to cope with a disaster.

Mayor Cranston used the opportunity on Tuesday to thank Rochip and other members of the Hamrad radio club who aided during the flood emergency.

"Amateur radio operators provided us with the only communications we had with the stricken area for several days when the telephone company's central office was damaged by rising waters from the river," Mayor Cranston said, "and the Hamrad radio club plays an important role in our emergency preparedness plan".

FOR FURTHER INFORMATION, please contact:

Clark Kent  
Hamrad Amateur Radio Club  
1234 Metropolis Street  
Amok City

Telephone: 555-5678

(Sample release #14  
General interest  
Field Day

[This Field Day event has a little different "twist" than most since it contains an invitation for the public to attend. In addition to the fact that this increases the possibility that the newspaper will be interested in covering this story, the invitation turns the event into one where there is an opportunity to inform members of the community about the club's role in its emergency management plans. It's an added opportunity to make friends for Amateur Radio.]

For Release On or Before June 20

#### AMATEUR RADIO OPERATORS TO DEMONSTRATE SKILLS

Amateur radio operators will be gathering at the Amok County Fair Grounds on Saturday morning, June 22, for their annual Field Day exercise. Part of a nationwide emergency preparedness exercise in which the local radio enthusiasts will be participating, members of the Hamrad Amateur Radio Club have invited local residents to drop in on the event and witness some of their unique activities this weekend.

Club members will begin early Saturday morning to erect temporary antennas, two-way radio stations and portable electric generators to power their equipment. That afternoon they will begin participating in this national drill to test their ability to provide radio communications under emergency conditions.

The Hamrad club is associated with the Amok County American Red Cross Chapter and has been assigned the role of providing emergency communications in the event of a natural disaster. Last May, when a destructive tornado struck in the Bumbleville area of Plodder county, members of the Hamrad club supplied communications into and out of the area for several days until regular telephone service could be restored.

The Field Day exercise emphasizes the Amateur Radio operators' ability to set up and operate their equipment in a minimum amount of time and operate from batteries or portable generators. During the 24-hour period of the test the five "ham" stations which will be operated by the club will contact other Field Day stations operating all across the country. Last year, the Hamrad club made contact with over 9,000 other stations.

Club president Mike Rochip suggested that members of the public interested in learning more about Amateur Radio and this weekend's activity stop at the fair grounds after 2 pm on Saturday or before the same time on Sunday afternoon while the stations are actually operating.

Members of the club will be available to explain more about the event and a special tent will be set up to welcome visitors. Rick O'Shay, 333 Main street, Amok City, will be in charge of the Amateur Radio event at the fair grounds this weekend. Nationally, the Field Day exercise is being sponsored by the American Radio Relay League, a national association of Amateur Radio operators located in Newington, CT.

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(Sample release #15  
General interest  
Feature story)

[This is an example of a "feature" story highlighting, in this case, a husband and wife team who share a common interest in Amateur Radio. There are many other story ideas which could be developed as newspaper feature articles. You could either submit your idea as a press release or suggest it as a feature story possibility to the editor of your local paper. In many cases, the editor will want to include photos as part of his newspaper's coverage of the story. It may not be necessary to remind you of this but be sure to get permission for the story from the subject or subjects of your story before you submit it.]

For Release As Needed

Popular Amok high school teachers Nick and Nora Charles share a number of common interests. On Saturday afternoons each fall Mr. Charles can be found coaching the Amok "Scapegoats" football team at Amok stadium while Mrs. Charles is nearby leading the school's marching band.

Last year the team had a 3 and 8 record in the Independence football division while the band placed third in the state championships held last November in Bumbleville. Nick and Nora Charles were there.

During the off-seasons, Mr. Charles teaches civics while Mrs. Charles heads up the school's music program. Both graduated from the Amok City high school before moving on to their college studies at the state university.

Mr. Charles graduated in 1980, Mrs. Charles in 1981. Mrs. Charles later returned to earn her M. A. degree in Musicology in 1984.

While the couple share their interests in teaching and their jobs compliment each other's, especially during football season, their shared interests go beyond that to a common interest in the same hobby.

Mr. Charles became a licensed Amateur Radio operator while still in high school. After they met and married, Mrs. Charles became interested as well and she received her Federal Communications Commission radio license in 1984.

"We both lead pretty active lives," Mrs. Charles says, "But we always find time in them for ham radio. Nick and I both have transmitters in our cars and it's a good way to keep in touch when one or the other of us is on the road".

The Charles' home on Weaver street near Bumbleville pike is distinguished by several unusual-looking antennas. One, a 45-foot steel tower in the back yard, provides support for a large rotatable antenna structure which the couple uses to talk to other Amateur Radio stations around the world.

Nick and Nora Charles can often be found inside the house in their "radio shack," a fully-equipped Amateur Radio station, where they operate. The walls of their converted den are covered with the "QSL cards" which Amateur Radio operators trade with each other as proof of the fact that a contact between them has been made.

The Charles' collection includes contact confirmations with such exotic places as the South Pole, Sri Lanka, China, Mozambique and the Soloman Islands.

"Since I teach civics", Mr. Charles reflects, "It is very interesting for me to be able to talk to people in other countries, people with different cultures, languages and backgrounds. And I am usually able to work some of the perspectives I gain into my classes."

For Mrs. Charles, she says, "I may not be able to use much of what I learn into my school work but it's helping me prepare a list of places Nick and I would like to visit when we retire one day."

Mr. and Mrs. Charles are both members of Amok City's Hamrad Amateur Radio Club. The couple worked side by side in Bumbleville following last year's tornado, which disrupted telephone communications for several days in that city. They relayed messages for the Amok County American Red Cross Chapter to help with the relief efforts.

FOR FURTHER INFORMATION, please contact:

Clark Kent  
Hamrad Amateur Radio Club  
1234 Metropolis Street  
Amok City

Telephone: 555-5678

Chapter Six

How To Handle Media Interviews

The press release is a great tool, but some reporters, and some stories, will require face-to-face or telephone interviews. When there are several reporters or several types of media involved, this becomes a "press conference."

Again, you need to be as well prepared as possible. Preparation, depending on how much advance notice you get, should include writing a press release, a statement or at least some written notes as a "crutch" to use during the interview. (Having on hand some ARRL literature or descriptive material explaining the organization you represent may help, too). A press release is also something the reporter can walk away with and use later when he's writing his story. If you have done your job well when you put it together, it will contain the points you want to make and increase the probability that the reporter will include them in his final story.

### 6.1 Meeting The Press

When you meet with the press, you should try quickly to evaluate the reporter. How much does this person know about Amateur Radio? About the event or situation you are talking

about? What is the reporter's agenda or, in other words, what preconceived notions does he bring with him to the interview? And are those correct notions?

Next, listen to the questions you are asked, make sure you understand them and then answer carefully and thoughtfully.

There are different types of questions and there are different ways of answering them. If you are lucky, the questions you get will be simple, straightforward and aimed at the right target. There are also poor questions which are wide of the mark. In these cases, try to help the reporter rechannel them into intelligent, useful or constructive veins by your answers and explanations.

If you don't understand what the reporter is getting at, try something like, "As I understand it, you are asking..." and then repeat or paraphrase the question until you get it right.

Watch the reporter's "body English," eye movements and expressions for signs that your answers may not be getting through. Take a little more time and provide a little more information until you are certain your message gets there in the way you intended.

Avoid one-word answers: They make lousy quotes and leave you open to the reporter's misinterpretation. He may think he's asking one question while you may be answering the one you think he's asking. Did you ever hear the one that goes...

"I know you believe you understand what you think I said but I'm not sure you realize that what you think you heard is not what I meant."

Remember that your interviewer probably doesn't know very much about radio or about our Amateur Radio activities. You will be lucky indeed if he knows that electrons were responsible for having heated his morning muffin in the microwave oven. And, if he knew as much as you know about the situation you are discussing, there would be no need for him to talk to you at all.

And make sure you don't take off on windy and complex explanations or lapse into ham radio jargon or technical dissertations over everyone's head except another amateur's.

Do try to control the direction of the interview by staying focused on the subject.

You actually have a big advantage here and you should use it. After all, you know the subject; your interviewer probably does not. Because he's groping his way through unfamiliar territory, you can probably lead him pretty easily in the direction you want by your informed statements and knowledgeable replies to the questions asked.

## 6.2 Damage Avoidance

If you don't know the answer to a question, don't be afraid to say so. It is a lot better to do that than it is to blunder into sheer guesswork or a wrong response. If it

is appropriate, refer the reporter to someone who may have the answer or offer to try to get the information needed.

Whatever happens, don't "lose your cool". There is no provocation, no situation or circumstance in which you can afford to be rude, arrogant or offensive in your handling of the media. They, after all, have the last word...and it will be in print or on the air.

Do not present your own personal opinion in such a way that it might be interpreted as an official ARRL position or the position of your club or organization. Know how the policies of these organizations are formulated. When you think something you say might be interpreted that way, qualify what you say with "In my personal opinion..." or, better yet, avoid expressing them at all. If you feel yourself getting in over your head, dummy up until you can get some help or guidance from your Section Manager, Public Information Coordinator or organization leaders.

Statements critical of other persons or organizations can cause real grief, whether or not they happen to be true. They may damage hard won reputations, undo someone else's hard work and cause irreversible damage. They could even lead to a law suit or other such nastiness. If you feel tempted, run for the nearest exit.

If you find yourself giving credit, make sure all the organizations or individuals involved are included. Don't risk offending someone through oversight.

Expect that, no matter how good a job you have done, there will be no shortage of people ready to find fault. Just do the best job you can and develop a thick hide.

## Chapter Seven

### Getting Your News Published

Earlier, we considered the nuts and bolts issues of preparing press releases. How can you be sure they will actually be published?

#### 7.1 Preparation and Assessment

The answer depends on how well you do your homework and, strangely enough, to some extent on where you live. A small town paper will probably be grateful for anything you send in and the chances are excellent that most of your articles will be used. The larger the town, however, the more difficult it will be for its newspaper's editor to see your items as "news"... unless they are actually news.

Let's take these two situations separately.

First, small town papers focus on local people and events which generally are not of sufficient interest to be considered news by a larger city's newspaper editor. As a consequence, in a small town paper, events like a club meeting or an election of radio club officers will probably appear in print.

Newspapers in larger towns, depending on how much larger, may be interested in an announcement of your club's election but, almost certainly, a meeting announcement will

likely find its way into the editor's "round file." There are just too many organizations vying for attention in larger towns and, because the editor cannot accommodate them all, he will use that type of article for only the most newsworthy community activities -- and then, usually, only after the fact if the outcome of the meeting is considered newsworthy.

All is not lost, however. With a little thought and some patient salesmanship, larger papers can be interested, for example, in feature articles such as a story about a Field Day exercise.

Newspaper editors respond first to news but they have other "hot buttons" which can be pressed. Human interest stories have a high degree of potential: A blind ham, someone who participated in a communications emergency, or one who performed some sort of unique public service are all good stories. These are all possibilities to consider and explore.

Your club may have among its members a "ham family," one where several of its members are Amateur Radio operators. One of your members or perhaps your club as a group did something that would get an editor's juices flowing because of some human interest angle. You need to think about what those possibilities are in your particular case and try to get them into print.

Study your local newspaper. One large daily, located in one of the country's major metropolitan areas, publishes a weekly "Neighbors" newsmagazine. A regionalized newspaper supplement, this is aimed at local happenings. Articles appear there from time to time on amateur events and individual amateur activities and this is the very type of thing on which you can focus your efforts.

In a smaller suburban home town paper, there may be a column on "Community Happenings" and, while your club meeting announcements may not get a rise out of the editor for his general coverage space, press releases directed at the "Community Happenings" section usually end up with meetings being announced.

## 7.2 Contacting Media Staff

Newspapers are really rather individual and the best suggestion, as we said before, is to do your homework. Study the contents of your local paper and take careful aim at the most likely targets, depending on the story you are trying to get across. Think like a newspaper editor.

If you take a little time to study it, you will find your local newspaper is a gold mine of information -- about itself -- and the people who put the paper together.

Check the editorial page: In most cases that is where you will find a box listing the names of the publisher, the managing editor and editors of the newspaper's various sections or features.

Most people, and most newspaper editors, too, react more favorably to well-directed personal approaches. Try sending your press releases to a specific individual rather than "To the Editor, Amok County Gazette."



Especially if you live in a small town, you might poll your friends and other club members to ask if any of them personally know the editor or any of his key staff members. You may be able to use that information to get yourself known and raise the probability of getting your stories published.

The important things to remember are patience, persistence and the will to try again when one of your efforts fails.

## Chapter Eight

### Handling The Big Story

If you have read this far you should be pretty well prepared to handle routine, small-scale stories. But what about the BIG stories that come along once in a while, like a hurricane, earthquake or other major disaster?

If you have developed the recognition we have been advocating in this book, you should be expecting a call from the news media, asking for the Amateur Radio perspective on events. What do you do then? Well, first and foremost, don't panic. You are probably better prepared for this than you think.

#### 8.1 San Francisco Earthquake

Let's talk about a couple of possible scenarios and consider first an event occurring remote from your own area. In the 1989 San Francisco earthquake, for example, local newspapers all across the country reacted exactly as you would expect them to, by looking for local tie-ins to this major national news story.

As far away as on the east coast, reporters scoured their sources for these local tie-ins. The idea, of course, is logical from the media's point of view. You are a source of a little local spin on the event. You might have received a call from a reporter, probing for that kind of information. What do you do then?

The reporter probably imagines that, when an event like that occurs, Amateur Radio operators across the country fire up their rigs and begin communicating with the stricken area. You know that's not the way it happens. The reporter also probably assumes that health and welfare messages are a high priority but you know they are not and that, to an area caught up in an actual disaster, they are just clutter that may get in the way of saving lives and property.

The reporter's purpose in these circumstances is not to give free column space or air time to Amateur Radio. The story line he has in mind is probably something like, "tearful relatives wait for word by ham radio about the fate of former area resident living in the stricken area."

Explain the facts to the reporter, nicely. You could tell him that local amateurs are following the event closely by listening in on communications activity in the affected area to see if any help is needed. Then, go on to explain something about the role of local Amateur Radio. Tell him

that local amateurs may become active in health and welfare or other types of message traffic once the crisis stage has passed and that you will call him back if you should learn of any newsworthy activity between your area and the affected one. Then follow through on that promise by checking your own sources over the next few days or weeks to see if anything of interest is actually happening.

## 8.2 The Big Story In Your Backyard

What if the story involves your own area? A disaster striking in your own backyard is a whole different matter. For one thing, you can count on a call from the local media, looking for information.

This is where having already done your homework is really going to become critical. Hopefully, in such an event, you will already be known to your area's amateur and public emergency service groups and, just as importantly, they will know who you are.

In these situations you need to understand thoroughly the emergency communications facilities operating in your area. Hopefully, you are already participating in RACES, ARES and/or NTS activities and able to explain, in simple terms, what amateur operators are doing in support of government and relief organizations in the affected area. You need to set and follow your own agenda in these matters, not the media's. Don't allow yourself to get wrapped up in the media's agenda. You should know what's right, what it is you want the media to say about amateur activity and then try to steer it along that line.

You should be aware that in these kinds of dynamic situations, roles may shift far from the norms you are accustomed to or are prepared to deal with. Chaos to a greater or lesser extent is an inseparable companion to any serious disaster. Sometimes there are changes in roles and relationships which occur unpredictably, sometimes subtly and sometimes graphically. Be prepared to roll along with events: Things are unlikely to occur just the way you might have imagined beforehand.

Your role in an emergency may shift from your usual one as a news source to that of a news coordinator or liaison between the media and Amateur Radio communications organizations. Depending on the exact role you usually play in your local ARES organization, you may or may not be in a position to actually speak for it in the circumstances in which you find yourself. Your role may be one of simply referring the news media to the proper ARES official and perhaps helping by offering explanations which will help the reporter understand the group's operation. The ARES official becomes the source in this situation: your role in this case becomes that of a liaison.

## 8.3 Guidelines

We cannot anticipate every situation in which you might find yourself during an emergency but there are a few simple guidelines that should be universally applicable:

1. Move quickly to get on the scene once an emergency occurs. The more time you have to find out what's happening, the better prepared you will be to deal with the questions you might be asked.

2. Move slowly enough, once you get there, to be sure about anything you do say. Don't let a reporter lead you or your news source into saying something you didn't intend to say.

3. Know who you are speaking for. You may be the spokesperson for your local ARES group, for example, but not for the Red Cross Chapter with which you are closely working. Know where the boundaries are and recognize your limitations: If you are not the designated Red Cross spokesperson, don't presume to speak for it.

4. Check your facts. This may be the fourth on this more or less chronological list but it is really first in importance. Unconfirmed rumors abound in nearly every disaster situation and they spread with remarkable speed and persist with great tenacity. Become a tyrant with regard to facts; insist on confirming every bit of news and pass along only those you know to be true.

5. Check the rumors. Rumors may simply be facts reported early, before they can be properly confirmed. Check out each one until you can speak with authority to either dismiss those that prove to be unfounded or confirm those which prove to be true.

6. Know the limits of your authority. In the wake of Hurricane Hugo in 1989, one Amateur Radio operator's transmission from devastated St. Thomas in the Virgin Islands was rebroadcast on network TV demanding that the National Guard be activated to help stop looting. The looting turned out to be relatively minor but less clear was on whose authority, if anyone's, the amateur was acting? This type of request is clearly in the domain of civil authorities and not that of an individual Amateur Radio operator.

And, don't forget, Part 97 of the regulations has some things to say about the proper use of Amateur Radio in newsgathering situations. You are going to have to know what they are and keep these regulations in mind. (See discussion at end of chapter).

#### 8.4 Be Prepared

In sum, preparing for the unexpected is largely a matter of keeping your head and having done your homework well in advance of an actual need. Beyond that, there are no precise rules to follow and getting through a communications emergency is largely a matter of careful improvisation (the emphasis here is on both words). The care needed in your approach to these events will be a matter of foresight and self-discipline: Your ability to improvise on the scene will

be a product of your preparation before an actual event.

Have you ever watched someone throw a ball and then lean this way or that, trying to "steer" the ball on its way to the target? Bowlers, in particular, seem to do that a lot. It is the mark of an amateur athlete: Professionals don't do that. They know that, once the ball leaves their hand, no amount of "body English," eccentric gyrations or muttered oaths is going to affect the ball's trajectory. Similarly, once an emergency occurs, it is too late to get prepared. With some advance planning, you can affect your public relations box score.

The things that count in being prepared are your involvement in and understanding of Amateur Radio and disaster service organizations operating in your area. You need to know who they are, what their missions are and who the responsible officials are in each one. And they need this same information about you and the organization or organizations you represent.

Disasters are scary things and being on the front lines with a serious responsibility like yours can be a stressful experience. Advance preparation can soften the stress involved and help you function better when an event does occur.

#### 8.5 News Gathering, the Media and Part 97

You must not allow your amateur station to be used for any activity directly related to program production or news gathering for broadcast purposes. There is only one exception: You can transmit news information about an event if the following requirements are met: (1) the news information involves the immediate safety of life or individuals or the immediate protection of property; (2) the news information is directly related to the event; (3) the information can't be transmitted by any other means because normal communications systems have been disrupted or because there are no other communications systems available at the place where the information is originated; and (4) other means of communication could not be reasonably provided before or during the event.

FCC completed a sweeping review of the relationship between broadcasting and Amateur Radio in June 1985. A number of rules in both the Broadcast and Amateur services were modified or overturned altogether. One change was the elimination of the requirement that broadcasters obtain permission from amateurs to rebroadcast amateur signals: Such permission is no longer required, and broadcasters are no longer obligated to advise FCC that any such retransmission has occurred. This arises from Amateur Radio's exemption from the secrecy of communications provisions of Section 705 of the Communications Act of 1934, as amended. The FCC felt there was still sufficient protection against Amateur Radio stations being used for broadcast program production and news gathering.

#### 8.6 ARRL On-The-Air operating Guidelines

Face it, chances are that sooner or later your amateur activity may come to the attention of the media. For example, a local TV station may want to interview you at your station concerning the latest ham transmissions from a hurricane-devastated Caribbean island.

News reporters can be pushy, to say the least. To help you cope with one breathing heavily down your back, asking you to sell your soul (and license) for his evening edition, ARRL has come up with a set of guidelines to keep in the back of your mind when under the hot, bright camera lights:

- \* Amateur Radio operators may assist news media representatives in their efforts to gather information for relay to the public from areas where normal communications have been disrupted.

- \* Amateurs may ask questions of, or relay media questions to, amateurs in the emergency area. The responses may be electronically recorded by media representatives.

- \* Amateur Radio must not be used to assist the news media in gathering information when telephones or other commercial means of communication are available.

- \* Amateur Radio must not be used to facilitate the operation of any business.

- \* Amateur Radio operators should depend on their own judgement when dealing with the news media and when operating their station in the public interest, convenience and necessity.

## Chapter Nine

### Other Public Relations Ideas

Here are a few additional public relations tips you might try in getting your message through:

#### 9.1 Amateur Radio Public Awareness Day

To make the public more aware of the existence, purposes, and benefits of Amateur Radio, clubs and Field Organization members set up public displays across the nation, in schools, libraries, town halls, parks -- anywhere an imaginative group can think of -- on Amateur Radio Public Awareness Day. The special day is held each September on the third Saturday. Why September? It's a time when no other major Amateur Radio event is taking place. Schools are back in session, and clubs are looking for a good kick-off for their fall season. The weather is generally good enough for outdoor exhibits at fairs and town parks.

For a comprehensive tutorial on putting together a good exhibit, see the ARRL Special Events Communications Manual.

#### 9.2 Club "Fact Sheet"

If your club or organization doesn't already have one, prepare a brochure or "fact sheet" giving a little of its

history, describing its mission, listing its officers and outlining the programs and events it sponsors. This is a great handout to use when you meet with the press or with government and emergency management officials. It can also be a neat thing to use in recruiting or orienting new members.

Here's a sample:

#### HAMRAD AMATEUR RADIO CLUB

Would you enjoy a hobby that will last a lifetime? A hobby that will expand your horizons and challenge your intellect, one that will help you build lasting friendships at home and even around the world? Are you looking for ways to become involved in worthwhile community service?

Then we have something unique and exciting to offer.

#### WELCOME TO THE HAMRAD AMATEUR RADIO CLUB!

Amateur Radio is a challenging high-tech hobby offering service to the community, life-long opportunities for learning and the excitement of communicating with other Amateur Radio operators around the world. Amateur radio operators today can explore many different communications modes, including all the more familiar methods of voice, computer and Morse communication as well as more exotic techniques involving Amateur Radio television, earth-satellite and moon bounce communications.

The Hamrad Amateur Radio Club, founded in 1968, is a general interest radio club having over 125 members. Although membership is concentrated in the greater Amok City area, the club's members also come from many other areas in and around Amok County. While an Amateur Radio license is required for full voting membership in the club, unlicensed individuals are invited to join as associate members. The Hamrad club is affiliated with the American Radio Relay League, the national association of Amateur Radio operators.

MEETINGS are held on the second Wednesday of every month at 8 PM at the Hilton Fire House on Arson Road. Short business meetings are followed by regular programs of interest to Amateur Radio operators. Refreshments are served. Anyone with an interest in Amateur Radio is welcome to attend.

The club's service activities include public safety communications for the annual Amok County Firemen's Parade, cooperation with the county's American Red Cross Disaster Service and the operation of a weekly net to drill members to prepare for providing emergency communications in natural disasters such as the 1989 Amok River flood which devastated Bumbleville.

Other activities include an annual Field Day emergency communications exercise, a hamfest (an Amateur Radio flea market), an annual picnic, maintaining a repeater station serving amateurs in Amok County and conducting Amateur Radio licensing classes.

The club conducts 8-week licensing classes each quarter during the year. Qualified instructors and volunteer examiners certified by the American Radio Relay League administer periodic examinations leading to Federal Communications Commission licenses. Telephone Edgar Bergen, 555-6286, for the next class schedule.

For more information on the Hamrad Amateur Radio Club, or on Amateur Radio in general, write to Clark Kent, 1234 Metropolis Street, Amok City.

### 9.3 Public Service Events

Public events present unique settings for a "captive" audience to become more aware of Amateur Radio. They are ideal for attracting inquiries and promoting interest in our hobby.

After a club has committed to providing communications for an event, ask for support for the public information and public relations effort. Most every event sponsor is eager to help us promote Amateur Radio at their events.

Ask for space for a paragraph on Amateur Radio in the event brochure, program and Press Kit. Depending on the event and the circumstances, this can range from mere acknowledgment of Amateur Radio operators to a brief description of our hobby and contact information such as the ARRL (for the prospective ham mailing with list of local clubs, classes and exam sessions).

In most cases, it is better for the promotion of Amateur Radio to refer to the group "generically" as Amateur Radio Operators or Ham Radio rather than using your club or group name (if you have one). The idea is to get the words "Amateur Radio" or "Ham Radio" in front of the public eye as much as possible. The Wireless Association of Greater Norfolk County may be a super club but the name doesn't convey Amateur Radio to the general public.

Make your activity and participants visible! Position a station in a highly visible and well traveled (with regard to spectators and participants) location. The Net Control Station (when feasible) or an Information station with a LARGE sign or banner displaying Ham Radio or Amateur Radio is a good attention getter. You may find someone in your area or club who has one to loan or who can generate one with computer banner or sign programs.

Ask to have the Public Address Announcer make a few announcements regarding Amateur Radio. Have "prepared" copy to be read, thanking the amateurs for their participation and inviting people to get more information about Amateur Radio. You or one of your crew can hand this to the Public Address Announcer directly.

Ask for space on the event information table or for your own info table. Handouts can include: Address of ARRL for prospective Ham mailing, list of local clubs or classes, and a brochure describing Amateur Radio. You may want to collect names and addresses of interested persons and forward them to ARRL for the prospective ham mailing (using sign-up slips and a "bucket" or other methods).

Arrange for visible means of identifying each ham participant and station. Signs on mobile communications vehicles and caps with the words Ham Radio on them are excellent. The general public should be able to read these from a distance. Buttons, ribbons, vests, arm-bands, sashes and badges are also good, but in a crowded environment, baseball caps stand out well. Some event sponsors find it to their advantage to have the Hams easy to locate in a crowd and may provide reimbursement for such items. Ask them!

Do arrange for a press release of some sort to the local press and media before and after the event. Again, this is to get the words Amateur Radio in front of them. Who knows, you may find that someone wants to get more of the story on the Amateur Radio involvement at the event.

#### 9.4 Invite Local Officials To Field Day, Club Meetings

Adopt selected key government officials and invite them to attend a Field Day exercise or other activity where you can show off your capabilities. Invite them to a club meeting to talk to your members about the community's emergency planning.

Invite local emergency management officials to your meetings, too.

#### 9.5 Proclamations

If your club or organization has a significant anniversary like, "The Hamrad Amateur Radio Club's 25th year," ask the town fathers or even the state's chief executive to issue a proclamation commemorating the event. They are usually happy to oblige. Follow up with a press release. These are considered newsworthy events: Don't miss the opportunity.

Here's a sample of a proclamation recognizing Amateur Radio Public Awareness Day:

Arizona Recognizes Public Awareness Day

Here are the words of the August, 1990 proclamation of the Governor of the state of Arizona:

Office of the Governor

PROCLAMATION

\* AMATEUR RADIO AWARENESS DAY \*

WHEREAS, the American Radio Relay League, the backbone of Amateur Radio in the United States, has declared September 15 as "Amateur Radio Public Awareness Day"; and



WHEREAS, "ham radio operators" are often the first to get word out of an area hit by a hurricane, earthquake, or some other major disaster; and

WHEREAS, Amateur Radio organizations, in cooperation with those in public service, also provide much needed communications for local events such as the Multiple Sclerosis Best Dam Bike Ride, the Palo Verde Siren Tests and Evacuation Drills, the Phoenix Jaycees Rodeo of Rodeos Parade, and the March of Dimes Walk America event; and

WHEREAS, September 15 from 8 AM until 4 PM the Arizona Repeater Association, along with several other Amateur Radio organizations in our State, are planning a major show-and-tell operation for the public, the largest in the Phoenix area taking place at 16th Street and Indian School Road; and

WHEREAS, several clubs will be demonstrating what amateur radio is all about at this event by giving people an opportunity to try their hand at operating some of the equipment; and

WHEREAS, Amateur Radio operators, licensed by the Federal Communications Commission, are forbidden by federal law to change for services, and any organization that requires their services may call on them;

NOW, THEREFORE, I, Rose Mofford, Governor of the State of Arizona, do hereby proclaim September 15, 1990, as \* AMATEUR RADIO AWARENESS DAY \*

## 9.6 Recognition Awards

Give a recognition award of your own. If you can identify a local government or emergency planning official in your community who deserves recognition, give him an award. A classy-looking certificate can be made up easily by one of your computer-literate members with a laser printer, a decent piece of paper and a suitable frame. Invite your honoree and the press to a club meeting to make the presentation. If the local garden club can do it, so can you!

## 9.7 Cable TV

Your meeting announcements, club auction date or an invitation for the public to attend your Field Day exercise could be sent to your local cable TV system's "Community Bulletin Board." All the cable companies offer this service by one name or another and most of them would be delighted to carry your message.

Cable Television has become commonplace. In fact, many of us would be lost without our converter boxes and remote controllers. Few realize that there are many aspects of

cable TV that are available to the subscriber aside from more channels to watch.

Cable TV comes into a community by way of a franchise agreement. Cable companies bid for a franchise and one is selected on the basis of cost per customer, quality of programming and services to be provided to the community. Many subscribers do not realize that one of the services almost always a part of each franchise agreement is called "Public Access."

Public Access is a channel reserved for residents' own programs. Some franchises provide production assistance including equipment and training. The best part is that Public Access costs nothing to the group putting on a program.

Consider promoting your ham radio club or running a series of license classes on TV. Show the "New World of Amateur Radio" videotape. Show your recent hamfest videotape! Televisé your Field Day or demonstrate OSCAR. These are all great ways to reach thousands of potential hams.

By calling or stopping by your local cable TV company, you can easily get the information you'll need to get started. Instead of sitting home and watching all of those channels with color bars go by, why not see if you can activate one and bring ham radio into your community.

#### Sample Letter To Cable TV Company

[The following can be sent to the local cable TV station to appear on its "Community Bulletin Board". Different cable channels have different requirements as to format, in this case, each line is to contain no more than ten words and a maximum number of lines. Be sure to check this with your local cable company before sending your announcement to be sure it fits the company's requirements. Because these announcements are usually free of cost, be sure to thank the cable company that runs your messages.]

Mr. Calvin N. Hobbs  
Butt and Head Cable Company  
100 Main Street  
Amok City

Dear Mr. Hobbs:

I am writing you as a member of the Hamrad Amateur Radio Club, of which I am a member.

Please accept the following announcement for the Channel 16 "Community Bulletin Board". We are asking that the announcement be run during the week ending September 20:

THE HAMRAD AMATEUR RADIO CLUB WILL HOLD AN AUCTION OF  
USED RADIO PARTS AND EQUIPMENT AT ITS MEETING ON TUESDAY,

SEPTEMBER 24, AT THE HILTON FIRE HOUSE ON ARSON ROAD,  
AMOK CITY BEGINNING AT 8 PM.

AREA RESIDENTS INTERESTED IN RADIO ARE INVITED TO  
ATTEND. IN ADDITION TO THE AUCTION, REGISTRATION WILL BE  
HELD FOR THOSE INTERESTED IN ATTENDING CLASSES TO PREPARE  
THEM FOR AMATEUR RADIO OPERATORS' EXAMINATIONS.

REFRESHMENTS WILL BE SERVED.

If you have any questions, please call me at the above  
number. Thank you for your past kindnesses.

Very truly yours,

Clark Kent

#### 9.8 Other Organizations

If your club meets in a church, a firehouse or a lodge  
hall, these organizations may be willing and interested in  
including your club's meeting announcements or other  
information about your activities in their newsletters or  
other publications.

#### 9.9 The Workplace

If any of your members works for a company or entity  
with a company house organ, consider communicating with its  
editor to suggest an article on the employee's amateur  
activity. Many company house organs often feature unusual  
employee hobbies.

#### 9.10 Speakers Bureau

Help your club start a speakers bureau and then promote  
it. Let your local schools and community service groups know  
it exists and that you have people willing to present a  
program. These groups need program material, too, to keep  
their meetings interesting.

#### 9.11 Public Programs

Consider having your club work on a project to develop  
a really interesting program about Amateur Radio using  
slides or a video format. This is a great idea for clubs  
looking for something interesting to do that will help them  
grow.

Use the slide or video program you developed above to  
meet with your local service clubs and present programs to

them on local Amateur Radio activity.

These are just a few of the things you can do. With a little effort, you could easily add to this list of projects that have a positive public relations impact.

## Chapter Ten

### Radio and TV

The print media, along with radio and TV, are what we collectively call the news media. They share the common purpose of being "agencies of mass communication" as described in a dictionary definition of the word "media."

Nearly everything we have covered so far applies equally well to each of the various types of media but there are some differences. These differences are not so much in the way we deal with radio and TV but in the ways they communicate with their audiences. The print media appeal to our eyes, radio to our ears and television to our eyes and ears. Therein lie the principle differences between them.

Operating in worlds measured in minutes and seconds of expensive air time, radio and TV are tougher to break into. Fortunately, it's not impossible. Once again, however, much of your success is going to depend on where you live. Small town stations are easier targets than large urban broadcast facilities.

Whether you live in a small town or a large one, start by analyzing your local station or stations and their programming. Like newspapers, radio and TV station programming consists of parts, including news programs and segments of news programs, panel shows, interviews, documentaries and a whole host of others. There are also different types of stations - commercial, cable and public broadcast stations.

Press releases, of course, are not going to be particularly helpful here, except perhaps as background information for the radio or TV station to use in evaluating your story's potential. A press statement or release may still be helpful to you in these situations as a crutch to help organize your thoughts. A word of caution: Don't try to write and present your own script. These are a whole different matter, one best left to station personnel who are experts at this.

Emergency situations are the most likely subjects to receive coverage from the electronic news media. Field Day events may be another possibility, especially in smaller communities. There are others, of course, but the points to keep in mind are that the kinds of stories that will appeal most to the electronic news media are those with dramatic impact which appeal to the ears and/or eyes and those which can be told in a short time.

One of the frustrations in dealing with the electronic media is the fact that only rarely are they willing to promise coverage in advance for a particular event. The reason for this is obvious if you think about it: They need

to be ready to cover breaking news. Camera and radio remote crews may have to be pulled from one story to cover another, more important story.

On most weekends, however, there is a dearth of news. The electronic media's usual newsmakers are at home, hopefully staying out of trouble. Politicians are usually relaxing, legislatures are not usually in session and there is generally less going on. Weekend news programs are often scratching for stories to fill the available air time. Weekends offer an opportunity for you to get coverage for your story. Most stations keep "HFA," or " Hold for Air stories" to draw on as the need arises to fill air time on weekends. There are real opportunities for you to exploit on weekends.

As mentioned earlier, radio stations offer interviews and television has panel show formats which may offer possibilities to explore. Among the cable TV stations in your area you may have The Discovery Channel, or something like it, featuring documentaries on subjects in science and nature.

The local Public Broadcasting System channel is another possibility. In Philadelphia not long ago, the PBS channel ran the ARRL film, "The World of Amateur Radio," as a result of the efforts of an area Amateur Radio operator.

The ways you might use to get to your local electronic media are as straightforward as the ones you would use to get to the print media. In addition, radio and TV stations are run by engineers, some of whom may be Amateur Radio operators. If you have one of them as a member of your club or organization, discuss your story possibilities with him and ask the best way for you to make an approach to the station's programming people.

If your local station nibbles at your bait or pulls the line off your reel, be ready to follow through quickly, intelligently and with as much prior preparation and professionalism as possible.

Prior preparation is important in all of the contacts you will have with any of the media. In the electronic media, especially in "live" shows, it is absolutely imperative. Put your very best spokespeople forward and prepare them as completely as possible. Fumbling, erratic, unprepared or hesitant performances compound greatly in front of these media and you need someone who will be able to cope with the pressures and function well in these circumstances.

You will be on your mettle in these situations and you may well have to be ready to improvise quickly to meet whatever challenge you are presented with. But, more than just a challenge, these are golden opportunities. Use them well.

## Chapter Eleven

### On Radio And TV Talk Shows

By Joseph J. Carr, K4IPV

More than 4,000 talk, interview and local public affairs shows are aired daily in the United States. They reach audiences totaling millions of people. According to the Washington, D.C. - based Broadcast Interview Source more than 350 of the 9700 stations in the USA are exclusively "talk." This forum represents a virtually untapped resource for you, the ARRL Public Information Officer. Here's how you can tap it.

### 11.1 Celebrities Only?

Fame never hurts, but isn't strictly necessary to book on talk shows. While a well-known Amateur such as Senator Barry Goldwater (K7UGA) would get the approving nod in a heartbeat, there are thousands of opportunities for lesser celebrities -- like you. An average of half a million interviews annually on 4,000 shows makes a lot of space for the right people. So who are these "right people?" They are people who talk show producers believe will 1) interest listeners or viewers, and 2) are a good, reliable interview. Your IQ (Interest Quotient) hangs heavily on whether or not people want or need to hear what you have to say. Depending upon the type of show, you must either be controversial, or able to offer them something that can change their lives for the better. Your IQ takes a nosedive, however, if you are a mere poor imitation of someone else; it soars to the heights if you are unique and well-spoken. That "well-spoken" remark comes from the opinion of talk-show experts who believe that how you say it is often more important than what you say. For promoting Amateur radio we need to convince producers that listeners will find "hamming" an interesting and vital hobby that they might like to join.

A good, reliable interview is several things. First, it is an interviewee (you!) who shows up on the right day, at the right time and in the right place. For a telephone interview (a "phoner") it means that you are at the phone at the right time -- and were smart enough to make it a phone in a quiet location and without the "Call Waiting" service. After all, your hollering kids and the "click-thunk-splatz" of the Call Waiting signal go out over the air right along with your most eloquent profundities!

Remember Calvin Coolidge? A story they tell about the 30th president involves an incident that happened at a White House party. "Silent Cal" was a man of few words. He was approached during the party by a woman socialite who told him: "Mr. President, I bet Mrs. Smith that I could make you say three words." The dour prexy retorted in his best murmur: "You lose." Don't be a "Silent Cal" interview unless you want some ticked off host to say: "you lose." A "good interview" is one where you do most of the talking. One community affairs show host told me that he sometimes awakens in a cold sweat from a deep sleep because of a recurring nightmare: a whole string of tight-lipped, uptight, "Silent Cal" interviews. After we taped my interview he told me "you're a good talk, Carr, I only had to use four of the seven questions we laid out for the 15-minutes."

A "good talk" is able to carry the conversation because he or she is an expert on the topic ...and has lots of material on hand. My 8th grade social studies teacher once scolded me with the remark "...you've got the world's largest store of useless knowledge." She was wrong about that (and a lot more, it turned out) because a large collection of anecdotal material is golden on a talk show.

Another of my teachers -- one of the best in the business -- taught a public speaking course at George Washington University. Doc Stevens offered his students one piece of advice that should be tattooed on the forearms of all who seek talk show appearances: don't ever speak impromptu. Always be prepared for contingencies in case things don't go the way they were planned. Have a talk or line of questioning planned, and be prepared to talk on it at length. Too much preparation is never a problem ...but too little is a disaster.

## 11.2 Types Of Talk Shows

Talk and interview shows come in a wide variety of shapes and sizes. I have been interviewed for a three minute mini-book-review on a 1,000-watt flea-powered station in Podunk, and also for two hours in prime time on a 50,000-watt clear channel rockcrusher that dominated its spot on the AM dial from Mexico to Canada, and from the Mississippi River to the western slope of the Rockies. I have also been interviewed for 90-minutes on a nationwide satellited network show.

Some shows are call-in talk shows. Listeners telephone the studio and ask their questions live on-the-air. Although this format attracts its share of nuts and cranks, it is also a vigorous arena that taxes you to the limit. I personally enjoy this format, especially when some of the callers disagree with me... or know as much as I do about my topic.

Another format is the cross-the-table interview with no call-ins. This type of interview is typically pre-taped for airing at a later time, although some shows do it live.

## 11.3 How To Handle The Tough Interview

Inevitably, if you do a lot of interviews you will encounter either the hostile host or a call-in jerk who wants to make life difficult for you (probably someone with an unresolved TVI complaint). Pioneer TV talk show host Joe Pine sometimes told his guest to go "...gargle with razor blades." Journalist Dan Wooding (Open Doors News Service) told me that a person does not really come of age in the interview biz until they have survived an interview on Britain's BBC. According to Wooding, a BBC interview is a vicious rite of passage into the adulthood of the talk show circuit.

But Dan also offered advice on how to handle that kind of interviewer. When he asks a provocative, outrageous or embarrassing question...ignore it. Answer in a happy, chipper, comfortable and thoroughly congenial manner, but

answer by asking a question of your own. You can then burn up about five minutes of that broadcaster's equivalent of a bear trap with your own answer to your own question.

In other cases, the interviewer will ask legitimate questions that, although designed to lead you out onto a shakey verbal pier above a school of man-eating barracudas, are nonetheless in your best interest to answer. Keep it cool, be amiable, and skewer the rogue with a well thought out answer. After all, you have had a lot more time to think about the topic than that overworked talk show host.

Another tough interview is the incompetent host. Guests on talk shows are a dime a dozen, and press releases and PR material comes into the station by the box load. Far too many talk show hosts never even see your stuff until you hand him or her a copy five minutes before the air time. The interview then degenerates into a discussion of the major headings ("Joe, what do you mean by..." as he reads a title to 500,000 listeners). The only hope for the "incomp" interview is to take command and run away with the host's show: yak it up! I suspect that the host will actually be relieved. After all, if he is too lazy to at least speedread the material that you sent in beforehand, then he is probably too lazy to keep the ball rolling: it's your show from the minute you realize that the host is taking the table of contents route.

#### 11.4 How To Get Invited

Fortunately, getting invited on radio and TV talk shows is not too difficult. First, you will have to identify the shows that fit your program. There are several avenues open for this phase of the campaign. The first step might be to listen to your local radio station to find out what shows are aired locally. You could also ask the local station manager for advice. You can also look in the standard broadcasting industry directories. Although some libraries might have them, in most cases you will have to spend some bucks to buy your own copies. See below for a list of recommended resources.

Second, you must prepare a press kit. According to Mitch Davis of Broadcast Interview Source, there is a "45-cent" rule for the press kit. If it weighs more than two-ounces in the envelope (which can be mailed first-class for 45-cents), then it is too big.

The press kit should demonstrate that you are experienced with the media (list even one little local interview); if clips are available, include them. Demonstrate why your topic, or your experience, is timely and newsworthy. For example, if Amateurs helped with communications for a storm emergency recently, contact the station or show producer about doing a story. Exploit any seasonal or annual aspects of your topic (Field Day, for example).

Also, if the station or show has a narrow range of listeners, then there might be an Amateur Radio angle that can be exploited. For example, if there is a local Christian



radio station in your town, then tune in on and become familiar with the Halo Missionary Net (21.390 MHz, 1800Z). This topic can also be exploited for personal appearances, lunch and breakfast talks, and other gatherings of local religious groups. I found that both Roman Catholic Protestant churches are eager to hear talks on their missionaries from a radio perspective. It's fresh, different, and so relevant to their own interests.

Expand your topic to include the greatest number of listeners. ALWAYS be a primary source ("I'm kinda like So-and-So" won't cut it -- they'll go get ol' So-and-So instead of you). Make sure that your phone number appears in at least three places in the press kit.

In a seminar for Washington's Open University, Mitch Davis and his associate Joe Shafran stressed the importance of a little hype to get the producer to actually open your letter (many -- maybe most -- wind up in the circular file unopened). Use a real stamp, not a postage meter stamp, and a well-designed envelope that stands out (but not too much glitz, please). Don't use computer generated mailing labels. In fact, Davis recommends hand writing the address on the envelope. Above all, address the press kit to a real person -- not just "guest coordinator" or "producer." If you have to call the show or station to find out the correct name, then do it. In fact, it is a good idea to call the person anyway. Ask for about thirty seconds of time, and then use it (and no more unless invited to do so) to tell him why you would be a good guest, and state that "some additional information" (the press kit) will hit his desk any day now.

Make yourself visible. A press kit, although very valuable, is a temporary asset at best. It dies (if not on arrival) very soon after arrival. The "we'll file it against the day when..." is the kiss of death. "The day when..." never comes. One way to achieve visibility is to send out multiple (but different) mailings to producers several times a year. Perhaps a better way is to buy a listing in one of the broadcast industry directories. The Talk Show Guest Directory (available from Broadcast Interview Source for \$19.95) will sell you a one-liner listing or a paragraph display ad for a relatively low price. Talk show producers use the directory to locate interesting guests, especially those with expertise or interest in special areas.

## 11.5 Conclusion

The radio-TV interview is one of the most powerful and rewarding methods to promote a book, a cause, an idea ... or Amateur radio. It works, it is accessible and it's for you.

Joe Carr, K4IPV, has a report available called TALK SHOW ACCESS. Contact him at POB 1099, Falls Church, VA 22041, for details.

## 11.6 Broadcast Industry Directories

Talk Show Guest Directory. New directory, but with a proven track record. Free one line listings. Paid advertisements at reasonable rates.

Broadcast Interview Source, Suite 930, 2500 Wisconsin Ave. NW, Washington, DC 20007. Phone: (202) 333-4904. Directory costs \$25/copy.

Talk Show Mailing List. Contact Broadcast Interview Source (see above) for prices and availability.

Broadcasting Yearbook. Broadcasting Magazine, 1735 DeSales St. NW, Washington, DC 20036. Lists every radio, TV and cable outlet in the USA. \$85

Directory Of Religious Broadcasting. National Religious Broadcasters, CN 1926, Morristown, NJ 07960. \$39.95 (\$24.95 to NRB members). Christian and religious broadcasters only; including many broadcast ministries.

Religious Broadcasting Magazine. Subscription \$18/year (see above for address).

## Chapter Twelve

### Writing For Non-Ham Publications

By Patty Winter, N6BIS

#### 12.1 Target your story to the audience

What's unique about the group you're writing for? What facets of Amateur Radio will interest them the most? Fire, police, and similar personnel will naturally be interested in the public service and emergency aspects of amateur radio, but don't forget to mention how much sheer fun it can be, too.

It doesn't have to be "Why you should become a ham." If you're writing to government or public service personnel, it might be "How Amateur Radio can help you." Give them specific examples of how amateurs have served their communities, and tell them how to find hams in their area to set up emergency preparedness teams. (If you're writing for your geographical area, you could put yourself or your local ARRL or radio club officer as a contact person. If you're writing for a national publication, refer them to ARRL Headquarters.)

#### 12.2 What should and shouldn't be included in your story

Do communicate the excitement of the hobby--and try to target this for your audience. For instance, technical professionals might be amazed to learn that we're using sophisticated digital techniques, and that we have our own satellites. Liven up your article with direct quotes from

people in their own profession/hobby who are excited about Amateur Radio.

Do give a "call to action." Tell your readers how they can find out more; e.g., give the ARRL HQ address, or a local contact if you're writing for a local publication.

Don't go into details that are inappropriate for your audience. Talking about the Amateur Radio implementation of the ARPA Internet protocol suite would be fine in Computer Networking magazine, but not in Astronomy Today. (But do tell the astronomers about Amateur Radio astronomy!)

Don't get defensive about the common public confusion between Amateur Radio and citizens' band. A brief, unemotional, informative statement is okay, such as: "Amateur radio offers more privileges than other public radio services, such as citizens band. In return, we're required to take a test and obtain a license from the Federal Communications Commission."

### 12.3 Target your story to the magazine

Get familiar with the magazine(s) you want to submit your article to. Here are some questions to think about as you read them.

How long are the articles?

One page? Two? Four or more? It will probably vary, and may be quite flexible. There may be a section that's perfect for your article--such as "First Person" or "In My Off Hours"--that's always a certain length; if so, make sure you write to that length.

What viewpoint are they written from?

Is everything in third person, or does the magazine seem to run some of each kind? First person can be fun because you can write directly from your own experience, but be sure to include interesting anecdotes from other hams in the same profession/hobby, too. Second person is good for "you--yes, you!--can do this and have fun" articles. For third person, you simply describe your interviewees' activities.

Do they include photographs?

If so, figure out a way to get some--and make sure they're of good quality. Does the magazine use black and white, color, or both? Black-and-white-photos should be printed on glossy (not matte) stock, have borders, and be at least 5x7 inches in size (preferably 8x10). Make sure the picture has good contrast. For color, send slides. If you're concerned about sending the original transparencies, high-quality duplicates will generally be acceptable.

Whatever media you use, make sure the picture is clearly focused and not "busy" with too much in it. If possible, crop out any distractions on the edges before submitting it.

Does the editor expect a query letter first?

A query letter is a proposal to a magazine for a story. Commercial magazines almost always want them, but professional and hobby magazines often have looser policies. If you aren't sure, you could go ahead and send one, or check the magazine's listing in the annual Writer's Market.

Does the magazine have writer's guidelines?

Again, the type of magazine we're discussing here may not have such a beast, but it's polite to ask. These guidelines (usually just a couple of typewritten pages) will include formatting requirements for submissions, and often include hints on the style preferred by the magazine.

#### 12.4 How to make professional submissions

Your mother was right: neatness counts. Make sure your article is professional in appearance. Double space, and use wide margins (at least one inch on all sides). Either use a typewriter with a fresh ribbon, or a computer with a daisywheel, laser, or high-quality dot-matrix printer. (If your dot-matrix printer uses only a few pins per character or doesn't have true descenders, use a friend's.) Good-quality photocopies are fine.

Put your name, address and daytime phone number at the top of the first page, center the title about a third of the way down, then leave a few lines before beginning the actual article. On subsequent pages, include the page number, article title, and your name.

Write a cover letter. This doesn't have to be fancy. Just write a concise, professional letter that briefly explains your article.

Include return postage and envelope. If you don't want your manuscript returned, mention that in your cover letter and forget the postage. If you do want it back, send a self-addressed, stamped envelope (business-size for short articles, 9x12 for thicker ones).

Copyrights. What you write is yours. When you submit an article to a publication, it's generally assumed that they will have only one-time rights to use it. However, this a complex subject, so if you're concerned about it, read the section on rights in Writer's Market or some other good freelancers' book.

#### 12.5 Article Ideas

Here's an easy exercise. Stop for a moment and ask yourself these questions: What profession am I in? What other hobbies do I have besides Amateur Radio? Do I belong to civic or charitable organizations? What family or other activities am I involved in?

Your answers will almost certainly provide the springboard for several articles--ones which will be fun and easy to do because you're already familiar with the subject matter and the audience you're writing for!

Some of those activities will have a natural link to Amateur Radio, such as travel buffs who'd be excited about talking to people in other countries, or businesspeople who are on the road a lot and would enjoy the ability to meet new friends in the cities they visit.

Here are some ideas to get you started:

Teachers. Teachers are always looking for ways to motivate students, so they'd love to hear how you use Amateur Radio in the classroom to let your kids meet people in different areas of the country, to teach world geography, or to practice a foreign language. Parents would be a prospective audience for the same reasons. You can also mention what great after-hours relaxation it is for yourself.

Outdoors enthusiasts/private pilots. Probably very few of these people know about the availability of small, lightweight VHF/UHF Amateur Radios. Lives have been saved because people had such radios with them when they were stranded in a semi-remote area. (The really remote areas won't have repeaters, of course, but there are plenty of ways to get yourself into trouble not far from metropolitan areas.)

People who work with invalids. Do health professionals and volunteers know how Amateur Radio can brighten the day of someone who's shut into their home or an institution? You can tell them.

History and genealogy buffs. These people can have a marvelous time talking with people in states or countries that hold special interest for them. The same with retirees, especially those now living away from their former homes.

Science and technical professionals, and hobbyists. Some professions and hobbies are a natural match with amateur radio. Many engineers could pass the Extra class theory questions with their eyes closed. Amateur astronomers might enjoy Amateur Radio astronomy--and professionals can pass the time while a spectrogram is exposing! Computer professionals and hobbyists can contribute their talents to the new world of digital Amateur Radio--as indeed has already happened.

Those are just a few ideas for members of professions and hobbies that seem to have a natural link with Amateur Radio. But what about the ones that don't? Does that mean those people wouldn't be interested? Of course not; you're in some of those groups and you're a ham, right?

Maybe there's a link that isn't obvious. For instance, an unusually high percentage of my ham friends are lawyers.

There's no obvious reason I can think of why lawyers would be disproportionately attracted to Amateur Radio. My best theory--from observing that most of them are avid contesters and/or DXers--is that they like to play as hard as they work. They've chosen the aspects of Amateur Radio that are most competitive.

If I'm right, then that's a subtle link, but a link nonetheless. Maybe other peoples' professions predispose them to Amateur Radio in ways that aren't immediately obvious. If you uncover those reasons, it will strengthen your presentation of ham radio to that audience.

Your article doesn't have to be a "hard sell piece" on Amateur Radio, however. Many magazines, professional journals, company newsletters, and local newspapers are looking for personality pieces--and heaven knows, there are plenty of personalities in Amateur Radio!

How about your coworker who recently won recognition for her help with public-service and disaster-relief communications? What about the seemingly ordinary doctor in your local medical association whose idea of a fun vacation is dragging a few hundred pounds of radio equipment halfway around the world for a DXpedition? And don't forget the high-school student whose interest in Amateur Radio helped earn him a college scholarship. Try local sports figures, newscasters, and other celebrities. With 400,000 hams in the United States alone, there are a lot of fascinating stories out there just waiting to be written.

The point is that there are innumerable angles you can use to make Amateur Radio interesting to all sorts of people. Let your mind explore the possibilities, and you should have enough article ideas to keep you going for a long, long time!

## Chapter Thirteen

### Writing Letters To The Editor

By Robert A. Smith, WD4RFD

Amateurs anywhere can be attacked by unwarranted legislation and regulation at any time. It is a shame when we fall victim to some half baked ideas cooked up by politicians trying to make their futures by attacking rather than building. Amateurs must battle back. Many of these battles are waged in the press with articles and editorials. Amateurs need to have their opinions showing up on these editorial pages. We must fight on this intellectual battlefield in addition to all else we do combating ignorance.

Letters to the editor are important because they can indicate strong community support those in the media may not have known was there. The editors expect associations and clubs to ship a letter on the club stationery protesting a proposed antenna height restriction. Though that letter may represent several hundred hams in a community, it still is only one letter on his desk. If everyone writes, all of a sudden he has a pile on his desk. First, you are getting

his attention. Then when one of the letters gets published you have your point of view before the public. The facts are now where they belong. You can debunk some of the myths. It is a good feeling!

Here are some general guidelines for those willing to try. I realize that for many writing goes back to high school composition classes and has a bad feeling for some. The thing to remember is we are still a democracy in which the pen is mightier than the sword.

These rules can also be applied to writing to your legislators and other regulating agencies. Keep in mind, always, you are a citizen and a voter in this society and not only deserve to be listened to but also have a responsibility to speak up if you see something wrong.

- 1) Have a clear goal in mind with your letter. Define your ideas and know exactly what you want to say. An outline may be helpful, at least make a list. Organize your thoughts so they can be easily followed.
- 2) Respond to a particular article or news item that is already in the paper when possible. If it hasn't been in the paper, the editor may have already decided his readers aren't interested. You need to be relevant.
- 3) Respond in a timely fashion. In the news business an item must be "hot" enough. Time is a critical factor.
- 4) Don't get hysterical. A bunch of wild claims, ranting with a flock of unsubstantiated rumors, and name calling can present the editor with a piece that will show your side as an ignorant shouting rube. This kind of letter does more good for the opposition, if published, than for the side you want to help.
- 5) Be clean in your writing. Make sure grammar is correct, use a dictionary, and use a typewriter double spaced. Don't use a bunch of attention getting gimmicks like capital letters and underlining. The editor doesn't want to do a lot of work on your letter. He wants to decide what to emphasize. Both are his job. Make it easy for him.
- 6) Be persistent. Only a few letters are published each day. The odds just from that perspective are formidable. Writing puts one more letter in the editor's mailbag from your point of view. It lets the editor know there are lots of folks interested thus enhancing the odds that someone with your point of view will be selected. He can't ignore a lot of letters that convey the same idea.
- 7) Keep it short. One page double spaced is almost an absolute maximum. If you can say what you want with a paragraph or two, and a catchy phrase, you will be remembered. No one quotes an entire novel to get an idea across. Try to say what you want in one page and make an attempt to shorten it from there. A shorter letter almost always will be picked over a long letter that says the same

thing.

8) Be a real person. Give your name, address, and telephone number to the editor. If you have a problem with publication of your name, tell him, but he deserves to know the source of material he is publishing. If you have particular qualifications and are somewhat of an authority in the subject you are writing about so much the better, and this should be indicated. Anonymous letters don't go very far.

9) Get to know the editor's name, write to him directly and be respectful.

10) Remember there are those who want to stop what you want to do, or do what you want to stop. Keep in mind they are writing too. An editor can't publish what isn't on his desk. You must send your thoughts to him.

Now the hardest part: Do your writing, and get your opinion to the editor. Let him know there is at least one person with your point of view.

---





Subject: Packet-to-Internet Gateways

=====

Gateway to: 44.80.32/24 (reliably) Central Pennsylvania  
Gateway to: 44.112/16 (not so reliably) Western Pennsylvania  
Internet address: af2j.ece.psu.edu 128.118.5.172  
Packet address: gw.af2j.ampr.org 44.80.32.136  
AX25 mycall: af2j  
Run by: Joe Reinhardt af2j  
Internet email address: jmr@ecl.psu.edu  
Services: no anonymous logins or ftp. SMTP.  
AxiP: No  
Other useful IP addresses: kb3kj 44.80.32.128 (Jim, Port Matilda, PA, IBM  
PS/2)  
af2j 44.80.32.135 (Joe, State College, PA, Mac)  
ka3wut 44.80.32.139 (Ryan, Dubois, PA, Amiga)  
????? 44.80.32.140 (???)

Gateway to: 44.76/16 South Texas  
Internet address: hamgate.cs.tamu.edu 128.194.2.126  
Packet address: hamgate.wb5bbw.ampr.org 44.76.0.5  
AX25 mycall: WB5BBW-9  
Run by: Kurt Freiberger, WB5BBW (409)847-8607  
Internet email address: kurt@cs.tamu.edu  
Services: ftp telnet finger echo  
AxiP: No  
Other useful IP addresses:  
Notes: One RF port, 1200 bps, 145.09 Mhz. Local BBS: W5AC.#STX.USA.NOAM  
24 hour operation. May be down between 8-5PM CST/CDT for other  
activity.

Gateway to: 44.72.0/18 Chicago Area, Illinois, USA  
Internet address: ke9yq.imsa.edu 143.195.1.8  
Packet address: ke9yq.ampr.org 44.72.38.50  
AX25 mycall: ke9yq  
Run by: Bob Van Valzah ke9yq  
Internet email address: bob@imsa.edu  
Servers: ftp telnet smtp finger  
AxiP: No for now, will entertain proposals  
Notes: Wa9aek [44.72.40.129] (Ken Stritzel) is the local FTP and mbox  
server. He's also my gateway to most of the rest of 44.72.0/18.  
N4pcr-1 [44.72.38.34] (Don Lemley, Gracillus Communications, Inc.)  
is the nearest IP switch. He has 56 Kb links to other IL sites, but  
I don't know how to use them yet. I don't know enough about NOS  
administration yet to've set up much of an environment on the gateway  
itself.

Gateway to: 44.48/16 Indiana, USA  
Internet address: k9iu.ucs.indiana.edu 129.79.16.175  
Packet address: k9iu.ampr.org 44.48.0.22  
AX25 mycall: k9iu-5  
Run by: Dwight Hazen wb9tlh  
Internet mail address: hazen@hazen.ucs.indiana.edu  
Servers: telnet ftp smtp finger netrom

axip: no  
Other useful ip addresses: 44.48.0.2

```
# This doesn't exist yet. Soon.  
#  
#Gateway to: 44.136.138/24 Brisbane, Australia (vk4)  
#Internet address: vk4kiv.star.qut.edu.au      131.181.5.122  
#Packet address: vk4kiv.qut.ampr.org          44.136.138.34  
#AX25 mycall: vk4kiv  
#Run by: Andy Joyce vk4kiv  
#Internet email address: joyce@qut.edu.au  
#Servers: ftp telnet smtp finger  
#Axip: Yes  
#Other useful IP addresses:  
#Notes:      The host will forward bulletins under AX25 to VK4DGQ from  
Usenet  
to  
#      QLDNET or SEQLAN.
```

```
Gateway to: 44.32/24      SouthEastern Colorado, USA (Colorado Springs, etc)  
Internet address: hpcsos.col.hp.com           15.255.240.16  
Packet address: gw.n3eua.ampr.org            44.32.0.1  
AX25 mycall: n3eua  
Run by: Bdale Garbee N3EUA  
Internet email address: bdale@gag.com  
Services: the gateway runs on an HP 9000/370 using Mike Westerhof's prototype  
          IPIP daemon. The .1 address is a Gracilis PackeTen standalone switch  
          in my basement. Right now, the PackeTen is the only thing reachable.  
          I've set up routing info for all hosts in the gateways file...  
Axip: "or not!"  
Other useful IP addresses: none yet
```

```
Gateway to: 44.72/16 Illinois, USA (most of central and southern IL)  
Internet address: pc1798.bradley.edu 136.176.110.10  
Packet address: wb9uus.ampr.org      44.72.123.97  
AX25 mycall: wb9uus  
Run by: Chuck Henderson wb9uus  
Internet email address: chuck@bradley.bradley.edu  
Servers: ftp telnet smtp finger netrom  
Axip: soon  
Notes:  
      The RF part of this system is not operating properly but should be  
soon.  
      I am setting up a connect into the 445mhz Backbone that covers much of  
IL. Nearest MSYS bbs is N9HWO.IL.USA.NOAM n9hwo.ampr.org 44.72.108.1  
I don't know enough about NOS administration yet to've set up much of  
an environment on the gateway itself. Any and all help is welcome.  
The Internet address will soon change to wb9uus.bradley.edu 136.176.5.9  
An updated version of this file will be sent to gateways@uhm.ampr.org  
when the date of the change is known.
```

```
Gateway to: 44.136.72.x to 44.136.137.x      Victoria, Australia (vk3)  
            44.136.72...79.x                Melbourne
```

44.136.81.x Shepparton  
44.136.82.x Bendigo  
44.136.83.x Western Victoria  
44.136.84.x Ballarat

Internet address: murban.met.unimelb.edu.au 128.250.120.17

Packet address: vk3rum.ampr.org 44.136.80.4

AX25 mycall: vk3rum (to vk3bbs, vk3bbs-2 (bpq switch) via link)

Run by: Peter Hallgarten VK3AVE on behalf of Melbourne Packet Radio Group Inc.

Internet email address: vk3ave@csource.oz.au

Servers: ftp telnet smtp finger netrom

Axip: Yes

Other useful IP addresses: 44.136.80.2 vk3rpa

Notes: vk3rum is connected to a 9600 Baud Full duplex link to vk3rpa & vk3bbs on callsign vk3rum. To gain access to other ax25/netrom systems connect to vk3bbs-2 (G8BPQ Switch) and then use it as a link to the outside world. VK3BBS runs G8BPQ network switch supporting WORLI BBS and NOS and is Victoria's (Serves Most of VK3) HF Mail Node.

Other gateways should add the following routes to catch all of the address space above:

```
route add 44.136.72/21 encap murban.met.unimelb.edu.au
route add 44.136.80/20 encap murban.met.unimelb.edu.au
route add 44.136.96/19 encap murban.met.unimelb.edu.au
```

---  
end



Subject: Misc Packet Info 92-Aug-15

\*\*\*\*\*  
\* Packet mail - sv1rd@sv2dxc \*  
\* Amprnet - sv1rd.ampr.org \*  
\* Email SV1RD@GRATHUN1.BITNET \*  
\* also now azahar@leon \*  
\*\*\*\*\*

=====  
### Miscellaneous Packet information

Note that all phone numbers with the '+' symbol have been verified.  
(ex. (310)826+7790 ).

1.bbs soft : AA4RE, C-BBS, ROSERVER/PRMBS (WITH TELEPHONE MODEM  
ACCESS),

WA7MBL, W0RLI, SV7AIZ, PBBS.

2.DOSgate (NM1D)soft with Remote Login for Dos/mashines

3.Thenet/NETROM Eprom soft for level 3 application

4.G8BPQ node Net/rom compatible multiconnect soft.

5.DX Cluster Packet Database for dx informationing

6.ARES/Data Packet Database for Emergency operation.

7.MONAX. Packet monitor program + collection system statistics.

8.R95,Yapp Terminals for binary file transfer.

10.TEXNET Applications software for use with the TEXNET switch.

more info for all above TAPR Tucson Amateur Packet Radio  
pob 12925 Tucson AZ 85732  
(602)749+9479  
fax (602)749-5636

10.Tcp/Ip Soft + source for internetworking and development with  
Netrom/  
ax25/tcp compatibility, Rem Login, Ethernet access etc.  
info epic!karn@bellcore.bellcore.com.internet  
or TCP-Grup@UCSD.Edu.internet  
or local tcpip users

11. APLINK Packet BBS with Amtor + hf Mbox and fwrdr  
info TAPR

12. PACTOR A new protocol for hf forwarding. info  
Dr. Tom Rink DL2FAK Roentgenstr. 36  
D-6450 Hanau 1 Germany.  
or DK5FH at DB0GV.DEU.EU

13. Packet Telemetry a. METCON-1 Telemetry + Control System  
info TAPR  
b. KTU Kamtronics Telemetry Unit (with weather sensors)  
info: Kamtronics 1202 E, 23 St Lawrence,  
KS 66046, USA  
FAX (913)842+2021  
c. AR-24 tnc+Remote Alarm + Control Features  
info Henry Radio  
2050 South Bundy Drive  
Los Angeles, CA 90025

(800)877+7979  
(310)820+1234  
fax (310)826+7790

14. medium Speed Modems a. K9NG 9600 baud Modem (kit) Info TAPR  
b. G3RUH 9600 full Duplex Modem Info G3RUH@GB7SPV  
c. Texnet 9600 info Texas Packet Radio Society  
POB 831566  
Richardson, TX 75083-156

15. High Speed Modems a. GLB NetLink 19200 No info  
b. WA4DSY 56 kbaud (kit)  
GRAPES, Inc.  
PO Box 871  
Alpharetta, GA 30239

or Doug, kd4nc gatech!gt-eedsp!kd4nc!dug  
Randy, wa4mei gatech!gt-eedsp!wa4mei!rsj  
Jack, wa4fib (don't remember his address at work, home is gatech!gt-  
eedsp!  
kd4nc!wa4fib  
Brian, wa4vzw gatech!gt-eedsp!kd4nc!wa4vzw.

16. PI card, The only High Speed packet adapter for attaching >56 Kbit modem  
(assembled)

barry@dgbt.doc.ca.internet  
or Packet working Grup  
Ottawa Amateur Radio Club  
P.O. Box 8873 Ottawa ON  
K1G 3J2 Canada

17. PacketTen netrom/tcp internetwork node info WB9MJN@W9IUP.IL.USA.NA  
or N4PCR @W9IUP.IL.USA.NA

18. Cellnet 56kbaud uhf cellular network info WB9MJN@W9IUP.IL.UAS.NA

19. ROSE switch soft info n2dsy@hou2d.att.com.internet

20. Satellite software info TAPR and AMSAT-UK, 94 Herongate Road,  
Wanstead Park, London E12 5EQ.  
or local Satellite groups/users

21. Satellite hardware a. see nr 14 medium Speed Modems  
b. TAPR PSK 1200 modem info TAPR  
c. PAC-COMM psk-1 TNC tnc+ psk modem  
info AMSAT-UK  
94 Herongate Road  
Wanstead Park,  
London E12 5EQ

22. Portable/Emergency tncs a. PAC-COMM tnc info  
3652 West Cypress St,  
Tampa FL 33609, USA  
b. AR-1200/2400 tnc + portable/mobile printer  
info HENRY RADIO  
2050 South Bundy Drive

Los Angeles CA 90025 USA  
(800)877+7979  
(310)820+1234  
FAX (310)826+7790

22. DSP-12 Multi Mode Controller with dsp soft for 400-9600 baud Applications  
+ Telemetry Options

info L.L. Grace Communications Products, Inc.  
41 Acadia Drive  
Voorhees, NJ 08043, USA  
(609)871+0070

23. FLEXNET Packet Nodes info: dk7wj@db0gv.dl.eu  
dg3fbl@db0gv.dl.eu

24. Optoisolate 8530 Packet Adapter

info Henk Peek, PA0HZP  
Usenet: henkp@nikhef.nl  
AX25 bbs: pa0hzp@pi8nvp  
AX25 smtp: pa0hzp@pi8nos  
P.O. Box 329, 1440 AH Purmerend  
Phone: +31 2990 30977





Subject: Packet Software Versions 92-Aug-15

submitted by:

```
*****  
* Packet mail - sv1rd@sv2dxc *  
* Amprnet - sv1rd.ampr.org *  
* Email SV1RD@GRATHUN1.BITNET *  
* also now azahar@leon *  
*****
```

=====

A versions list copied from packet-radio :

The following is the first draft of common packet software dates and versions. There are errors, oversights, and omissions. Comments and corrections are welcome. The dates and versions are accurate as of the date below. During the month it took to accumulate the list, half the packages were updated. The next release will include commercial tnc firmware revisions and commercial packet software revs.

# @(#) Packet Software Versions. Fri Jun 12 00:45:53 PDT 1992  
Official releases only, no Beta versions.

Software is for MSDOS unless otherwise specified

```
    ** BBS'S and Nodes  
Name                Vers                Date                Author/Notes  
-----  
APLINK              6.04                920224              W5SMM  
                    Concurrent Amtor MBO/Packet BBS  
PAMS                 2.03                920315              W5SMM  
                    Personal Amtor Mail-Box.  
AA4RE BBS           2.12                910306              AA4RE  
                    Multi-connect Full service BBS.  
                    Phone, server, callbook support.  
CBBS                 6.6                 900309              K3RLI & AG3F  
                    C-language source (orig by WORLI)  
ROSERVER PRMBS      1.58                910731              KA2QBE  
                    BBS - phone modem support  
ROSE Swtich (date)  911130              W2VY  
                    Node. Routing by telephone prefix  
WA7MBL BBS          5.14                900211              WA7MBL  
                    Full service BBS  
WORLI BBS           13.12               ?                   WORLI  
                    Full service BBS. Requires DesqView and 286/386.  
                    Servers. Callbook w/G8BPQ node.  
AresData            1.5                 910120              WN6I & N6KL  
                    Remote database. 5 fields per record, 4 searchable.  
                    80 characters per record.  
G8BPQ NODE          4.05                920321              G8BPQ  
                    NET/ROM compatible software node.
```

SV7AIZ BBS	3.24	900405	SV7AIZ
	Supports WORLI/AA4RE/AresData/etc servers.		
	Multi connect BBS.		
TexNet Society	1.6	910205	Texas Packet Radio
pacKet BBS	5.1	920229	VK2DHU
	Node and server support. For use in a central server network.		
	Personal BBS and enhanced terminal program.		
	ASCII and Binary transfer.		
F6FBB BBS	5.14	920331	F6FBB
	Multi connect full service BBS.		
	Supports ASCII and Binary (YAPP). Forwards in compressed mode.		

\*\* Communications Software (written specifically for packet)

Name	Vers	Date	Author/Notes
YAPP	2.0	861218	WA7MBL
	Tnc2/PK232 Terminal program. Text and binary (YAPP) modes.		
LAN-LINK	1.59	910327	G3ZCZ
	Also supports the KAM PK232 MFJ1278 non-packet modes.		
VIRTUOSO	1.3	?	KE0PH
	Mac Terminal program		
PktGOLD	5.5	?	?
	Terminal program. Lots of Features.		

\*\* Software TNC's for modem only TNC's

Name	Vers	Date	Author/Notes
Baycom	1.5	?	PE1OPI
	TNC PAD emulator.		
Digicom 64	2.03	?	
	Commadore 64. TNC PAD emulator.		
Poor Mans Pkt	1.1	?	
	Software emulates TNC PAD.		

\*\* Firmware

Name	Vers	Date	Author/Notes
TAPR TNC-2 Packet	1.1.8	?	Tuscon Amateur

\*\* TCP/IP. KISS mode TNC reqd. Must be TAPR TNC-2 1.1.7b or above.

Name	Vers	Date	Author/Notes
KA9Q NET	K5JB.K10	920318	K5BJ (orig by KA9Q)
	TCP/IP package with AX.25, ethernet, slip, etc...		
KA9Q NOS	G1EMM 1.6	910119	G1EMM
	Enhanced KA9Q NOS. TCP/IP		
MSYS BBS	1.13	920211	WA8BXN
	Multi connect full service BBS node; tcp/ip support.		
	Phone and servers supported. Requires KISS mode TNC.		
WNOS	2b	?	DB3FL
AmigaNOS	2.8s	?	G1YYH

MacTCP	2.2	?	N6OYU
	Mac TCP/IP		
NET KA9Q)		910123	PE1CHL (orig by
BM	?	?	?
	BDale's Mailer for NOS		
IM/Mac	1.0b20	?	ON1XK
	Mac BM Mailer		

My thanks to:

Russ NW6U @ KI6EH.#NOCAL.CA.USA

Send corrections to:

# Jeff Liebermann Box 272 1540 Jackson Ave Ben Lomond CA 95005  
# 408.336.2558 voice wb6ssy@ki6eh.#nocal.ca.usa wb6ssy.ampr.org [44.4.1.86]  
# 408.699.0483 digital\_pager 73557,2074 cis [don't]  
# jeffl@comix.santa-cruz.ca.us uunet!comix!jeffl jeffl%comix@scruz.ucsc.edu



Subject: Amateur Radio Callsign License Plates

The ARRL Regulatory Information Branch may have more up-to-date info, but here is the latest file:

The following information is from the ARRL Regulatory Information Branch files:

This report was compiled from data given to ARRL HQ from ARRL State Government Liaison volunteers. If you know that any of this information is incomplete, a letter to the Regulatory Information Branch at ARRL HQ would be appreciated. Email sent to 2155052@mcimail.com Subject: "Attention RIB" will be printed and forwarded to the Regulatory Information Branch.

NOTE: Most states require a copy of an FCC amateur license as well as proof that tax has been paid on the vehicle. They also require that the title is in the ham's name. The license fees, in most cases, are in addition to the usual registration fee.

The asterisk indicates that the information is from 1986. All other information is current as of 1991.

STATE	INITIAL/RENEWAL FEE	NOTES
Alabama*	\$ 3/3	
Alaska*	\$ free/free	General or above with 5 band capability
	\$ 20/30	Novice or Technician
Arizona	\$ 5/free	
Arkansas	\$ 2	private passenger vehicles and pickups only - October 1 deadline
California	\$ 21/none	
Colorado	\$ 2/2	
Connecticut	\$12/Free	Only issued for passenger, commercial, combination, camper or motorcycles Processing time-9 weeks
Delaware*	\$ 10/free	
Florida	\$ 5.00/1.50	
	(service fee) 2.50	
	(postage fee) 1.30	
Georgia*	\$25/25	same cost as vanity plates
Hawaii*	\$ 3.25/3.25	
Idaho	\$ 5/free	
Illinois	\$3/free	Illinois residents over 65 can get plates at half cost--excludes amateur "Ham Radio" appears on plate Car, truck or motorcycle only If driver has ham tags, may legally use a headset special brochure available
Indiana	\$ 2/2	
Iowa*	\$ 5/5	
Kansas	\$ 1/1	Passenger or trucks Same call sign/tag permitted on cars and trucks

Kentucky*	\$ 25/25	
Louisiana	\$ 1/1	
Maine	\$ 15/15	
Maryland*	\$ 5/5	
Massachusetts	\$40/40	Ham tag fee is half way between regular plate registration of \$20 and vanity plate fee of \$70 processing time is 3-4 months passenger vehicles only (law pending to include other types of vehicles) Novice operators not eligible for ham plates Only people with ham tags eligible for a permit to own a ham rig capable of receiving police frequencies
Michigan	\$ 2/free	
Minnesota	\$ 10/free	
Mississippi	\$15/	
Missouri	\$15/15	Affidavit required stating that Amateur holds an amateur license SGL is state legislator Ham tags issued only to "conditional" tags expire Dec. 31
Montana	\$ 5/	
Nebraska	\$9/5	Passenger, camper, or truck Processing time--4-6 weeks plus usual registration fee
Nevada	\$25/free	Plates not available in NH
New Hampshire	\$ 10/free	more than one car can use a ham call (e.g. W2WEC-2)
New Jersey	\$ 10/free	
New Mexico*	\$ 3/3	
New York	\$11/5	More than one ham call can be used, but must be altered (KB1HQ-1)
North Carolina	\$10/	Bills currently in House and Senate to raise the fee to \$10.00 each year
North Dakota	\$ Free/ Free	
Ohio*	\$ 5/free	
Oklahoma*	\$ 2.70/2.70	
Oregon*	\$ 5/free	
Pennsylvania	\$ 20/free	request for multiple plates (WA3IAO-1) pending
Rhode Island	\$ free	
South Carolina	\$ 1/1	Deadline: July 1 and plate is valid starting Nov. 31
South Dakota*	\$ 2.50/2.50	
Tennessee*	\$ free/free	
Texas	\$ 2/1	
Utah	\$ 5/none	
Vermont*	\$15/15	
Virginia	\$ 1/1	Amateur equipment must be kept in the vehicle
Washington	\$ 6/free	
West Virginia	\$ 5/	All plates expire July 1
Wisconsin	\$10/free	
Wyoming*	\$ 4/4	

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Ed Hare, KA1CV

ehare@arrl.org

American Radio Relay League  
225 Main St.  
Newington, CT 06111  
(203) 666-1541 - voice  
ARRL Laboratory Supervisor  
RFI, xmtr and rcvr testing  
-----

There is no limit to what you can  
accomplish if you don't care who  
gets the credit. - Harry S Truman





Subject: THE ARRL INCOMING QSL BUREAU SYSTEM

#### Purpose

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of numerous call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteers. The service is free and ARRL membership is not required.

#### How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL Outgoing QSL Service. The member sends his cards to his outgoing bureau where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus where volunteers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one or more letters of the alphabet. Operating costs are funded from ARRL membership dues.

#### Claiming your QSLs

Send a 5 x 7-1/2 or 6 x 9 inch self-addressed, stamped envelope (SASE) to the bureau serving your callsign district. Neatly print your call-sign in the upper left corner of the envelope. A suggested way to send envelopes is to affix a first class stamp and clip extra postage to the envelope. Then, if you receive more than 1 oz. of cards, they can be sent in the single package.

Some incoming bureaus sell envelopes or postage credits in addition to the normal SASE handling. They provide the proper envelope and postage upon the prepayment of a certain fee. The exact arrangements can be obtained by sending your inquiry with a SASE to your area bureau. A list of bureaus appears below.

#### Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you with a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

#### DOs

- \* DO keep self-addressed 5 x 7-1/2 or 6 x 9 inch envelopes on file at your bureau, with your call in the upper left corner,

- and affix at least one unit of first-class postage.
- \* DO send the bureau enough postage to cover SASEs on file and enough to take care of possible postage rate increases.
  - \* DO respond quickly to any bureau request for SASEs, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.
  - \* DO notify the bureau of your new call as you upgrade. Please send SASEs with new call, in addition to SASEs with old call.
  - \* DO include a SASE with any information request to the bureau.
  - \* DO notify the bureau in writing if you don't want your cards.

#### DON'Ts

- \* DON'T send domestic US to US cards to your call-area bureau.
- \* DON'T expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.
- \* DON'T send your outgoing DX cards to your call-area bureau.
- \* DON'T send SASEs to your "portable" bureau. For example, AA2Z/1 sends SASEs to the W2 bureau, not the W1 bureau.
- \* DON'T send SASEs to the ARRL Outgoing QSL Service.

#### ARRL INCOMING DX QSL BUREAU ADDRESSES

First Call Area: All calls\* -  
 W1 QSL Bureau  
 Y.C.C.C.  
 Box 216, Forest Park Station  
 Springfield, MA 01108

Second Call Area: All calls\* -  
 ARRL 2nd District QSL Bureau  
 N.J.D.X.A., P.O. Box 599  
 Morris Plains, NJ 07950.

Third Call Area: All calls -  
 C-CARS, P.O. Box 448  
 New Kingstown, PA 17072 - 0448

Fourth Call Area: All single-letter prefixes (K4, N4, W4) -  
 Mecklenburg Amateur Radio Club  
 P.O. Box DX  
 Charlotte, NC 28220

Fourth Call Area: All two-letter prefixes (AA4, KB4, NC4, WD4, etc.) -  
 Sterling Park Amateur Radio Club

Call Box 599  
Sterling Park, VA 22170

Fifth Call Area - All calls\* -  
ARRL W5 QSL Bureau  
P.O. Box 44246  
Oklahoma City, OK 73144

Sixth Call Area: All calls\* -  
ARRL Sixth (6th) District DX QSL Bureau  
P.O. Box 1460  
Sun Valley, CA 91352

Seventh Call Area: All calls -  
Willamette Valley DX Club, Inc.  
P.O. Box 555  
Portland, OR 97207

Eighth Call Area: All calls -  
8th Area QSL Bureau  
P.O. Box 182165  
Columbus, OH 43218-2165

Ninth Call Area: All calls\* -  
Northern Illinois DX Assn.  
Box 519  
Elmhurst, IL 60126

Zero Call Area: All calls\* -  
W0 QSL Bureau  
P.O. Box 4798  
Overland Park, KS 66204

Puerto Rico: All calls\* -  
KP4 QSL Bureau  
P.O. Box 1061  
San Juan, PR 00902

U.S. Virgin Islands: All calls -  
Virgin Islands ARC  
GPO Box 11360  
Charlotte, Amalie  
Virgin Islands 00801

Hawaiian Islands: All calls\* -  
Wayne Jones, NH6GJ  
P.O. Box 788  
Wahiawa, HI 96786

Alaska: All calls\* -  
Alaska QSL Bureau  
4304 Garfield St.  
Anchorage, AK 99503

Guam: MARC  
Box 445  
Agana, Guam 96910

SWL: Mike Witkowski  
4206 Nebel St.  
Stevens Point, WI 54481

QSL Cards for Canada may be sent to:

CRRL DX QSL Bureau System  
Kennebecasis Valley Amateur Radio Club  
Box 51  
St. John, NB E2L 3X1

QSL cards may also be sent to the individual bureaus:

VE1, VE0\* - L.J. Fader, VE1FQ  
P.O. Box 663  
Halifax, NS B3J 2T3

VE2 - A.G. Daemen, VE2IJ  
2960 Douglas Ave.  
Montreal, PQ H3R 2E3

VE3 - The Ontario Trilliums  
P.O. Box 157  
Downsview, ON M3M 3A3

VE4 - Adam Romanchuck, VE4SN  
26 Morrison St.  
Winnipeg, MB R2B 3V4

VE5 - B.J. Madsen, VE5FX  
739 Washington Dr.  
Weyburn, SK S4H 2S4

VE6\*- Norm Waltho, VE6VW  
P.O. Box 1890  
Morinville, AB T0G 1P0

VE7\*- Dennis Livesay, VE7DK  
Delta  
BC V4C 4W7

VE8\*- Rolf Ziemann, VE8RZ  
2 Taylor Road.  
Yellowknife, NWT X1A 2K9

VY1 - Yukon Amateur Radio Assn.  
P.O. Box 4597  
Whitehorse, YU Y1A 2RB

VO1, VO2 - Roland Peddle, VO1BD  
P.O. Box 6  
St. John's, NF A1C 5H5

\* These bureaus sell envelopes or postage credits. Send a SASE to the bureau for further information.

\*eof

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

One of the greatest bargains of League membership is being able to use the ARRL Outgoing QSL Service to conveniently send your DX QSL cards overseas to foreign QSL Bureaus. Your ticket for using this service is your QST address label and just \$2.00 per pound. For those not quite so DX active (sending 10 cards or less), enclose \$1.00. You can't even get a deal like that at your local warehouse supermarket! And the potential savings over the substantial cost of individual QSLing is equal to many times the price of your annual dues. Your cards are sorted promptly by the Outgoing Service staff, and cards are on their way overseas usually within a week of arrival at ARRL Hq. Approximately two million cards are handled by the Service each year!

QSL cards are shipped to QSL Bureaus throughout the world, which are typically maintained by the national Amateur Radio Society of each country. While no cards are sent to individuals or individual QSL managers, keep in mind that what you might lose in speed is more than made up in the convenience and savings of not having to address and mail QSL cards separately. (In the case of DXpeditions and/or active DX stations that use U.S. QSL managers, a better approach is to QSL directly to the QSL manager. The various DX newsletters, the W6GO QSL manager directory, and other publications, are good sources of up-to-date QSL manager information.)

As postage costs become increasingly prohibitive, don't go broke before you're even halfway towards making DXCC. There's a better and cheaper way -- "QSL VIA BURO" through the ARRL outgoing QSL Service!

#### How To Use The ARRL Outgoing QSL Service

- 1) Presort your DX QSLs alphabetically by parent call-sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y and so on). NOTE: Some countries have a parent prefix and use additional prefixes, i.e., U (parent prefix) = ES, R, YL, 4K, . . . . When sorting countries that have multiple prefixes, keep that country's prefixes grouped together in your alphabetical stack. Addresses are not required. DO NOT separate the country prefix by use of paper clips, rubber bands, slips of paper or envelopes.
- 2) Enclose the address label from your current copy of QST. The label shows that you are a current ARRL member.
- 3) Enclose payment of \$2.00 per each pound of cards -- approximately 150 cards weigh one pound. A package of ten (10) cards or less costs only \$1.00. Please pay by check (or money

order) and write your callsign on the check. Send "green stamps" (cash) at your own risk.

- 4) Include only the cards, address label and check in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main Street, Newington CT 06111.
- 5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership" on the primary member's QST address label.
- 6) Blind members who do not receive QST need only include the appropriate fee along with a note indicating the cards are from a blind member.
- 7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is current. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and a QST label enclosed for each ARRL member.

#### Recommended QSL-Card Dimensions

The efficient operation of the worldwide system of QSL Bureau requires that cards be easy to handle and sort. Cards of unusual dimensions, either much larger or much smaller than normal, slow the work of the Bureaus, most of which is done by unpaid volunteers. A review of the cards received by the ARRL Outgoing QSL Service indicates that most fall in the following range: Height = 2-3/4 to 4-1/4 in. (70 to 110 mm), Width = 4-3/4 to 6-1/4 in. (120 to 160 mm). Cards in this range can be easily sorted, stacked and packaged. Cards outside this range create problems; in particular, the larger cards often cannot be handled without folding or otherwise damaging them. In the interest of efficient operation of the worldwide QSL Bureau system, it is recommended that cards entering the system be limited to the range of dimensions given. [Note: IARU Region 2 has suggested the following dimensions as optimum: Height 3 1/2 in. (90 mm), Width 5 1/2 in. (140 mm).]

#### Countries Not Served By The Outgoing QSL Service

Approximately 270 DXCC countries are served by the ARRL Outgoing QSL Service, as detailed in the ARRL DXCC Countries List. This includes nearly every active country. As noted previously, cards are forwarded from the ARRL Outgoing Service to a counterpart Bureau in each of these countries. In some cases, there is no Incoming Bureau in a particular country and cards therefore cannot be forwarded. However, QSL

cards can be forwarded to a QSL manager, i.e.; 3C1MB via (EA7KF).  
For this reason, the ARRL Outgoing Service cannot forward cards  
to the following countries:

A5 Bhutan  
A6 United Arab Emirates  
A7 Qatar  
C9 Mozambique  
D2 Angola  
EP Iran  
ET Ethiopia  
J5 Guinea-Bissau  
KC4 U.S. bases in Antarctica  
KC6 Belau  
V6 (KC6) Micronesia  
KH1 Baker and Howland Is.  
KH4 Midway I.  
KH5 Palmyra and Jarvis Is.  
KH7 Kure I.  
KH8 Am. Samoa  
KH9 Wake I.  
KH0 Mariana Is.  
KP1 Navassa I.  
KP5 Desecheo I.  
OD Lebanon  
P5 North Korea  
S2 Bangladesh  
T2 Tuvalu  
T3 Kiribati  
T5 Somalia  
TJ Cameroon  
TL Central African Republic  
TN Congo  
TT Chad  
TY Benin  
TZ Mali

V4 (VP2K) St. Kitts & Nevis  
VP2E Anguilla  
VP2M Montserrat  
VQ9 Chagos  
VR6 Pitcairn Island  
XT Burkina Faso  
XU Kampuchea  
XW Laos  
XX9 Macao  
1Z (XZ) Myanmar (Burma)  
YA Afghanistan  
ZA Albania  
ZD7 St. Helena  
ZD9 Tristan da Cunha  
ZK3 Tokelau



3C Equatorial Guinea  
3C0 Pagalu I.  
3V Tunisia  
3W, XV Vietnam  
3X Guinea  
4W North Yemen  
5A Libya  
5H Tanzania  
5R Madagascar  
5T Mauritania  
5U Niger  
5X Uganda  
70 South Yemen  
7Q Malawi  
8Q Maldives  
9G Ghana  
9N Nepal  
9Q Zaire  
9U Burundi

NOTE: SWL cards can be forwarded through the QSL Service.

NOTE: We no longer hold cards for countries with no Incoming Bureau. Only cards indicating a QSL manager for a station in these particular countries will be forwarded.



From: dls@genrad.com (Diana L. Syriac)  
Newsgroups: rec.radio.amateur.misc  
Subject: Re: Do QSL bureaus actually work?  
Date: 11 Nov 91 15:04:15 GMT  
Sender: news@genrad.UUCP  
Organization: GenRad, Inc., Concord, Mass.  
Lines: 174

In article <9111081225.AA01153@s5000.RSVL.UNISYS.COM>  
bert@s5000.RSVL.UNISYS.COM writes:

>I got back on HF just about one year ago. This time I decided I'd be a DXer.  
>The second thing I did (after ordering new QSL cards) was to send a buck and  
>some address labels to the Zeroth District QSL Bureau.  
>Since then, I've sent out hundreds of cards via the ARRL outgoing bureau.  
>I've received exactly nothing in return.  
>I realize that the bureau is SUPPOSED to be slow; that's why it's cheap. But,  
>NOTHING? For a WHOLE YEAR? And not even anything that might have dribbled in  
>from my other sporadic efforts over the past 15 years of being a W0?  
>Thinking back, I can't postively recall ever getting ANYTHING from the  
bureaus  
>in any of the districts I've been licensed in, and that's for over 30 years.  
>Is this typical? Am I just expecting too much? Anybody care to relate their  
>experiences?

For the betterment of all hams out there, I'll relate a few things about the  
Incoming QSL bureau. I am a sorter (ie, I'm one of the ones that sends hams  
their foreign QSL cards from the bureau), so I do have first hand knowledge  
of this. Note that all bureaus and sorters are slightly different, but most  
of this applies to all.

EVERYTHING YOU EVER WANTED TO KNOW ABOUT BUREAUS BUT WERE AFRAID TO ASK

\*How long DOES it take to get a card thru the QSL bureau???

The AVERAGE time is 6 months to a year. I've seen cards come thru  
in as little as 3 months....but not often...I've also seen cards  
come  
thru TEN YEARS LATER...but not often. Two years is not an unusual  
time, so do be patient.

\*Why does it take so long???

Well, let's start at the beginning, the FOREIGN ham. Definitely,  
you  
won't see a card until he sends one out. And some don't do this  
but  
once every three months, where they might sit down and send out  
all  
the QSL contacts they've made in the past three months. Some  
foreign  
hams wait YEARS before sending out their QSL cards!!! Then we  
have  
the FOREIGN QSL bureaus. Many foreign QSL bureaus don't send the  
cards  
until they have a specified amount, for example 10 pounds going to  
the  
US. This may take six months to build up that amount, and if your

card happens to come in right after they just shipped a bunch....well, you figure it out.

Eventually, it reaches the incoming QSL bureau. You get them in a few days, right? WRONG. Next, the incoming QSL bureau does a "primary sort" to separate the QSL cards into 26 letters, the letter immediately after the number. Now, these "letter" cards have to get to the letter sorter (like me) somehow. Either the sorter goes to pick them up, or the cards are delivered to an intermediary, who delivers them to another intermediary, who calls the letter sorter, who comes to pick up his cards. Up until 6 months ago, there were two intermediaries between me and the QSL bureau. Now there is only one. But figure one to three months between the time when the cards get to the QSL bureau and the time it gets to the sorter.

Ok, now the letter sorter does a "secondary sort" to sort the QSL cards by the SECOND letter after the number (or first/second letter before the number for 2x1 calls). The letter sorter also has to process all the new "credits" (cash, stamps, envelopes) that have come in that month from US hams who want their cards. Finally, the sorter starts sending out QSL cards IF the ham has money/envelopes on hand. Depending on his schedule, this may occur anywhere from 1 week to 1 month after he gets the cards from the bureau.

Remember, he may have been on vacation for two weeks, his work schedule may be too busy, there may be three THOUSAND cards to sort, any number of reasons why it takes so long. The letter sorter IS A VOLUNTEER and gets nothing in return for doing this job....except an occasional nice letter from thankful hams and an occasional nastygram from those not so thankful hams who think THEY know better than he how to do his job.

If you add all those times up, you'll see why it takes an average of 6 months to a year.

\*OK, assuming that the letter sorter does get QSL cards for me, do I get them immediately?

Not necessarily. Different sorters work differently. I used to send

ALL QSL cards out if the ham had an envelope on hand. But after getting a number of nastygrams complaining about only one QSL card in the envelope, I have changed my methods. Now, I send out cards if there is an ounce of cards (about 5) OR if I've held the one or

two cards for 90 days. I figure if I've held it for 90 days and there are no more coming in, the ham probably still wants the cards. I have a few hams who have specifically requested that I send their cards every month regardless of how many they have, and I do this.

\*Oh, gee, you HOLD cards? Then I'll just put 5 ounces of postage on and let you send me the cards when you get 5 ounces worth!  
DON'T DO THIS, PLEASE!!!! When sending in envelopes, ALWAYS only place one ounce of postage on the envelope. Sure, send along extra postage or cash for additional ounces or postal increases, but don't attach it to the envelopes. Remember, it's your money, and if you want to waste 5 ounces of postage on 1 ounce of cards, that's your business. But why not make it easy for the poor sorter who sorts your cards for no pay? Many (like myself) don't have room to store many thousands of cards for many months. They get sent out after 90 days regardless of how many you have.

\*I don't have any 5x7 or 6x9 inch envelopes, I'll just send a small envelope instead.  
Another DON'T DO THIS. The small personal envelopes are TOO SMALL for QSL cards. The business size envelopes are just marginally better and work for most QSL cards. But foreign QSL cards vary in size and many will not fit in a standard business size envelope either. If you're looking for a better compromise, there's some oversize business size envelopes that are about 1/2" larger, or use number 6 size envelopes (Christmas card size envelopes). Obviously, I prefer 5x7 or 6x9 inch envelopes, since they are easier to keep track of.

The other alternative is to let the sorter "buy" envelopes for you. Most (not all) bureaus will allow you to send in money instead of envelopes. The sorter then charges a set fee (for our bureau, it's 10 cents an envelope or 3 for 25 cents) for envelopes. And before you croak about how expensive that is, check the local prices of 6x9 inch envelopes....I think I saw at the local store three 6x9 inch envelopes for 79 cents.....I'm really making a bundle on selling envelopes, aren't I?

\*What happens to QSL cards if the ham doesn't have any money/envelopes at the sorter?  
This varies. But, most sorters will hold the cards for up to 45 days. After this point, they will get disposed (thrown away) or sent back to the QSL bureau. Some sorters may send out postcards to notify the ham that he has cards on file; I do. However, if the ham doesn't

is  
the  
hold  
the  
QSL,  
new  
Unknown",  
future

respond IMMEDIATELY, the cards will get destroyed. Figure there about 3 month return trip between the time you send something to QSL bureau and the time the sorter actually receives it, so don't expect your cards within a month. I hold cards for about 90 days, then throw them away. I have some "accounts" that I don't even them for 90 days. These are hams that I've sent a postcard to in past and got no response....or got a response that says "I don't don't bother me!" No interest in QSL cards, so out they go. This means that when you change your address or call, send your address to the bureau! If the cards bounce due to "Address Unknown", you'll receive no more cards and cards will not be stored for future posterity.

\*What do I do when I get a new callsign?  
your  
"new"  
then

Send the QSL bureau a letter indicating your OLD callsign(s) and new callsign. The "old" sorter will transfer your account to the sorter. It will take a couple extra months the first time, but it will settle down again.

\*I sent some envelopes in to the bureau a year ago and still haven't received any cards, what do I do?  
set.  
cards  
can

I'd say be patient and wait longer. Maybe there were no QSL cards for you. The envelopes/money is still there, so you should be HOWEVER, if you wish to find out what your "account" is like, ASK. Send a Self-Addressed Stamped Envelope (this can be any size, but business envelope is best, cuz you might get some enclosed QSL with your response!) and ASK for the status of your account. You also ask for information on the incoming and/or outgoing bureau at the same time. I have flyers that describe both of these. And if you're smart, you might also send along a dollar at the same time to update your account....JUST IN CASE you're receiving no cards because there is no money in your account. I mean really, you can afford a dollar, right?

lose  
the  
was  
general.

Do keep in mind that QSL bureaus are human too. Sometimes they money/envelopes. This happened to me once. The bureau "found" lost envelope behind a sorting box six months later. Meanwhile, I coughed up the cash from my personal checking account, figuring it I that had lost the money. Sorters are very nice persons in

Treat yours nice, and you'll get good service.

Hope I answered all your questions (and more!).

Diana

```
->Diana L. Syriac      dls@genrad.com      Ham: KC1SP (Sweet
Pea)      <-
->I'D RATHER BE FLYING! P-ASEL, INST      CAP: 1LT, Freedom
690 Mobile<-
->GenRad      AD ASTRA, PER
ASPERA      <-
->MS/6, 300 Baker Ave, Concord, Mass. 01742      (508) 369-4400 x2459      <-
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Subject: List of QST Product Reviews

Company	Product	QST Issue
A & A Engineering	Deluxe Memory Keyer Kit	Nov-88
A & A Engineering	Smart Battery Charger	Aug-88
A.E.A.	AD-1 Auto Dialer	May-79
A.E.A.	AMT-1 AMTOR Terminal Unit	Nov-83
A.E.A.	AT-300 Antenna Tuner	Aug-90
A.E.A.	BT-1P Code Trainer	Feb-83
A.E.A.	CK-1 Memory Keyer	Aug-81
A.E.A.	CP-1 Computer Patch Interface	Apr-84
A.E.A.	Doctor DX C64 Morse Trainer	Dec-84
A.E.A.	Hot Rod Antenna For 2-M	Nov-83
A.E.A.	Isopole 2-M Antenna	Apr-80
A.E.A.	Isopole 220-MHz Vertical Gain	Jun-82
A.E.A.	KT-1 Keyer	Jan-81
A.E.A.	KT-2 Keyer/Trainer	Dec-83
A.E.A.	MBA RO Code Reader	Aug-83
A.E.A.	MBA-RC Code Reader	Aug-83
A.E.A.	MK-1 Memory Keyer	Oct-80
A.E.A.	MM-3 Morse Machine	Jul-90
A.E.A.	Morsematic MM1	Oct-80
A.E.A.	PAKRATT Model PK-64	Jun-86
A.E.A.	PK-232 Multi-Mode Digital Comm	Jan-88
A.E.A.	PKT-1 Terminal Node Controller	Nov-85
Accu-Circuits	Accu-Memory II keyer	Jul-79
Advanced Computer Control	RC-850 Repeater Controller	Feb-84
Advanced Radio Devices	230A HF/MF Linear Amplifier	May-89
Advanced Receiver Research	MM144VDG Mast-Mounted Preampli	Feb-87
Advanced Receiver Research	MML144VDG Mast-Mounted Preampl	Feb-87
Advanced Receiver Research	TRS04VD TR Sequencher	Feb-87
Alda	103 Transceiver	Dec-78
Alinco	ALM-203T 2-M FM Hand-Held Tra	Jun-86
Alinco	DJ-100T Hand-Held 2-Meter FM T	Mar-89
Alinco Electronics	DR-110T 2-Meter FM Transceiver	Jul-89
Alliance	HD-73 Heavy-Duty Rotator	Dec-80
AMCOMM	S225 2-M Transceiver	Jan-78
Ameco Equipment Co.	Ameco PT-3 1.8-54 MHz Preampl	Apr-88
Ameritron	AL-1200 HF Linear Amplifier	Dec-85
AmpereX	110 2-M Amplifier	Mar-79
Angle Linear	VHF/UHF Receiving Preamplifier	Aug-78
Antenna Specialists	HM-224 220-MHz Mobile Antenna	Apr-77
Antenna, Inc.	Model 10043 Power/SWR Meter	Nov-76
Apollo (Village Twig)	2000X-2 Antenna Tuner	May-80
ARCOS	432-MHz Trans. Conv./Amps.	Aug-76
Astrolite	436B Headset	Jan-79
Austin	OMNI 2-M Antenna	Dec-83
Austin Custom Antenna	Metropolitan Triband VHF/UFH A	Jan-89
Autek Research	MK-1 Keyer	Jun-77
Autek Research	QF-1 RC Active Filter	Mar-77
Autek Research	QF-1A Audio Filter	Jul-80
Autek Research	WM1 SWR/Wattmeter	Nov-89
Autek Research	WM1 SWR/Wattmeter	Nov-89
Avanti	AH 151.3G Window-Mount Antenna	Dec-79
Avatar Magnetics	Transformers	Nov-82

Azden	PCS 2000 2-M FM Transceiver	Aug-80
Azden	PCS-300 2-M Hand-Held	Sep-82
B & K	Model 1820 Frequency Counter	Nov-78
B & W	RF Clipper	Oct-79

Company	Product	QST Issue
Barlow-Wadley	XCR-30 Receiver	Jan-77
Bearcat	Model 100 Scanner	Mar-83
Bearcat	Model 210 Scanner	Jul-78
Bencher	Paddle	May-78
Bencher	Paddle (Improved model)	Dec-80
Bencher	ZA-1 and ZA-2 Baluns	Oct-80
Berk-Tek	RG-8X Coaxial Cable	Dec-79
Bird	4360 and 4362 Ham-Mate Wattmet	Aug-79
Bird	43P Peak-reading Directional W	Dec-89
Bird	Model 4381 Power Analyst	Jul-80
Bird	Model 4410 Thruline Wattmeter	Oct-83
Bird Electronic Corp.	43P Peak-Reading Directional W	Dec-89
Blacksburg Group	Fist Fighter Keyer	Jan-83
Brown & Simpson Eng.	MK-75 Electronic Keyer	Aug-76
Bunker Ramo	Solderless Coaxial-Cable Conne	Mar-77
Butternut	HF5V-II Multiband Vertical	May-79
CES	Model 510SA Smart Patch	Apr-84
Clear Channel Communicati	AR-3000 Ranger 10-M All-Mode T	Jun-87
Clegg	AB-144 All-Bander Receiving Co	Oct-80
Clegg	FM-28 2-M FM Transceiver	Jun-78
Clegg	FM-DX 2-M FM Transceiver	Sep-76
Coaxial Dynamics	83000-A MF/HF Wattmeter	Feb-91
Collins	KWM-380 HF Transceiver	Oct-82
Collins	Low-Cost Mechanical Filter	Jun-78
Comet	CD-160H MF/HF Wattmeter	Feb-91
Communications Elec. Spec	CES 200 & CES 210 Tone Pads	Feb-76
Communications Elec. Spec	Model 100 Digital Display	Apr-76
Communications Power	WM-7000 Wattmeter	Sep-78
Communications Specialist	SS-32 M CTCSS Encoder	Mar-83
Communications Specialist	TE-64 Tone Encoder	Sep-80
Computer Warehouse Store	Video Monitor	Apr-77
Comtronix	FM-80 10-M FM Transceiver	Dec-80
Creative Design Co	VHF/UHF Log-Periodic Antenna (	Aug-88
Crosby, Jerry	LOGBOOK Software (TRS-80)	Dec-83
Cubic	Astro 102 BXA HF Transceiver	Dec-81
Curtis	EK-480M CMOS Deluxe Keyer	Jun-80
Curtis	EK430 keyer & 8044-2 Kit	Feb-76
Curtis	IK-440 Instructokeyer	Mar-76
Cushcraft	2-M Collinear Array	Feb-78
Cushcraft	220B 220-MHz Boomer	Aug-83
Cushcraft	225WB 220-MHz Yagi	Dec-89
Cushcraft	225WB 220-MHz Yagi	Dec-89
Cushcraft	32-19 Boomer & 324K Stacking K	Nov-80
Cushcraft	40-2CD 40-M Skywalker Yagi	Jul-83
Cushcraft	617-6B Boomer 6-M Yagi	Sep-82
Cushcraft	A4 Yagi Antenna	Jan-83
Cushcraft	ARX-220B Ringo Ranger Antenna	Nov-87
Cushcraft	ATB-34 Tribander	Jun-79
Cushcraft	D3W World Ranger 12,17 and 30-	Oct-90

Cushcraft	R3 3-Band Vertical	Mar-83
Cushcraft	R5 Multiband Vertical Antenna	Oct-90
Daiwa	AF-606K Audio Filter	Jan-83
Daiwa	CN-720 SWR and Power Meter	Jan-79
Daiwa	CS-201 and CS-401 Coaxial Swit	May-79
Daiwa	RF 440 RF Speech Processor	Apr-79
Data Precision	938 Digital Capacitance Meter	Nov-79

Company	Product	QST Issue
Datong Electronics Ltd.	Datest 1 IC/Transistor Tester	Apr-77
Datong Electronics Ltd.	FL1 Audio Filter	Aug-79
Datong Electronics Ltd.	PC1 General-Coverage Receiving	Apr-83
Davis	CTR-2-500 Frequency Counter	Apr-78
Daytronics	Mimic Programmable-Memory Keye	Dec-78
Decibel Products	DB-702/DB-702T Antennas	Oct-76
Decibel Products	Vapor-Bloc Coaxial Cable	Nov-78
Dentron	160-V Skyclaw Antenna	Nov-76
Dentron	MLA 2500 Amplifier	Mar-78
Design Electronics	QSK 1500 High Power RF Switch	Sep-85
DGM Electronics, Inc.	SRT 3000 Terminal	Dec-83
Diamond Antenna	SX-100 MF/HF Wattmeter	Feb-91
Diawa	NS-660PA MF/HF Wattmeter	Feb-91
Dielectric Communications	Model 1000A RF Wattmeter	Dec-79
Digital Radio Systems	PC Packet Adapter	Feb-89
Direct Conversion Techniq	DC-10A Receiver Module and VV-	Jan-79
Down East Microwave	23-cm & 13-cm Loop Yagis	Jul-90
Down East Microwave	3333LY 33-CM Loop Yagi	Apr-87
Drake	R-7 Receiver	Jan-80
Drake	RCS-4 Remote Coax Switch	Dec-76
Drake	TR-7 HF Transceiver	May-79
Drake	UV-3 VHF FM System	Aug-78
DSI Instruments	3600A Frequency Counter	Feb-79
E-Tek	FR4TR Frequency Counter	Oct-80
Egbert	RTTY Program	Jun-82
Electronic Signal Product	VHF 144-5A 2-M FM Receiver Kit	Nov-79
Electrospace Systems	HP-2 160-M Matching Network	Mar-79
Electrospace Systems	HV-580 10-M Dual-Mode Antenna	Mar-79
ETO	Alpha 76 Linear Amplifier	Jan-78
ETO	Alpha 86 Linear Amplifier	Apr-89
Flesher	TR-128 Baud-Rate Converter	Apr-80
Flesher	TU-170 RTTY Terminal	Mar-79
Flesher	TU-300 & TU-400 RTTY Modem	Jun-83
Flesher	TU-400 & TU-300 RTTY Modem	Jun-83
Fluke	8020A Multimeter	Sep-78
Fox-Tango	2.1-kHz TS-830 Filter	Sep-83
Fox-Tango	YF-90H1.8 Crystal Filter	Apr-82
Garant Enterprises	GD-8 "Window" Antenna	Sep-90
GEM	Quad Antenna	Jan-78
Genave	GTX-1 2-M Handheld Transceiver	Dec-76
Genave	GTX-100 220-MHz Transceiver	May-76
Genave	GTX-800 2-M FM Transceiver	Nov-78
HAL	2550/ID Keyer	Sep-76
HAL	CWR 6850 Telereader RTTY/CW Te	May-83
HAL	DS-3000 Video Display Terminal	May-77
HAL	DS-3100 ASR Video Display Term	Apr-80

HAL	FYO Key	Dec-76
HAL	MCEM-8080 Microcomputer	Dec-76
HAL	ST-6000 Demodulator	May-77
Ham Radio Center, Inc.	Adjustable key	Jul-76
Hamco	Scotia Paddle	Dec-78
Hamlog/AppleCoder	Apple II Software	Jan-83
Hamtronics	432-435 MHz Converter Kits	Jul-78
Hamtronics	P8 VHF Preamplifier	May-77
Hamtronics	XV-4 Transmitting Converter	Jan-82
Harp, H. Alan	CW Sendin' Machine	Jul-76

Company	Product	QST Issue
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Heath	EE-3404 6809 uP Course	Jul-84
Heath	ETS-3401 Microcomputer Trainin	Sep-82
Heath	GC-1000 "Most Accurate Clock"	Jan-86
Heath	GR-740 Scanner	Jan-85
Heath	GU-1820 AC Power System	Dec-82
Heath	HD-1250 Dip Meter	Jan-76
Heath	HD-1410 Electronic Keyer	Mar-78
Heath	HD-1418 Active Audio Filter	Mar-84
Heath	HD-1420 VLF Converter	Nov-86
Heath	HD-1422 Antenna Noise Bridge	Nov-86
Heath	HD-1982 Micoder Microphone	Nov-76
Heath	HD-3030 Computer Interface	Feb-85
Heath	HD-4040 Terminal Node Controll	Nov-85
Heath	HD-8999 Ultra Pro CW Keyboard	Apr-84
Heath	HFT-9 Antenna Tuner	Jul-84
Heath	HK-232 Packkit Multi-Mode Digi	Jan-88
Heath	HL-2200 Amplifier	Nov-83
Heath	HM-2140 Dual HF Wattmeter	Feb-80
Heath	HM-2140-A MF/HF Wattmeter	Feb-91
Heath	HM-2141 VHF Wattmeter	Sep-80
Heath	HN-31A Cantenna	May-84
Heath	HO-5404 Station Monitor	Jan-87
Heath	HR-1680 Receiver	Jan-77
Heath	HV-2000 Voice Synthesizer	Dec-87
Heath	HW-104 HF Transceiver	Dec-76
Heath	HW-2021 2-M FM Hand-Held Trans	Jan-77
Heath	HW-5400 HF Transceiver	Oct-84
Heath	HW-8 QRP Transceiver	Apr-76
Heath	HW-9 Delux QRP CW Transceiver	Jul-85
Heath	HW-99 Novice CW Transceiver	Mar-86
Heath	HX-1681 CW Transmitter	Mar-81
Heath	IB-5281 RLC Bridge	Dec-80
Heath	IC-2100 Elec. Slide Rule	Aug-76
Heath	ID-4801 Eprom Programmer	Aug-86
Heath	IM-2215 Digital Multimeter	Jun-80
Heath	IM-2320 Digital Multimeter	May-87
Heath	IP-2715 Battery Eliminator	Jun-77
Heath	IP-2718 Tri-Power Supply	May-77
Heath	SA-1480 Remote Antenna Switch	Jul-80
Heath	SA-2040 Antenna Tuner	Nov-80
Heath	SA-2060 Transmatch	Jul-82
Heath	SA-2500 Antenna Tuner	Mar-85
Heath	SA-2550 Remote Antenna Matcher	Aug-88

Heath	SA-7010 HF Tribander	Aug-80
Heath	SB-104A HF Transceiver	Oct-75
Heath	SB-1400 MF/HF Transceiver	Oct-89
Heath	SB-1400 MF/HF Transceiver	Oct-89
Heath	SB-220 Linear Amplifier	Aug-70
Heath	SB-221 Linear Amplifier	Mar-80
Heath	SB-230 HF Amplifier	Feb-76
Heath	SB-614 Monitorscope	Jun-76
Heath	SB.COM: Computer-Control Soft	Oct-89
Heath	SS-9000 HF Transceiver	Feb-84
Heath	SW-7800 Gen. Cov. Receiver	Apr-85
Heath	uMatic Memory Keyer SA-5010	May-82
Heath	VF-2031 2-M FM Hand-Held Trans	Oct-79

Company	Product	QST Issue
Heath	VF-7401 2-M Transceiver	Nov-81
Heath	VL-1180 2-M Mobile Amplifier	May-82
Heath	VL-2280 2-M Base Station Ampli	Jun-82
Heath	SB-1000 HF Linear Amplifier	Feb-88
Heil Sound, Ltd.	HM-5 Microphone	Apr-84
Henry Radio	3002A 2-Meter Linear Amplifier	Nov-89
Henry Radio	Tempo 3002A 2-Meter Linear	Nov-89
Hewlett-Packard	3476A Digital Multimeter	Apr-77
Hewlett-Packard	HP-25 Programmable Calculator	Oct-76
Horizon	10-FM 2-M Vertical Antenna	Jan-79
Horizon	Model 15-147 Vertical Antenna	Jan-79
Hustler	2-Meter Mag-Mount Antenna	Feb-89
Hustler	6-BTV Vertical Antenna	Jan-84
Hy-Gain	214 2-M Yagi	Oct-78
Hy-Gain	V-2 2-M Antenna	May-82
ICOM	IC-211 Multimode 2-M Transceiv	Dec-78
ICOM	IC-228H 2-Meter FM Transceiver	Jan-89
ICOM	IC-22S 2-M FM Transceiver	Dec-77
ICOM	IC-245 2-M Transceiver	Sep-77
ICOM	IC-25A 2-M Transceiver	Jul-82
ICOM	IC-271 2-M Transceiver	May-85
ICOM	IC-275A 2-Meter Multimode Tran	Oct-87
ICOM	IC-290H 2-M All-Mode Transceiv	May-83
ICOM	IC-2A 2-M FM Hand-Held Transce	Jan-81
ICOM	IC-2GAT Hand-Held 2-Meter FM T	Jun-90
ICOM	IC-375A 220-MHz Multimode Tran	Mar-88
ICOM	IC-3AT 220-MHz FM Transceiver	Feb-83
ICOM	IC-45A 450-MHz FM Transceiver	Nov-83
ICOM	IC-471 70-cm Transceiver	Aug-85
ICOM	IC-551 6-M Multimode Transceiv	Jun-81
ICOM	IC-575A 50- and 28-MHz Multimo	Nov-88
ICOM	IC-701 HF Transceiver	Apr-79
ICOM	IC-720A HF Transceiver	Aug-82
ICOM	IC-725 MF/HF Transceiver	Mar-90
ICOM	IC-730 HF Transceiver	Dec-82
ICOM	IC-735 H Transceiver	Jan-86
ICOM	IC-740 HF Transceiver	Sep-83
ICOM	IC-745 HF Transceiver	Sep-85
ICOM	IC-751	Jan-85
ICOM	IC-761 160- to 10-Meter Transc	Sep-88

ICOM	IC-765 160- to 10-Meter Transc	Dec-90
ICOM	IC-781 160- to 10-Meter Trance	Jan-90
ICOM	IC-900 Multiband VHF/UHF FM Mo	Dec-88
ICOM	IC-u2AT 2-Meter FM Hand Held T	May-87
ICOM	R-70 General-Coverage Receiver	Jun-83
Info-Tech	M-150 and M-75 RTTY Units	Apr-78
Info-Tech	M-44 AMTOR Converter	Aug-85
Info-Tech	Model 300 Keyboard	Apr-79
Info-Tech	Model 30C CW-To-Video Converte	Nov-78
Inline Instruments	Coaxial Relays and Couplers	Apr-76
Instant Software	Electronic Breadboard	Dec-82
International Instrumenta	Digital Capacitance Converter	Mar-79
IRL	FSK-1000 RTTY Demodulator	Jun-80
JRC	NRD 515 All-Wave Receiver	Nov-81
JRC	NRD-525 General-Coverage Recei	Jul-88
JRC	NSD 515 HF Transmitter	Nov-82

Company	Product	QST Issue
Kampp Electronics	Autobrak Kits	Aug-78
Kantronics	8040-B Receiver	Jun-78
Kantronics	All Mode Communicator No. 7414	Jun-89
Kantronics	CW Training System	Mar-83
Kantronics	Interface I & Software	Feb-84
Kantronics	Interface II & Software	Sep-84
Kantronics	KPC-2400 Packet Communicator	Nov-87
KDK	FM-2051 2-M Transceiver	Oct-78
Kenwood	AT-250 Automatic antenna tuner	Oct-88
Kenwood	DM-81 Dip Meter	Dec-80
Kenwood	Dual-Band VHF/UHF FM Transceiv	Feb-89
Kenwood	R-1000 General-Coverage Receiv	Dec-80
Kenwood	R-820 Receiver	Jul-79
Kenwood	RC-10 Remote control Handset	Feb-89
Kenwood	TH-21AT 2-M Transceiver	Apr-85
Kenwood	TL-922A Linear Amplifier	Sep-80
Kenwood	TM-221A/321A/421A VHF/UHF FM T	Jul-88
Kenwood	TM-2570A 2-Meter Transceiver	Oct-86
Kenwood	TR-2400 2-M FM Transceiver	Apr-81
Kenwood	TR-751A 144-MHz All-Mode Trans	Mar-87
Kenwood	TR-7730 2-M FM Transceiver	May-82
Kenwood	TR-7800 2-M FM Transceiver	Sep-81
Kenwood	TR-9000 2-M Multimode Transcei	Dec-81
Kenwood	TR2200A 2-M FM Transceiver	Nov-76
Kenwood	TR7400A 2-M Transceiver	Sep-77
Kenwood	TS-120S HF Transceiver	Feb-80
Kenwood	TS-130S HF Transceiver	Jul-81
Kenwood	TS-140S 160- to 10-Meter Tran	Jun-88
Kenwood	TS-180S HF Transceiver	May-80
Kenwood	TS-430S HF Transceiver	Mar-84
Kenwood	TS-440S HF Transceiver	Dec-86
Kenwood	TS-520S HF Transceiver	May-78
Kenwood	TS-530S HF Transceiver	Mar-82
Kenwood	TS-700A 2-M Transceiver	Mar-76
Kenwood	TS-700S 2-M Transceiver	Feb-78
Kenwood	TS-820 HF Transceiver	Sep-76
Kenwood	TS-830 HF Transceiver	May-81

Kenwood	TS-8400 UHF FM Transceiver	Jan-82
Kenwood	TS-930S HF Transceiver	Jan-84
Kenwood	TS-940S HF Transceiver	Feb-86
Kenwood	TS-950SD MF/HF Transceiver	Jan-91
Kenwood	TV-502 2-M Transverter	Aug-77
Kenwood	TW-4000A 2-M/70-CM FM Dual Ban	Aug-84
Kenwood	R-5000 General-Coverage Receiv	Feb-88
Kenwood	TH-31BT Hand-held Transceiver	Nov-87
Kenwood	TS-680S 160- to 6-meter transc	Oct-88
Klitzing	70CM10W60 UHF Amplifier	Jun-79
Klitzing	SSB-1 Squelch Board	Jun-79
KLM	144-148-13LBA 2-M Yagi	Feb-85
KLM	16-Element 2-M Yagi	Aug-79
KLM	2-M-16LBX 2-M Yagi	Mar-85
KLM	21.0-21.5-6A Big Sticker Anten	Dec-83
KLM	220-22LBX 220-MHz Yagi	Sep-86
KLM	2M-22C and 435-49CX Yagis	Oct-85
KLM	40-M Yagi	Nov-77
KLM	7.2-2 40-M Yagi	Jul-84

Company	Product	QST Issue
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KLM	AP-144DIII Base Stn. Antenna	Sep-83
KLM	PA 15-80BL 2-M Linear Amplifie	Sep-79
Kronotek	RT-1 RF-Actuated Timer	Jan-77
L-Tronics	Little L-Per VHF Direction Fin	Apr-78
Lab Science	Econotrace Curve Tracer	Oct-76
Lafayette	HA-146 2-M FM Transceiver	Jul-76
Lambda	Coaxial Portal Unit	Nov-82
Lance Johnson Engineering	D-Lay-5 Rotator Control	Apr-83
Larsen	JM Mobile Antenna Mount	Apr-76
Layfayette	BCR-101 Communications Receive	Jan-79
Leader	LAC-895 Antenna Coupler	Jul-76
LMW Electronics	2304TRV2 2304-MHz Transverter	Dec-87
LMW Electronics	LMW 1296TRV1K 23-cm Transverte	Dec-87
M & M Electronics	Model MSB-1 Audio Filter	Jun-82
Macrotronics	Code Class	Mar-83
Macrotronics	M800 RTTY System	Nov-79
Macrotronics	Ritty Riter	Dec-80
Macrotronics	RM1000 Modem	Jun-84
Macrotronics	Terminall RTTY Modem	Jun-82
Maggiore Elec Lab	Hi Pro MK I 2-M Repeater	Aug-84
Maggiore Elec Lab	Hi Pro MK1 220-MHz Repeater	Feb-82
MAXCOM	Antenna Matcher & Dipole	Nov-84
McKay Dymek	DR33C All-Wave Receiver	Sep-79
MFJ	1278 Multi-mode Data Controlle	Sep-89
MFJ	815B MF/HF Wattmeter	Feb-91
MFJ	CMOS-440RS Electronic Keyer	May-76
MFJ	MFJ 484 Grandmaster Keyer	Aug-80
MFJ	MFJ-1270 Terminal Node Control	Sep-86
MFJ	MFJ-1278 Multi-Mode Data Contr	Jul-89
MFJ	MFJ-931 Artificial RF Ground	Apr-88
MFJ	MJF 496 Keyboard	Jul-82
Micro Pro Systems	MPS CW Machine II	Jul-84
Micro-80, Inc.	Morse Code Trainer II	Oct-83
Microcomm	UHF Modules	Aug-76

Microcraft	Code*Star Reader Kit	Jul-83
Microtronics	M-80 Ham Interface	May-79
Microwave Associates	89127 10-GHz Transceiver	Sep-77
Microwave Modules	MMC 1296 Receiving Converter	Dec-77
Microwave Modules	MMD050 Counter	Nov-76
Microwave Modules	MMD500P Prescaler	Nov-76
Microwave Modules	MMS1 & MMS2 Code Trainers	Jun-84
Microwave Modules	MMT432 Transverters	Sep-77
Microwave Modules	MMV 1296 Varactor Tripler	Dec-77
Midland	13-509 220-MHz Transceiver	Oct-77
Miller, J.W.	AT2500 Antenna Tuner	Jul-81
Miller, J.W.	TVI Filters	Jan-78
Mirage	A1015 6-M Amplifier	Aug-84
Mirage	B-108 2-M Amplifier	May-79
Mirage	B215 2-M Amplifier	Feb-85
Mirage	C106 All-Mode 220-MHz Amplifier	Mar-83
Mirage	C211 220-MHz Amplifier	Feb-86
Mirage	C22 All-Mode 220-MHz Amplifier	Mar-83
Mirage	D1010 430-450-MHz Amplifier	Jan-84
Mirage	MP1 MF/HF Wattmeter	Feb-91
Mirage	Mp2 VHF Wattmeter	Aug-79
Mity-Time	LCD Clock	Dec-80

Company	Product	QST Issue
Motorola	MEK6800D2 Evaluation Kit	Nov-77
MSL	Digital QSK Kit	Oct-80
Murch	UT-2000-B Transmatch	Apr-82
N9CR	Contest Radio Operating System	Aug-83
National Semiconductor	SC/MP Microprocessor	Jan-77
NDI	HC-1400 2-M FM Transceiver	Nov-79
Nel-Tech Labs	DVK-100 Digital Voice Keyer	Nov-87
Nye Co., William	SSK-3 Keyer/Paddle	Apr-76
Nye-Viking	RFM-003 MF/HF Wattmeter	Feb-91
Omega	T-2000C Beam Steering Combiner	Mar-77
Optoelectronics	8000.1 Frequency Counter	Jan-79
Optoelectronics	8010 Frequency Counter	May-80
Optoelectronics	850-4 Clock & TB-1 Time Base	Jul-77
Optoelectronics	PDT-590 Digital Thermometer	Apr-80
Optoelectronics	TRMS 5000 DMM/Thermometer	Nov-80
PAC-COMM	TNC-200 Terminal Node Control	Jun-87
Palomar Engineers	R-X Noise Bridge	Jan-77
Palomar Engineers	VLF Converter	Aug-78
Penniman-Rasmussen	TVI Filters	May-76
PIPO Communications	PP-1 & PP-2 Tone Encoders	Feb-77
Processor Technology	8KRA Static Memory Module	May-77
Processor Technology	SOL-20 uComputer	Jul-77
Processor Technology	VDM-1 Video Display Module	Mar-77
Propagation Products	Insulators and Quad Kit	Mar-78
QM70 Products	FMT-440 Transverter	Nov-77
Radio Shack	DX-302 Communications Receiver	Aug-81
Radio Shack	RG-8M Coaxial Cable	Dec-80
Radio Shack	TRS-80 Microcomputer	Jun-78
RCA	COSMAC VIP Microcomputer	Feb-79
RF Concepts	RFC 2-23 and RFC 3-22 Solid-St	Mar-88
RF Concepts	RFC 2-317 2-Meter Amplifier -	Oct-87



RF Concepts	RFC 3-312 220-MHz Amplifier	Apr-88
RF Concepts	RFC 8-RC Repeater Controller	Apr-89
RF Products	5/8-Wave 220-MHz & 450-MHz Ant	Aug-83
RIW	432-19 19-Element 432-MHz Yagi	Dec-78
Robot	Robot 800 Terminal	Apr-82
Sabtronics	2000 Digital Multimeter	Feb-79
Santec	LS-202A 2-M SSB/FM Transceiver	Dec-85
SAY	SPS-20M Power Supply	Oct-78
Sem Con	HA-2 2-M Mobile Antenna	May-79
Sherwood	Crystal Filter	Feb-77
Sherwood	SE-1 Microphone Equalizer	Jan-83
SHF Systems	SHF 1240K 1296-MHz Transverter	Feb-90
Sinclair	DO236H 2-M Antenna	Apr-77
Smith Electronics, Dick	K-6345 Radio Direction Finder	Aug-86
Solar Power Corp.	Series E Solar Electric Genera	Aug-77
Solid State Sales	CCD Camera Kit	Feb-77
Soundpower	SP100 Audio Processor	Jan-80
Southwest Technical Prod.	6800 Computer System	Apr-77
Southwest Technical Prod.	AC-30 & MF-68 Interface & Disc	Aug-78
Southwest Technical Prod.	CT-1024 Terminal Systems Kit	Mar-77
Spectrum Communications	SCR 1000 2-M FM Repeater	Jul-83
Spectrum International	1296-MHz Loop Yagi	Jun-78
Spectrum International	JMF 432 & JMF 1296 UHF Filters	Apr-76
Spider	HF Mobile Antenna	Jul-86
SSB Electronics	LT 33S 902-MHz Transverter	Apr-87

Company	Product	QST Issue
Swan	100 MX HF Transceiver & Acc.	Jun-79
Swan	Astro 102 BXA	Dec-81
Swan	Astro 150 HF Transceiver	Jul-80
TAPR	TAPR-1 Terminal Node Controlle	Nov-85
Technico	TEC-9900-SS Computer Kit	Jul-78
TEDCO	Model 1 QRP Transceiver	Nov-80
Tektronix	T922 Dual-Trace Scope	Nov-76
TELCO	125 2-M Class-C Amplifier	Mar-78
Telex Hy-Gain	TH7DX Antenna	Feb-83
Tempo	K6FZ 20-M Loop Antenna	Sep-79
Tempo	S1 2-M FM Transceiver	Jun-79
Ten Tec	Model 585 Paragon 160-10 Meter	May-88
Ten-Tec	247 & 277 Antenna Tuners	Apr-80
Ten-Tec	2510 Mode-B Satellite Station	Oct-85
Ten-Tec	425 Titan HF Linear Amplifier	Apr-86
Ten-Tec	544 HF Transceiver	Jul-79
Ten-Tec	561 Corsair II HF Transceiver	Aug-87
Ten-Tec	Argosy HF Transceiver	Oct-82
Ten-Tec	Century 21 HF Transceiver	Dec-77
Ten-Tec	Century/22 HF CW Transceiver	May-85
Ten-Tec	OMNI D HF Transceiver	Jan-80
Ten-Tec	Omni V Model 562 160-10 Meter	Nov-90
TET	3F35DX Triband Antenna	Apr-80
TET	HB-35 Triband Antenna	Dec-82
Tokyo Hy-Power Labs	HC-200 Transmatch	May-83
Tonna	F9FT 144/16 2-M Yagi	Jul-79
Tono	0-777 Communications Terminal	Apr-87
Tono	EXL-5000E RTTY/CW/AMTOR Term	Jul-85

TUCH-COM	1215 Tone Encoder Microphone	Feb-79
Twin Oaks	Morse Code Training Program	Aug-83
Uniden Corp of America	President HR2510 10-M Transcei	May-89
Universal Software, Inc.	Super-RATT RTTY/CW Software	Nov-83
UPI Communication Systems	Climbing-Safety Belt	Dec-89
UPI Communications System	Climbing-safety Belt	Dec-89
VHF Engineering	Blue Line RF Power Amplifiers	Sep-78
VHF Engineering	CW Identifier Kit	Jul-76
VHF Engineering	RPT 220 220-MHz Repeater	Nov-76
VHF Engineering	Synthesizer II	Feb-78
Vibroplex	Brass Racer Key	Jul-83
Vibroplex	EK-1 Keyer	Jul-83
Viewstar	PT-2000A HF Linear Amplifier	Jan-84
Viewstar	VS 1500A Transmatch	Oct-83
VOMAX	Speech Processor	Aug-77
West Jersey Comm Prod	80-M "BN CAGE" Antenna	Sep-83
Western Electronics	998BUA Trap Dipole	Nov-82
Weston	6000 Digital Multimeter	May-77
Wilson	2202 SM Transceiver	Dec-77
Wilson	System 3 Tribander	Aug-79
Wilson	System 40 Tribander	Apr-82
Wilson	System One 4-Element Tribander	Sep-78
Yaesu	CPU-2500 RK 2-M FM Transceiver	Sep-79
Yaesu	FL-7000 Solid-State HF QSK Lin	Sep-87
Yaesu	FRG-7700 Communications Receiv	Aug-81
Yaesu	FT-101E HF Transceiver	Sep-76
Yaesu	FT-101ZD HF Transceiver	Dec-79
Yaesu	FT-102 HF Transceiver	Oct-83

Company	Product	QST Issue
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Yaesu	FT-107M HF Transceiver	Apr-81
Yaesu	FT-109RH Hand-held Transceiver	Nov-87
Yaesu	FT-127 220-MHz FM Transceiver	Jan-82
Yaesu	FT-127 RA 220-MHz Transceiver	Aug-79
Yaesu	FT-207 R 2-M FM Transceiver	Apr-80
Yaesu	FT-212RH 2-M & FT-712RH 70-cm	Dec-88
Yaesu	FT-221 Multimode 2-M Transceiv	Jul-77
Yaesu	FT-230R 2-M FM Transceiver	Jun-83
Yaesu	FT-23R 2-Meter Hand-held Trans	Dec-87
Yaesu	FT-301D HF Transceiver	Oct-77
Yaesu	FT-470 Dual-BAnd Hand-Held VHF	Sep-90
Yaesu	FT-480 R 2-M Multimode Transce	Oct-81
Yaesu	FT-680 R 6-M Multimode Transce	Aug-82
Yaesu	FT-707 HF Transceiver	Jun-81
Yaesu	FT-708 R 450-MHz FM Transceive	Apr-83
Yaesu	FT-726R VHF/UHF Transceiver	May-84
Yaesu	FT-730R 440-MHz FM Transceiver	Sep-83
Yaesu	FT-736R VHF/UHF Transceiver	May-90
Yaesu	FT-747GX MF/HF Transceiver	Aug-89
Yaesu	FT-757-GX HF Transceiver	Dec-84
Yaesu	FT-767GX All Mode HF Transceiv	Sep-87
Yaesu	FT-77 HF Transceiver	Nov-83
Yaesu	FT-7B HF Transceiver	Mar-80
Yaesu	FT-901DM HF Transceiver	Nov-78
Yaesu	FT-980 HF Transceiver	Nov-84

Yaesu	FT-ONE HF Transceiver	Aug-83
Yaesu	FTV-901 R Transverter	Feb-82
Yaesu	MFJ-1278 Multi-Mode Data Contr	Sep-89
Yaesu	YC-7 Frequency Display	Mar-80
Yaesu	YS-60 MF/HF Wattmeter	Feb-91
Z.R.C.	Cold Galvanizing Compound	Oct-80



From: ehare%arrlhq.UUCP@uhasun.hartford.edu (Ed Hare KA1CV)  
Newsgroups: rec.radio.amateur.misc  
Subject: Re: Ham Radio Interference from Neighbor  
Date: 7 May 92 15:40:01 GMT  
Sender: arrlhq!ehare (Ed Hare KA1CV)  
Organization: American Radio Relay League  
Lines: 115

I received a personal email request for advice that I thought I would share with the net. After this I promise I will shut up about EMI/RFI for a while. :-), Ed.

To: uhasun!nvuxr.cc.bellcore.com!karayan  
Subject: Re: TVI blues  
Message-ID: <648@arrlhq.UUCP>

>I saw your latest posting in netnews on TVI and what the ground  
>contributes to it. Finally! Somebody understands me! People keep  
>telling me that I need to find good ground, etc. However, I live  
>in a 2nd story apartment. The grounding path will go from my livingroom  
>(where the rig is) to the kitchen (cold water pipe) and down, through  
>the 1st floor and basement, to the ground. If this path doesn't  
>radiate like crazy, I don't know what will.

It sure will!

>Soooo, I am running my rig into a balun, flat-ribbon feedline and  
>to a 15m folded dipole. Everything is balanced after the tuner.  
>Otherwise, my ground is floating -- nothing connected to the lug.  
>Do you see any problems with this arrangement?

Not from an EMI standpoint. There are safety considerations that I will not get into here.

>Nevertheless, I have TVI problems galore! I haven't been all that  
>successful getting out with the indoor antenna, but my two TVs get  
>me just fine! I assume that the house electrical wiring picks up  
>RF from the antenna and feeds it to the TVs. Am I right? Would  
>power-line chokes correct the problem?

I think I would try the "standard" TVI remedies. Contact your section Technical coordinator (located through your Section Manager - page 8 of QST - or ARRL HQ.)

\* Install a low-pass filter between the transmitter and the antenna tuner. If the TVI is on channels harmonically related to 15 meters, ie channel 3 and channel 6, this will probably be the cure. Even if not, put it on anyway. The TVI might stem from both station harmonics and fundamental overload. This way you will be confident that it is not your station.

\* Purchase some FT140-43 ferrite cores. (#43 is the material of choice for 15 meters. If you also operate on 80, get some FT-140-J, FT-140-75, or FT-140-77. If you have RG-8 (or equiv size) cable, or a BIG line cord or plug, you may need to use an FT-240 size core.)

\* Wrap about 10 turns of the transmitter's AC line cord around one of these

cores, as close as possible to the transmitter. This is a common-mode choke. (If you have other AC-powered equipment connected to the transmitter, ie keyer, SWR meter, TNC, etc, install one of these on its AC line cord, too. The idea here is to prevent any chassis RF (harmonics or fundamental) from seeking earth via the power lines.)

\* Do the same thing with the coax cable between the transmitter and the tuner. This is also a common-mode choke.

\* Now you know that the transmitter is (probably) clean.

\* Simplify the TV installation. Multiple TVs, VCRs, etc make it impossible to troubleshoot. Get it down to one antenna or cable and a TV. If it is cable and a non-cable-ready TV, use the set-top converter or VCR as you normally do. After you get the bugs out, you can start adding stuff back one at a time.

\* If you have a TV preamp, booster or distribution amp, get it the heck out of there. These things are notorious for overload.

\* Install a high-pass filter on the TV (or before the set-top converter/VCR.) If using a set-top converter/VCR, you may need to use one before the converter AND before the TC.)

\* Install a common-mode choke in the same location(s). If the TV is using a CATV or community antenna, I would try the common-mode chokes before the high-pass filter, just to play the percentages.

\* Install a common-mode choke on the TV and set-top converter/VCR AC-line cords.

\* If you still have interference, try using a differential-mode AC-line filter on the TV, set-top converter or VCR, and the station transmitter. Radio Shack catalog 15-1111 is universally available.

\* If you still have TVI, either you have one of those "wierd" problems that you don't even want to think about, or you have a TV that is just so susceptible that it can't be helped. If so, call me here at HQ. I will offer some advice. But please, read the RFI Tips handout and the Radio Frequency Interference book before you call me. I don't mind helping, but would prefer that we not have to cover the basics.

>Needless to say, I have not advertised that I am a ham and I operate  
>in the deep dark of the night. No wonder I'm getting nowhere; that's  
>when 21m is dead. Any advice?

Yeah, move! Actually, the best solution is to clean up your own house. That may take care of everyone's problem. If not, at least you can demonstrate that it is not your equipment. Do be careful, though. If you mishandle the situation you may find yourself having to buy a few hundred ferrites, high-pass filters, etc. You are not bound by law to purchase any filters to compensate for inadequate filtering in consumer equipment. Some hams take the easy way out and pay for the one filter needed to help one neighbor. You probably can't afford that luxury.

>I would appreciate any pointers, Ed. Thanks in advance.  
>George, N2OWO

-----  
Ed Hare, KA1CV | ehare%arrlhq.UUCP@uhasun.hartford.edu  
American Radio Relay League | uhasun!arrlhq!ehare  
225 Main St. |  
Newington, CT 06111 | There is no limit to what you can  
(203) 666-1541 - voice | accomplish if you don't care who  
Senior ARRL Laboratory Engineer | gets the credit. - Harry S Truman  
RFI, xmtr and rcvr testing





Subject: The Electronic Repeater Mapping Project

The server will only recognize one repeater per mail message. If you want to submit multiple repeaters, you will have to submit multiple mail messages. A daemon will auto-reply when your message has been processed. If your message has some sort of evil error in it (i.e., one of the required lines is missing or undetectable) it will send you a message with the error and a copy of this file.

The information format I want:

Each line starts with # and then 4 upper-case letters (hopefully mnemonic) describing the info on that line. The rest of the line is (more or less) free form.

The \*required\* lines:

```
#CALL (the callsign of the repeater)
#OUTP (the output frequency of the repeater)
#INPT (the input frequency of the repeater, or just + or - for standard offs)
#LOCA (the longitude, lattitude, and HAAT of the repeater)
#SEND (the e-mail address of the sender)
#UPDT (the date & time of last update)
```

The other useful lines:

```
#TONE (the CTCSS input tone, followed by '/' and output tone, if there is one)
#COVG (the primary coverage area)
#911C (the 911/emerg autodial code, IF THE REPEATER OWNER OKs GIVING IT OUT)
#AUTO (autopatch facilities available?)
#CLSD (if this repeater is closed, who can use it)
        You only need to put a #CLSD line in for closed repeaters.
#AFFL (affiliation i.e., RACES ARES etc)
#SPON (sponsor of the repeater)
#CONT (how to contact the sponsor, name/addr/phone #)
#LINK (links to repeater, callsigns and frequencies, or something like CONDOR
        for large nets)
#COMM (a comment, as many #COMM lines as you like)
```

For example (this repeater does not exist):

```
#CALL KZ6QRM Mobile Uncoordinated Repeater (my car)
#OUTP 440.15
#INPT 222.22
#LOCA 122 01 09 W / 37 18 30 N / -2m
#SEND steve@wattres.sj.ca.us (Steve Watt)
#UPDT Thu Apr 02 00:39:58 PST 1992
#TONE 100.0 / 131.8
#COVG My house, special events
#AUTO It's a car without a cellphone. No autopatch.
#CLSD Only availble to people with the callsign KD6GGD. ;)
#SPON KD6GGD and his performing Corolla All-Trac
#CONT E-mail is the only way. steve@wattres.sj.ca.us
#LINK Only to my HT
#COMM I hope you're at least scanning this message. Send the registrations
#COMM (for active repeaters only, please) to "repeaters@wattres.sj.ca.us".
#COMM It's an ICOM 901A with a 220 band unit. It also spends most of its time
#COMM off, when I'm not in the car. It is not in repeater mode when I am in
```

#COMM the car. So it's not a terribly useful repeater, unless I say so. :)

If you are having difficulty finding the latitude and longitude for the repeater, try the Geographic Name Server at UMichigan.

telnet martini.eecs.umich.edu 3000

I haven't tried this service, so I can't vouch for its accuracy.

Once again: The address is repeaters@wattres.sj.ca.us. Don't send messages there that you expect somebody to read. Send those to me.

Also: PLEASE MAKE SURE THE REPEATER SPONSOR OK'S GIVING OUT THE EMERGENCY CODE! If you include other codes in your message, make sure that it's OK to give those out, also. Some repeater sponsors object to having the codes freely circulated, and others charge money for them.



Subject: GLOSSARY OF SOLAR-TERRESTRIAL TERMS

a INDEX. A 3-hourly "equivalent amplitude" index of local geomagnetic activity; "a" is related to the 3-hourly K INDEX according to the following scale:

K	0	1	2	3	4	5	6	7	8	9
a	0	3	7	15	27	48	80	140	240	400

A INDEX. A daily index of geomagnetic activity derived as the average of the eight 3-hourly a indices.

ACTIVE. Geomagnetic levels such that  $15 \leq A_p < 30$ .

ACTIVE DARK FILAMENT (ADF). An ACTIVE PROMINENCE seen on the DISK.

ACTIVE LONGITUDE. The approximate center of a range of heliographic longitudes in which ACTIVE REGIONS are more numerous and more FLARE-active than the average.

ACTIVE PROMINENCE. A PROMINENCE displaying material motion and changes in appearance over a few minutes of time.

ACTIVE PROMINENCE REGION (APR). A portion of the solar LIMB displaying ACTIVE PROMINENCES.

ACTIVE REGION (AR). A localized, transient volume of the solar atmosphere in which PLAGEs, SUNSPOTS, FACULAE, FLAREs, etc. may be observed.

ACTIVE SURGE REGION (ASR). An ACTIVE REGION that exhibits a group or series of spike-like surges that rise above the limb.

AFRED. Abbreviation for the A INDEX for Fredericksburg.

ANGSTROM. A unit of length =  $1.0E-08$ cm.

A<sub>p</sub> INDEX. An averaged planetary A INDEX based on data from a set of specific stations.

ARCH FILAMENT SYSTEM (AFS). A bright, compact PLAGE crossed by a system of small, arched FILAMENTS, which is often a sign of rapid or continued growth in an ACTIVE REGION.

ASTRONOMICAL UNIT (AU). The mean earth-sun distance, equal to  $1.496E+13$ cm or 214.94 solar radii.

AURORA. A faint visual phenomenon associated with geomagnetic activity, which occurs mainly in the high-latitude night sky; typical auroras are 100 to 250 km above the ground.

AURORAL OVAL. An oval band around each geomagnetic pole which is the locus of structured AURORAE.

AUTUMNAL EQUINOX. The EQUINOX that occurs in September.

BARTEL'S ROTATION NUMBER. The serial number assigned to 27-day rotation periods of solar and geophysical parameters. Rotation 1 in this sequence was assigned arbitrarily by Bartel to begin in January 1833.

BRIGHT SURGE ON THE DISK (BSD). A bright gaseous stream (SURGE) emanating from the CHROMOSPHERE.

BRIGHT SURGE ON THE LIMB (BSL). A large gaseous stream (SURGE) that moves outward more than 0.15 solar radius above the LIMB.

BURST. A transient enhancement of the solar RADIO EMISSION, usually associated with an ACTIVE REGION or FLARE.

CARRINGTON LONGITUDE. A system of fixed longitudes rotating with the sun.

CENTIMETER BURST. A solar radio burst in the centimeter wavelength range.

CENTRAL MERIDIAN PASSAGE (CMP). The passage of an ACTIVE REGION or other feature across the longitude meridian that passes through the apparent center of the solar DISK.

CHROMOSPHERE. The layer of the solar atmosphere above the PHOTOSPHERE and beneath the TRANSITION REGION and the CORONA.

CONJUGATE POINTS. Two points on the earth's surface, at opposite ends of a geomagnetic field line.

CONTINUUM STORM (CTM). General term for solar noise lasting for hours and sometimes days.

COORDINATED UNIVERSAL TIME. By international agreement, the local time at the prime meridian, which passes through Greenwich, England. Therefore, it is also known as GREENWICH MEAN TIME, or sometimes simply UNIVERSAL TIME.

CORONA. The outermost layer of the solar atmosphere, characterized by low densities ( $<1.0E+09/cc$ ) and high temperatures ( $>1,0E+06deg.K$ ).

CORONAL HOLE. An extended region of the CORONA, exceptionally low in density and associated with unipolar photospheric regions.

CORONAL RAIN (CRN). Material condensing in the CORONA and appearing to rain down into the CHROMOSPHERE as observed in H-ALPHA at the solar LIMB above strong SUNSPOTS.

CORONAL TRANSIENTS. A general term for short-time-scale changes in the CORONA, but principally used to describe outward-moving PLASMA clouds.

COSMIC RAY. An extremely energetic (relativistic) charged particle.

CROCHET. A sudden deviation in the sunlit geomagnetic field (H component; see GEOMAGNETIC ELEMENTS) associated with large solar FLARE X-ray emission.

D REGION. A daytime layer of the earth's IONOSPHERE approximately 50 to

90 km in altitude.

DARK SURGE ON DISK (DSD). Dark gaseous ejections visible in H-ALPHA.

DIFFERENTIAL ROTATION. The change in SOLAR ROTATION RATE with latitude. Low latitudes rotate at a faster angular rate (approx. 14 degrees per day) than do high latitudes (approx. 12 degrees per day).

DISAPPEARING SOLAR FILAMENT (DSF). The sudden (timescale of minutes to hours) disappearance of a solar FILAMENT (PROMINENCE).

DISK. The visible surface of the sun (or any heavenly body) projected against the sky.

Dst INDEX. A geomagnetic index describing variations in the equatorial RING CURRENT.

E REGION. A daytime layer of the earth's ionosphere roughly between the altitudes of 85 and 140 km.

EMERGING FLUX REGION (EFR). An area on the sun where new magnetic flux is erupting.

ERUPTIVE PROMINENCE ON LIMB (EPL). A solar PROMINENCE that becomes activated and is seen to ascend from the sun.

EXTREMELY LOW FREQUENCY (ELF). That portion of the radio frequency spectrum from 30 to 3000 hertz.

EXTREME ULTRAVIOLET (EUV). A portion of the electromagnetic spectrum from approximately 100 to 1000 angstroms.

F CORONA. Of the white-light CORONA (that is, the corona seen by the eye at a total solar ECLIPSE), that portion which is caused by sunlight scattered or reflected by solid particles (dust) in interplanetary space.

F REGION. The upper layer of the IONOSPHERE, approximately 120 to 1500 km in altitude. The F region is subdivided into the F1 and F2 regions. The F2 region is the most dense and peaks at altitudes between 200 and 600 km. The F1 region is a smaller peak in electron density, which forms at lower altitudes in the daytime.

FACULA. A bright region of the PHOTOSPHERE seen in white light, seldom visible except near the solar LIMB.

FIBRIL. A linear pattern in the H-ALPHA CHROMOSPHERE of the sun, as seen through an H-alpha filter, occurring near strong SUNSPOTS and PLAGE or in FILAMENT channels.

FILAMENT. A mass of gas suspended over the PHOTOSPHERE by magnetic fields and seen as dark lines threaded over the solar DISK. A filament on the LIMB of the sun seen in emission against the dark sky is called a PROMINENCE.

FILAMENT CHANNEL. A broad pattern of FIBRILS in the CHROMOSPHERE, marking where a FILAMENT may soon form or where a filament recently

disappeared.

- FLARE. A sudden eruption of energy on the solar DISK lasting minutes to hours, from which radiation and particles are emitted.
- fMIN. The lowest radiowave frequency that can be reflected from the IONOSPHERE.
- foEs. The maximum ORDINARY MODE radiowave frequency capable of reflection from the SPORADIC E REGION of the IONOSPHERE.
- foF2. The maximum ORDINARY MODE radiowave frequency capable of reflection from the F2 REGION of the IONOSPHERE.
- FORBUSH DECREASE. An abrupt decrease, of at least 10%, of the background galactic COSMIC RAY intensity as observed by neutron monitors.
- GAMMA. A unit of magnetic field intensity equal to  $1 \times 10.0E-05$  GAUSS, also equal to 1 NANOTESLA.
- GAMMA RAYS. High energy radiation (energies in excess of 100 keV) observed during large, extremely energetic solar FLARES.
- GAUSS. The unit of magnetic induction in the cgs (centimeter-gram-second) system.
- GEOMAGNETIC ELEMENTS. The components of the geomagnetic field at the surface of the earth. In SESC use, the northward and eastward components are often called the H and D components, where the D component is expressed in gammas and is derived from D (the declination angle) using the small angle approximation.
- GEOMAGNETIC FIELD. The magnetic field observed in and around the earth. The intensity of the magnetic field at the earth's surface is approximately 0.32 gauss at the equator and 0.62 gauss at the north pole.
- GEOMAGNETIC STORM. A worldwide disturbance of the earth's magnetic field, distinct from regular diurnal variations.
- Minor Geomagnetic Storm: A storm for which the Ap index was greater than 29 and less than 50.
- Major Geomagnetic Storm: A storm for which the Ap index was greater than 49 and less than 100.
- Severe Geomagnetic Storm: A storm for which the Ap index was 100 or more.
- Initial Phase: Of a geomagnetic storm, that period when there may be an increase of the MIDDLE-LATITUDE horizontal intensity (H).
- Main Phase: Of a geomagnetic storm, that period when the horizontal magnetic field at middle latitudes is generally decreasing.

Recovery Phase: Of a geomagnetic storm, that period when the depressed northward field component returns to normal levels.

GEOSYNCHRONOUS. Term applied to any equatorial satellite with an orbital velocity equal to the rotational velocity of the earth. The net effect is that the satellite is virtually motionless with respect to an observer on the ground.

GMT. Greenwich Mean Time. (See COORDINATED UNIVERSAL TIME.)

GRADUAL COMMENCEMENT. The commencement of a geomagnetic storm that has no well-defined onset.

GRANULATION. Cellular structure of the PHOTOSPHERE visible at high spatial resolution.

GREEN LINE. The green line is one of the strongest (and first-recognized) visible coronal lines. It identifies moderate temperature regions of the CORONA.

Greenwich Mean Time. See COORDINATED UNIVERSAL TIME.

GROUND-LEVEL EVENT (GLE). A sharp increase in ground-level COSMIC RAY count to at least 10% above background, associated with solar protons of energies greater than 500 MeV. GLEs are relatively rare, occurring only a few times each SOLAR CYCLE.

H-ALPHA. This ABSORPTION LINE of neutral hydrogen falls in the red part of the visible spectrum and is convenient for solar observations. The H-alpha line is universally used for patrol observations of solar flares.

H-component of the Geomagnetic Field. See GEOMAGNETIC ELEMENTS.

HIGH FREQUENCY (HF). That portion of the radio frequency spectrum between between 3 and 30 MHz.

HIGH LATITUDES. With specific reference to zones of geomagnetic activity, "high latitudes" refers to 50° to 80° geomagnetic.

HIGH-SPEED STREAM. A feature of the SOLAR WIND having velocities that are about double average solar wind values.

HOMOLOGOUS FLARES. Solar flares that occur repetitively in the same ACTIVE REGION, with pattern of development.

HYDER FLARE. A FILAMENT-associated TWO-RIBBON FLARE, often occurring in spotless regions. The flare presumably results from the impact on the CHROMOSPHERE of infalling FILAMENT material.

INTERPLANETARY MAGNETIC FIELD (IMF). The magnetic field carried with the SOLAR WIND.

IONOSPHERE. The region of the earth's upper atmosphere containing a small



percentage of free electrons and ions produced by photoionization of the constituents of the atmosphere by solar ultraviolet radiation at very short wavelengths (<1000 angstroms). The ionosphere significantly influences radiowave propagation of frequencies less than about 30 MHz.

IONOSPHERIC STORM. A disturbance in the F REGION of the IONOSPHERE, which occurs in connection with geomagnetic activity.

K CORONA. Of the white-light CORONA (that is, the corona seen by the eye at a total solar eclipse), that portion which is caused by sunlight scattered by electrons in the hot outer atmosphere of the sun.

K INDEX. A 3-hourly quasi-logarithmic local index of geomagnetic activity relative to an assumed quiet-day curve for the recording site. Range is from 0 to 9. The K index measures the deviation of the most disturbed horizontal component.

KELVIN. A unit of absolute temperature.

Kp INDEX. A 3-hourly planetary geomagnetic index of activity generated in Gottingen, Germany, based on the K INDEX from 12 or 13 stations distributed around the world.

LEADER SPOT. In a magnetically bipolar or multipolar SUNSPOT group, the western part precedes and the main spot in that part is called the leader.

LIGHT BRIDGE. Observed in white light, a bright tongue or streaks penetrating or crossing SUNSPOT UMBRAE. The appearance of a light bridge is frequently a sign of impending region division or dissolution.

LIMB. The edge of the solar DISK.

LIMB FLARE. A solar FLARE seen at the edge (LIMB) of the sun.

LOOP PROMINENCE SYSTEM (LPS). A system of loop prominences associated with major FLARES.

LOW FREQUENCY (LF). That portion of the radio frequency spectrum from 30 to 300 kHz.

M 3000. The optimum HIGH FREQUENCY radio wave with a 3000 km range, which reflects only once from the IONOSPHERE (single hop transmission).

MAGNETIC BAY. A relatively smooth excursion of the H (horizontal) component (see GEOMAGNETIC ELEMENTS) of the geomagnetic field away from and returning to quiet levels.

MAGNETOGRAM. Solar magnetograms are a graphic representation of solar magnetic field strengths and polarity.

MAGNETOPAUSE. The boundary layer between the SOLAR WIND and the MAGNETOSPHERE.

MAGNETOSPHERE. The magnetic cavity surrounding the earth, carved out of the passing SOLAR WIND by virtue of the GEOMAGNETIC FIELD, which pre-

vents, or at least impedes, the direct entry of the solar wind PLASMA into the cavity.

MeV. Mega (million) electronvolt. A unit of energy used to describe the total energy carried by a particle or photon.

MEDIUM FREQUENCY (MF). That portion of the radio frequency spectrum from 0.3 to 3 MHz.

MICROWAVE BURST. A radiowave signal associated with optical and/or X-ray FLARES.

MIDDLE LATITUDES. With specific reference to zones of geomagnetic activity, "middle latitudes" refers to 20 deg. to 50 deg. geomagnetic.

MOUNT WILSON MAGNETIC CLASSIFICATIONS.

Alpha. Denotes a unipolar SUNSPOT group.

Beta. A sunspot group having both positive and negative magnetic polarities, with a simple and distinct division between the polarities.

Beta-Gamma. A sunspot group that is bipolar but in which no continuous line can be drawn separating spots of opposite polarities.

Delta. A complex magnetic configuration of a solar sunspot group consisting of opposite polarity UMBRAE within the same PENUMBRA.

Gamma. A complex ACTIVE REGION in which the positive and negative polarities are so irregularly distributed as to prevent classification as a bipolar group.

NANOTESLA (nT). A unit of magnetism  $10.0E-09$  tesla, equivalent to a gamma ( $10.0E-05$  gauss).

NEUTRAL LINE. The line that separates longitudinal magnetic fields of opposite polarity.

PENUMBRA. The SUNSPOT area that may surround the darker UMBRA or umbrae. It consists of linear bright and dark elements radial from the sunspot umbra.

PERSISTENCE. Continuation of existing conditions. When a physical parameter varies slowly, the best prediction is often persistence.

PHOTOSPHERE. The lowest layer of the solar atmosphere; corresponds to the solar surface viewed in WHITE LIGHT. SUNSPOTS and FACULAE are observed in the photosphere.

PLAGE. An extended emission feature of an ACTIVE REGION that exists from the emergence of the first magnetic flux until the widely scattered remnant magnetic fields merge with the background.

PLAGE CORRIDOR. A space in chromospheric (see CHROMOSPHERE) PLAGE lacking

plage intensity, coinciding with polarity inversion line.

PLASMA. Any ionized gas, that is, any gas containing ions and electrons.

POLAR CAP ABSORPTION (PCA). An anomalous condition of the polar IONOSPHERE whereby HF and VHF (3 - 300 MHz) radiowaves are absorbed, and LF and VLF (3 - 300 kHz) radiowaves are reflected at lower altitudes than normal. In practice, the absorption is inferred from the proton flux at energies greater than 10 MeV, so that PCAs and PROTON EVENTS are simultaneous. Transpolar radio paths may still be disturbed for days, up to weeks, following the end of a proton event.

POST-FLARE LOOPS. A LOOP PROMINENCE SYSTEM often seen after a major TWO-RIBBON FLARE, which bridges the ribbons.

PROMINENCE. A term identifying cloud-like features in the solar atmosphere. The features appear as bright structures in the CORONA above the solar LIMB and as dark FILAMENTS when seen projected against the solar DISK.

PROTON EVENT. By definition, the measurement of at least 10 protons/sq.cm/sec/steradian at energies greater than 10 MeV.

PROTON FLARE. Any FLARE producing significant FLUXes of greater-than-10 MeV protons in the vicinity of the earth.

QUIESCENT PROMINENCE (FILAMENT). Long, sheet-like prominences nearly vertical to the solar surface.

QUIET. A descriptive word specifically meaning geomagnetic levels such that  $A_p < 8$  (see  $A_p$  INDEX).

RADIO EMISSION. Emissions of the sun in radio wavelengths from centimeters to dekameters, under both quiet and disturbed conditions.

Type I. A noise storm composed of many short, narrow-band bursts in the metric range (300 - 50 MHz).

Type II. Narrow-band emission that begins in the meter range (300 MHz) and sweeps slowly (tens of minutes) toward dekameter wavelengths (10 MHz). Type II emissions occur in loose association with major FLAREs and are indicative of a SHOCK wave moving through the solar atmosphere.

Type III. Narrow-band bursts that sweep rapidly (seconds) from decimeter to dekameter wavelengths (500 - 0.5 MHz). They often occur in groups and are an occasional feature of complex solar ACTIVE REGIONS.

Type IV. A smooth continuum of broad-band bursts primarily in the meter range (300 - 30 MHz). These bursts are associated with some major flare events beginning 10 to 20 minutes after the flare maximum, and can last for hours.

RECURRENCE. Used especially in reference to the recurrence of physical parameters every 27 days (the rotation period of the sun).

RIOMETER (Relative Ionospheric Opacity meter). A specially designed radio receiver for continuous monitoring of COSMIC NOISE. The absorption of cosmic noise in the polar regions is very sensitive to the solar low-energy cosmic ray flux.

SECTOR BOUNDARY. In the SOLAR WIND, the area of demarcation between sectors, which are large-scale features distinguished by the predominant direction of the interplanetary magnetic field, toward or away from the sun.

SHORT WAVE FADE (SWF). A particular ionospheric solar flare effect under the broad category of sudden ionospheric disturbances (SIDs) whereby short-wavelength radio transmissions, VLF, through HF, are absorbed for a period of minutes to hours.

SMOOTHED SUNSPOT NUMBER. An average of 13 monthly RI numbers, centered on the month of concern.

SOLAR COORDINATES.

Central Meridian Distance (CMD). The angular distance in solar longitude measured from the central meridian.

SOLAR CYCLE. The approximately 11-year quasi-periodic variation in frequency or number of solar active events.

SOLAR MAXIMUM. The month(s) during the SOLAR CYCLE when the 12-month mean of monthly average SUNSPOT NUMBERS reaches a maximum. The most recent solar maximum occurred in December 1979.

SOLAR MINIMUM. The month(s) during the SOLAR CYCLE when the 12-month mean of monthly average SUNSPOT NUMBERS reaches a minimum.

SOLAR SECTOR BOUNDARY (SSB). The apparent solar origin, or base, of the interplanetary SECTOR BOUNDARY marked by the larger-scale polarity inversion lines.

SOLAR WIND. The outward flux of solar particles and magnetic fields from the sun. Typically, solar wind velocities are near 350 km/s.

SPORADIC E. A phenomenon occurring in the E REGION of the IONOSPHERE, which significantly affects HF radiowave propagation. Sporadic E can occur during daytime or nighttime and it varies markedly with latitude.

SUDDEN COMMENCEMENT (SC, or SSC for Storm Sudden Commencement). An abrupt increase or decrease in the northward component of the geomagnetic field, which marks the beginning of a GEOMAGNETIC STORM.

SUDDEN IMPULSE (SI+ or SI-). A sudden perturbation of several gammas in the northward component of the low-latitude geomagnetic field, not associated with a following GEOMAGNETIC STORM. (An SI becomes an SC if a storm follows.)

SUDDEN IONOSPHERIC DISTURBANCE (SID). HF propagation anomalies due to ionospheric changes resulting from solar FLAREs, PROTON EVENTS and GEOMAGNETIC STORMs.

SUNSPOT. An area seen as a dark spot on the PHOTOSPHERE of the sun. Sunspots are concentrations of magnetic flux, typically occurring in bipolar clusters or groups. They appear dark because they are cooler than the surrounding photosphere.

SUNSPOT GROUP CLASSIFICATION (Modified Zurich Sunspot Classification).

- A - A small single unipolar SUNSPOT or very small group of spots without PENUMBRA.
- B - Bipolar sunspot group with no penumbra.
- C - An elongated bipolar sunspot group. One sunspot must have penumbra.
- D - An elongated bipolar sunspot group with penumbra on both ends of the group.
- E - An elongated bipolar sunspot group with penumbra on both ends. Longitudinal extent of penumbra exceeds 10 deg. but not 15 deg.
- F - An elongated bipolar sunspot group with penumbra on both ends. Longitudinal extent of penumbra exceeds 15 deg.
- H - A unipolar sunspot group with penumbra.

SUNSPOT NUMBER. A daily index of SUNSPOT activity (R), defined as  $R = k (10g + s)$  where S = number of individual spots, g = number of sunspot groups, and k is an observatory factor.

SURGE. A jet of material from ACTIVE REGIONs that reaches coronal heights and then either fades or returns into the CHROMOSPHERE along the trajectory of ascent.

TWO-RIBBON FLARE. A FLARE that has developed as a pair of bright strands (ribbons) on both sides of the main inversion ("neutral") line of the magnetic field of the ACTIVE REGION.

TYPE I, II, III, IV. See RADIO EMISSION

U BURST. A fast radio burst spectrum of a FLARE. It has a U-shaped appearance in an intensity-vs.-frequency plot.

ULTRA HIGH FREQUENCY (UHF). Those radio frequencies exceeding 300 MHz.

UMBRA. The dark core or cores (umbrae) in a SUNSPOT with PENUMBRA, or a sunspot lacking penumbra.

UNIVERSAL TIME (UT). See COORDINATED UNIVERSAL TIME.

UNSETTLED. With regard to geomagnetic levels, a descriptive word speci-

fically meaning that  $7 < \text{the Ap INDEX} < 15$ .

VERY HIGH FREQUENCY (VHF). That portion of the radio frequency spectrum from 30 to 300 MHz.

VERY LOW FREQUENCY (VLF). That portion of the radio frequency spectrum from 3 to 30 kHz.

WHITE LIGHT (WL). Sunlight integrated over the visible portion of the spectrum (4000 - 7000 angstroms) so that all colors are blended to appear white to the eye.

WHITE LIGHT FLARE. A major FLARE in which small parts become visible in white light. Such flares are usually strong X-ray, radio, and particle emitters.

WOLF NUMBER. An historic term for SUNSPOT NUMBER. In 1849, R. Wolf of Zurich originated the general procedure for computing the sunspot number.

X-RAY BACKGROUND. A daily average background X-ray FLUX in the 1 to 8 angstrom range. It is a midday minimum designed to reduce the effects of FLAREs.

X-RAY BURST. A temporary enhancement of the X-ray emission of the sun. The time-intensity profile of soft X-ray bursts is similar to that of the H-ALPHA profile of an associated FLARE.

X-RAY FLARE CLASS. Rank of a FLARE based on its X-ray energy output. Flares are classified by the order of magnitude of the peak burst intensity (I) measured at the earth in the 1 to 8 angstrom band as follows:

Class	(in Watt/sq. Meter)
B	$I < 10.0E-06$
C	$10.0E-06 \leq I \leq 10.0E-05$
M	$10.0E-05 \leq I \leq 10.0E-04$
X	$I \geq 10.0E-04$

ZURICH SUNSPOT CLASSIFICATION. A sunspot classification system that has been modified for SESC use.

\*\* END OF SAR DEFINITIONS \*\*

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<><> Allan Courtney <> acourt@lunatix.uucp <> ukma!lunatix!acourt <><>  
<><> And if all else fails....try: acourt%lunatix.uucp@ms.uky.edu <><>  
-----



Subject: SSTV Modes and Info

The main focus of this file is on SSTV because information on this mode is so scarce. I keep trying to ignore WEFAX and ATV because they are even larger topics already well covered by various handbooks and magazines. However some WEFAX and ATV information sneaks in when it is closely related to SSTV, for instance some software that does both SSTV and WEFAX.

Please send additions and corrections to johnl@avs.com and I'll distribute a new version occasionally.

The most recent version will always be available in /pub/ham-radio/sstv\_wefax\_info at ftp.cs.buffalo.edu.

Let me know where you saw this file; I'd be interested in knowing how far it gets propagated.

Version of July, 1992.

Background

-----

There are several different ways to send images over ham radio:

1. RTTY art - Remember when people were amused by making pictures out of characters?
2. FSTV (Fast Scan TV - Also called ATV) - Similar to broadcast TV. Full motion, color, sound, etc. Restricted to UHF and up because a signal requires several MHz of bandwidth.
3. WEFAX (weather facsimile) - Very high resolution gray scale images sent by audio tones over a period of minutes.
4. SSTV (Slow Scan TV) - Low to medium resolution still images sent through audio channels over a period of several seconds to a few minutes. Mostly color these days.
5. Digital SSTV - I haven't seen any proposals yet. You could always compress images using an international standard, such as JPEG, and send the files over existing packet radio networks.

Transmission Modes

-----

The original 8 second SSTV transmission mode (around 1958) had the following characteristics:

black = 1500 Hz  
white = 2300 Hz  
gray levels in between  
120 scan lines  
15 lines per second



5 mS of 1200 Hz for horizontal sync  
30 mS of 1200 Hz for vertical sync

Since that time many more modes have been invented, sometimes to add new capabilities, sometimes the result of Not Invented Here syndrome.

The major groups are:

Robot - Introduced with the Robot scan converters (California).  
Wraase - Introduced with the Wraase scan converters (Germany).  
Martin - Developed by Martin Emmerson (England).  
    First available as replacement PROMs for Robot 1200C.  
Scottie - Developed by Eddie Murphy (Scotland).  
    First available as replacement PROMs for Robot 1200C.  
AVT - Developed by Ben Blish/Williams (Montana).  
    First available in the AVT system.

The Robot, Wraase, Martin, and Scottie modes are all closely related. They all use the tones above for black, white, and gray levels. They all have 1200 Hz horizontal sync, although some Martin and Scottie implementations rely on accurate crystal oscillators and ignore the horizontal sync once synchronized. Color is generally transmitted by sending each scan line 3 times, once each for red, green, and blue components. Robot is different from the rest in that it encodes colors with luminance (Y) and chrominance (R-Y and B-Y) instead of R,G,B.

Each of these modes has a few different speeds, usually providing 120 or 240 scan lines and varying degrees of horizontal resolution. (Actually some send 128 or 256 lines but the top 8 or 16 are always a fixed gray scale, leaving 120 or 240 usable lines.)

The Robot modes have a much longer vertical sync (called VIS) containing 7 bits of information and a parity bit. This identifies the format of the following image so manual selection is not required on systems that recognize it. Everyone else has adopted the Robot VIS coding and assigned themselves unused codes in the original specification.

The AVT mode is radically different from the rest. It has no horizontal sync at all; very accurate crystal oscillators are required to prevent slanted pictures. Rather than a vertical sync pulse of about 1/3 second, it has a digital header with 32 repetitions of the transmission mode, and a sequence number. It is only necessary to receive one of the 32 groups correctly to achieve synchronization. For more details see the AVT article in CQ-TV mentioned in the bibliography.

#### Frequencies

-----

By convention, SSTV operation is generally found on only a few frequencies.  
>From a brochure from the International Visual Communication Association:

3.845  
7.171  
14.230  
14.233  
21.340

28.680  
144.5

#### Nets

-----

Two different Slow Scan nets meet on Saturdays at 15:00 and 18:00 UTC on 14.230 MHz.

#### Scan Converters

-----

A couple years ago anyone who was serious about SSTV had a Robot 1200C.

It is a complete system dedicated to SSTV. Just connect it to

- Color TV camera (either NTSC or PAL).
- Color TV set or monitor.
- Speaker and Mic connectors of a transceiver.
- Tape recorder for picture storage.

It has 4 black & white modes (one compatible with original 8 second) and 4 color modes with different transmission times and resolutions.

It displays images with 256 x 240 resolution with 18 bits per pixel. That's more than 250,000 colors.

Robot Research  
5636 Ruffin Road  
San Diego, CA 61927

It also has a parallel port for connection to a home computer. Several different programs for transferring images to/from the 1200C and for performing various other functions are available.

(Combined list from Roland's column, IVCA brochure, etc.)

Hi-Res (for IBM PC)  
Tom Jenkins N9AMR  
5968 S. Keystone Ave.  
Indianapolis, IN 46227

SCAN, Version 6.0 (for IBM PC)  
Bert Beyt W5ZR  
301 Tampico St.  
New Iberia, LA 70560

SSTV by KC5VC (for IBM PC)  
Garnet Bebermeyer WB0UNB  
15 Alameda Ct.  
Fenton, MO 63026

IMAGE (for IBM PC)  
Dick Isely WD9GIG  
736 Fellow St.  
St. Charles, IL 60174

name? (for Amiga)  
Tom Hibben KB9MC  
Mule Hollow Road  
Box 188  
DeSoto, WI 54624

Replacement PROMs are available to give the 1200C other transmission modes such as Wraase, Martin, Scottie, and AVT. PROMs available from:

Martin Emmerson G3OQD  
6 Mount Hurst Rd.  
Hayes, Bromley  
Kent, England

Robot Research is more interested in selling higher priced systems to industrial customers. The 1200C hasn't been enhanced or advertised for years. The last I heard it is still available from P.C. Electronics (need to dig up address...).

Three clones of the 1200C are available:

Ribbit  
Brian Summers VE3DUO  
336 Goodram Drive  
Burlington, Ontario  
Canada L7L 2K1

LM9000  
John Wilson VK3LM  
R.M.B. 4201A  
Tallangatta Valley 3701  
Victoria Australia

NS-88  
Muneki Yamafuzi JF3GOH  
P.O. Box 670  
Osaka Japan 531

I think the LM9000 is available only as blank PC boards. One magazine article warned readers not to be too hasty about purchasing boards because the other parts required are hard to find and more expensive than you would expect. But if you do build one it is compatible with the 1200C and can use the Martin Emmerson PROMs.

The only other stand-alone scan converter mentioned during the last few years is the Wraase SC-2. I have no details on features.

Volker Wraase Elektronik  
Kronsberg 10  
D-2300 Altenholz/Kiel  
Germany  
Tel.: 0431/32528

Home Computers

-----

Now that most home computers have plenty of memory and acceptable color graphics, the most cost effective method is to use a computer with a suitable interface and software.

Note that if you want to send a picture of anything real, you will also need a frame grabber which will add a few hundred more \$ to the total system cost.

Amiga

-----

The AVT system has become quite popular during the last couple years for both SSTV and WEFAX. It is composed of an interface that attaches to the parallel port and software.

It has images with up to 4096 colors, all the popular transmission modes, builtin graphics editor, text generation, image processing techniques to clean up noisy pictures, and loads of other features.

AVT Master  
AEA  
P.O. Box C2160  
2006 196th St. S.W.  
Lynnwood, WA 98036-0918

Atari ST

-----

Color SSTV, WEFAX, and other ham radio software are available from these user group program libraries:

Atari Microcomputer Network  
John Adams KC5FW  
17106 Happy Hollow  
San Antonio, TX 78232

ASTUR (Atari ST Users on Radio)  
GEERAERT Michel  
W. Elsschotlann 21  
B-8460 Koksijde  
Belgium

The WEFAX program requires a very simple interface containing an XR-2211.

The "sSTV" program can use two different interfaces. In the low cost configuration, the internal sound generator is used for transmit and a simple two chip interface (total cost about \$7 including perf board, connectors, etc.) is used for receive.

Much better results can be obtained with an interface from:

A&A Engineering  
2521 W. LaPalma, Unit K  
Anaheim CA 92801

(714) 952-2114

See 73 Magazine, December 89 and January 90, for more details.

The latest version of the software has all the popular modes (Robot, Wraase, Martin, Scottie, AVT), a graphical user interface, on-screen tuning indicator, and full screen images with dithering to give the appearance of hundreds of colors when viewed from a distance.

Another Atari SSTV system is available from:

Robert Gendron VE2BNC  
315 6025 Croissant Brodeur  
Brossard, Longueuil  
Quebec J4Z 1Y8  
Canada

IBM PC

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Several WEFAX systems are available:

PC HF Facsimilie 4.0  
PC GOES/WEFAX  
Software Systems Consulting  
150 Avenida Cabrillo, "C"  
San Clemente, CA 92672

MULTIFAX  
Schwittek WEFAX Systems  
David E. Schittek NW2T  
1659 Waterford Road  
Walworth, NY 14568

AEA-FAX  
AEA (address above)

A & A Engineering  
(address above)

There are surely others. I found these by flipping through a couple recent magazines. My current main interest is SSTV so I'm not familiar with the features of WEFAX systems.

A several months ago, I started this paragraph with "The SSTV picture is dimmer" because there were no viable systems available. Software Systems Consulting (above) has an interface and software for SSTV but it is only black & white. Today everyone uses color so it would be foolish to spend a significant amount on a B&W system.

The situation has changed recently. There are now two substantial systems with rumors of three more on the way.

ViewPort VGA (developed by KA2PYJ)  
A & A Engineering  
(address above)

Pasokon TV  
John Langner WB2OSZ  
115 Stedman St. #F  
Chelmsford, MA 01824-1823  
(please send SASE for details)

Both systems above require a VGA and can display up to 32768 simultaneous colors if VGA card has the HiColor feature.  
They both send and receive a variety of modes, read/write different image file formats, etc.

Mac  
---

Many people have asked many times and there doesn't seem to be anything available.

Others  
-----

There have been SSTV implementations for other machines such as the Radio Shack COCO and the old 8 bit Ataris. (See Bibliography, below.) CQ-TV also mentions SSTV for machines we never heard of in the USA.

Multi-mode TNCs  
-----

The MFJ-1278 can sort of do SSTV with a computer and suitable software.

John (??? callbook says Robert) Tuttle K1UTI  
Penny Ln  
Barrington, NH 03825

Software Available by FTP over Internet  
-----

If you don't have Internet access, consult the FAQ list for information on how to get these files by e-mail.

SSTVFAX2.ZIP Hams: Send and Receive SSTV and FAX pictures  
JVFX50.ZIP very good program to encode and decode  
FAX/SSTV/ASCII..

(Most of the jvfax50.zip locations from VE2IMS. Others fromarchie.)

Host capella.eetech.mcgill.ca

Location: /wuarhive/mirrors/msdos/hamradio  
FILE -rw-r--r-- 407934 Jun 28 20:00 jvfax50.zip

Location: /wuarhive/mirrors3/garbo.uwasa.fi/ham  
FILE -r--r--r-- 408165 Jun 24 13:41 jvfax50.zip

Host garbo.uwasa.fi

Location: /pc/ham  
FILE -rw-rw-r-- 408165 Jun 24 17:41 jvfax50.zip

Host isfs.kuis.kyoto-u.ac.jp

Location: /mirrors/simtel20.msdos/hamradio  
FILE -rw-rw-r-- 407934 Jun 29 05:00 jvfax50.zip

Host nic.switch.ch

Location: /mirror/msdos/hamradio  
FILE -rw-rw-r-- 407934 Jun 28 22:00 jvfax50.zip

Host pc.usl.edu

Location: /pub/ham  
FILE -rw-r--r-- 407934 Jul 2 11:24 jvfax50.zip

Host plaza.aarnet.edu.au

Location: /micros/pc/garbo/pc/ham  
FILE -r--r--r-- 408165 Jun 24 17:41 jvfax50.zip

Location: /micros/pc/oak/hamradio  
FILE -r--r--r-- 407934 Jun 28 20:00 jvfax50.zip

Location: /micros/pc/simtel-20/hamradio  
FILE -r--r--r-- 407934 Jun 28 20:00 jvfax50.zip

Host rigel.acs.oakland.edu

Location: /pub/msdos/hamradio  
FILE -rw-r--r-- 407934 Jun 28 20:00 jvfax50.zip

Host src.doc.ic.ac.uk

Location: /ibmpc/wsmr-simtel20.army.mil/hamradio  
FILE -r--r--r-- 407934 Jun 28 21:00 jvfax50.zip

Host sun0.urz.uni-heidelberg.de

Location: /pub/msdos/simtel/hamradio  
FILE -rw-rw-r-- 407934 Jun 28 20:00 jvfax50.zip

Host swdsrv.edvz.univie.ac.at

Location: /pc/dos/hamradio  
FILE -rw-r--r-- 407934 Jun 28 19:00 jvfax50.zip

Host wuarhive.wustl.edu

Location: /mirrors/msdos/hamradio  
FILE -rw-r--r-- 407934 Jun 28 19:00 jvfax50.zip

Location: /mirrors3/garbo.uwasa.fi/ham

FILE -r--r--r-- 408165 Jun 24 12:41 jvfax50.zip

Host garfield.catt.ncsu.edu (152.1.43.23)  
Last updated 06:01 9 Jul 1992

Location: /pub/hamradio/programs  
FILE rw-r--r-- 28323 Jun 18 12:00 sstvfax2.zip

Host wuarchive.wustl.edu (128.252.135.4)  
Last updated 04:16 10 May 1992

Location: /mirrors/msdos/hamradio  
FILE rw-rw-r-- 28323 Apr 30 19:00 sstvfax2.zip

Host gdr.bath.ac.uk (138.38.32.1)  
Last updated 07:03 9 Jul 1992

Location: /pdsoft/msdos/hamradio  
FILE rw-r--r-- 35968 Sep 7 1987 wefax.arc

Host garfield.catt.ncsu.edu (152.1.43.23)  
Last updated 06:01 9 Jul 1992

Location: /pub/hamradio/programs  
FILE rw-r--r-- 35968 Jun 18 12:01 wefax.arc

Host caticsf.cati.csufresno.edu (129.8.100.15)  
Last updated 03:48 22 Jun 1992

Location: /pub/ham-radio/radio/progs  
FILE rw-r--r-- 35968 Nov 12 1991 wefax.arc

Host wuarchive.wustl.edu (128.252.135.4)  
Last updated 04:16 10 May 1992

Location: /mirrors/msdos/hamradio  
FILE rw-rw-r-- 35968 Sep 6 1987 wefax.arc

Host ucsd.edu (128.54.16.1)  
Last updated 03:39 8 May 1992

Location: /hamradio/dsp  
FILE r--r--r-- 41110 Aug 10 1988 wefax.arc

Host sun0.urz.uni-heidelberg.de (129.206.100.126)  
Last updated 17:54 5 May 1992

Location: /pub/msdos/simtel/hamradio  
FILE rw-rw-r-- 35968 Sep 6 1987 wefax.arc

Host src.doc.ic.ac.uk (146.169.2.1)  
Last updated 17:24 5 May 1992

Location: /ibmpc/wsmr-simtel20.army.mil/hamradio  
FILE r-xr-xr-x 35968 Sep 6 1987 wefax.arc



Host rigel.acs.oakland.edu (141.210.10.117)  
Last updated 16:46 5 May 1992

Location: /pub/msdos/hamradio  
FILE rw-r--r-- 35968 Sep 6 1987 wefax.arc

Host plaza.aarnet.edu.au (139.130.4.6)  
Last updated 16:16 5 May 1992

Location: /micros/pc/simtel-20/hamradio  
FILE rw-r--r-- 35968 Sep 6 1987 wefax.arc

Location: /micros/pc/oak/hamradio  
FILE rw-r--r-- 35968 Sep 6 1987 wefax.arc

Host nic.funet.fi (128.214.6.100)  
Last updated 15:36 5 May 1992

Location: /pub/ham/dsp/dsp4  
FILE rw-rw-r-- 41110 Mar 1 1990 wefax.arc

Host ucsd.edu (128.54.16.1)  
Last updated 03:39 8 May 1992

Location: /hamradio/dsp  
FILE r--r--r-- 70742 Aug 10 1988 newwefax.arc

Host nic.funet.fi (128.214.6.100)  
Last updated 15:36 5 May 1992

Location: /pub/ham/dsp/dsp12  
FILE rw-rw-r-- 70742 Mar 1 1990 newwefax.arc

Location: /pub/msdos/communications/hamradio  
FILE rw-r--r-- 10500 Sep 21 1990 autofax.lzh  
FILE rw-r--r-- 202198 Jan 16 09:22 fax40.lzh

Host garfield.catt.ncsu.edu (152.1.43.23)  
Last updated 06:01 9 Jul 1992

Location: /pub/hamradio/programs  
FILE rw-r--r-- 208740 Jun 18 11:56 fax40.zip

Host wuarchive.wustl.edu (128.252.135.4)  
Last updated 04:16 10 May 1992

Location: /mirrors/msdos/hamradio  
FILE rw-rw-r-- 208740 Jan 10 18:00 fax40.zip

Host sun0.urz.uni-heidelberg.de (129.206.100.126)  
Last updated 17:54 5 May 1992

Location: /pub/msdos/simtel/hamradio  
FILE rw-rw-r-- 208768 Jan 11 12:00 fax40.zip

Host src.doc.ic.ac.uk (146.169.2.1)  
Last updated 17:24 5 May 1992

Location: /ibmpc/wsmr-simtel20.army.mil/hamradio  
FILE r--r--r-- 208740 Jan 10 19:00 fax40.zip

Host rigel.acs.oakland.edu (141.210.10.117)  
Last updated 16:46 5 May 1992

Location: /pub/msdos/hamradio  
FILE rw-r--r-- 208740 Jan 10 19:00 fax40.zip

Host plaza.aarnet.edu.au (139.130.4.6)  
Last updated 16:16 5 May 1992

Location: /micros/pc/simtel-20/hamradio  
FILE rw-r--r-- 208740 Jan 10 19:00 fax40.zip

Location: /micros/pc/oak/hamradio  
FILE rw-r--r-- 208740 Jan 10 19:00 fax40.zip

Host nic.funet.fi (128.214.6.100)  
Last updated 15:36 5 May 1992

Location: /pub/msdos/communications/hamradio  
FILE rw-r--r-- 208740 Jan 16 07:36 fax40.zip  
FILE rw-r--r-- 30628 Sep 21 1990 wefax.lzh

Host garfield.catt.ncsu.edu (152.1.43.23)  
Last updated 06:01 9 Jul 1992

Location: /pub/hamradio/programs  
FILE rw-r--r-- 28323 Jun 18 12:00 sstvfax2.zip

Host wuarchive.wustl.edu (128.252.135.4)  
Last updated 04:16 10 May 1992

Location: /mirrors/msdos/hamradio  
FILE rw-rw-r-- 28323 Apr 30 19:00 sstvfax2.zip

Host garbo.uwasa.fi (128.214.87.1)  
Last updated 05:54 9 Jul 1992

Location: /pc/ham  
FILE rw-rw-r-- 408165 Jun 24 17:41 jvfax50.zip

Software Available from phone BBSs  
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#### Publications -----

Modern information on SSTV is very scarce. The last SSTV handbook, that I know about, was written by Don Miller W9NTP and Ralph Taggart WB8DQT about 15 years ago.

The British Amateur Television Club has a book, The Slow Scan Companion (?), but it's not really a handbook with organized chapters on different topics. It's more like a random collection of magazine articles. It is missing

very fundamental information such as how color images are conveyed by audio tones.

There are a few magazines that specialize in Amateur Television. These are mostly oriented toward fast scan TV but SSTV and WEFAX are mentioned occasionally.

(Regular column on 'Satellites, Facsimile & Slow-Scan TV Imaging' by Fred Sharp W8ASF)  
The SPEC-COM Journal  
P.O. Box 1002  
Dubuque, IA 52004-1002

(Frequent column 'SSTV Revisited' by Roland Humphries G4UKL)  
CQ-TV  
British Amateur Television Club  
Dave Lawton G0ANO  
Greenhurst, Pinewood Road  
High Wycombe, Bucks HP12 4DD  
England

Amateur Television Quarterly  
1545 Lee St.  
Suite 73  
Des Plaines, IL 60018

Booklets of old ATVQ and A5 articles are available from:

ESF Copy Service  
4011 Clearview Dr.  
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The 1993 ARRL Radio Amateur's Handbook will have a completely new and expanded section on SSTV. It's not out yet because this is the middle of 1992.

## Bibliography

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It will take some time to track down more old articles for this section. But it won't take long to type them in because there aren't many!

I've purposely excluded the scores of articles describing modifications to the Robot 400 (an early Black & White only system) because they're all in the booklets from ESF and of little interest to someone without a Robot 400.

Abrams, Clay K6AEP & Taggart, Ralph WB8DQT, "Color Computer SSTV", 73, Nov-Dec 84.

Goodman, Dick WA3USG, "SSTV with the Robot 1200C Scan Converter and the Martin Emmerson EPROM Version 4.0", 73 Amateur Radio Today, Jul 91, p. 46.

Langner, John WB2OSZ, "Color SSTV for the Atari ST", 73 Amateur Radio, Dec 89, p. 38, Jan 90, p. 41.

Langner, John WB2OSZ, "SSTV - The AVT System Secrets Revealed", CQ-TV 149 (Feb 90), p. 79.

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Schick, Martin K. KA4IWG, "Color SSTV and the Atari Computer", QST, Aug 85.

ARRL Bibliography on Image Communications  
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The following was provided by Ed Hare at ARRL:

The ARRL Handbook and the Operating Manual each have a chapter devoted to amateur television. These books are available from ARRL Headquarters or your local amateur dealer.

There are two periodicals devoted to amateur television:

ATV Quarterly  
1545 Lee St  
Suite 73  
Des Plaines IL 60018

SPEC-COM  
POB 1002  
Dubuque IA 52004-1002

Contact these publishers directly for subscription information.

ARRL Bibliography on Image Communications:

1925

May	Visible Radio Communication (Wilkerson)	p. 15 4 pages
July	Television Arrives (Bidwell)	p. 9 6 pages
	Picture Transmission Permitted (Experimenters' Section)	p. 37 2 pages
August	Jenkins Experimenters	p. 59 1 page
November	Henkins Machine (Hints & Kinks)	p. 59 1 page
December	Practical Picture Transmission (Dewhirst)	p. 12 6 pages

1926

January	Voss (German) System	p. 29 2 pages
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1927	November	Weather Map Transmission and Reception (Dewhirst)	p. 9 7 pages
1928	May	Amateur Television (Thomsen)	p. 17 2 pages
	August	Some More about Amateur Television (Westman)	p. 30 2 pages
	September	Radiovision (Dewhirst)	p. 15 4 pages
		Synchronism (Jenkins)	p. 30 1 page
	October	Amateur Television Waves	p. 8 1 page
1929	March	What Price Television (Sleeper)	p. 48 3 pages
	June	Photo-Electric Cells & Methods of Coupling to Vacuum Tubes (Dewhirst)	p. 17 6 pages
1937	December	Radio Amateurs in the Television Picture (Lamb)	p. 8 4 pages
	December	Introduction to Modern Television (Wilder)	p. 11 6 pages
1938	January	Circuit Elements in Modern Television Reception (Wilder)	p. 31 5 pages
	February	Sweep Circuit Considerations in the Television Receiver (Wilder)	p. 38 5 pages
	March	A Universal Test Unit for the Study of Television Images (Wilder)	p. 37 3 pages
	April	Construction of Television Receivers Part I (Wilder)	p. 23 5 pages
	May	Construction of Television Receivers Part II	p. 39 4 pages

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	October	Building Television Receivers with Standard Cathode-Ray Tubes (Sherman)	p. 21 5 pages
	December	A Practical Television Receiver for the Amateur (Shumard)	p. 21 6 pages
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	March	An Electrostatic-Deflection Kinescope Unit for the Television Receiver (Sherman)	p. 52 4 pages
1940	February	A Deflection and Video Chassis for Television Reception (Lawrence)	p. 29 3 pages
	March	A Design for Living -- With Television (Rosenblatt)	p. 44 4 pages
	May	A New Electronic Television Transmitting System for the Amateur (Sherman)	p. 30 7 pages
	June	A Receiver for the New Amateur Television System (Sherman)	p. 38 6 pages
	July	An Efficient U.H.F. Unit for the Amateur Television Transmitter (Waller)	p. 32 5 pages
	October	Television Camera-Modulator Design for Practical Amateur Operation (Lamb)	p. 11 13 pages
		Simplifying Television Deflection and Video Chassis (Experimenters Section)	p. 74 1 page
	November	Two-Way Television Communication Inaugurated	p. 36 3 pages

	December	New Amateur Television Records on 112 Mc.	p. 53 1 page
1944	May	Television in K6 Land (Souza)	p. 42 3 pages
	December	Video Amplifier Design (Merritt)	p. 24 5 pages
1945	November	Extended Range Television Reception (Wilder)	p. 18 6 pages
1946	March	Military Television Cameras -- and the Amateur (Middleton)	p. 41 4 pages
	June	I.F. Amplifiers in Television Receivers (Kronenberg)	p. 62 4 pages
1950	June	Amateur Television -- A Progress Report (Tilton)	p. 11 5 pages
1953	November	An Amateur Television Camera (Keller)	p. 10 6 pages
1958	August	A Narrow-Band Image Transmission System, Part I (Macdonald)	p. 11 7 pages
	September	A Narrow-Band Image Transmission System, Part II (Macdonald)	p. 31 7 pages
1960	March	First Amateur Transatlantic Picture Transmission	p. 75 1 page
	April	Slow-Scan Image Transmission (Macdonald)	p. 36 5 pages
	May	Slow-Scan Tests Coming Up (Macdonald) (TC)	p. 52 2 pages
	September	Amateur Color Transmission (Shadbolt)	p. 13 3 pages
1961	January	S.C.F.M. -- Improved System for Slow-Scan Image Transmission Part I	p. 28 5 pages

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	August	League Seeks "Slow-Scan TV" (Happenings)	p. 63 2 pages
1962	November	Amateur TV -- The Easy Way (Cambell)	p. 33 10 pages
1964	March	A Compact Slow-Scan TV Monitor (Macdonald)	p. 43 6 pages
1965	February	Slow-Scan Via OSCAR III (Miller)	p. 20 1 page
	June	A Slow-Scan Vidicon Camera Part I: Performance and Electrical Design (Macdonald)	p. 11 5 pages
	July	A Slow-Scan Vidicon Camera Part II: Mechanical Design (Macdonald)	p. 15 4 pages
	August	A Slow-Scan Vidicon Camera Part III: Setup and Operating Procedures (McDonald)	p. 24 3 pages
1966	September	Twenty-Meter Slow-Scan Tests (Report on pictures) (Macdonald)	p. 38 1 page
	October	Narrow-Band TV Using Pseudo-Random Dot Scan (Simpson) (TC) (Also see 1/67 TC)	p. 46 2 pages
1967	January	Pseudo-Random Scanning (Macdonald) (TC)	p. 47 1 page
	February	First Slow-Scan Pictures From Antarctica!	p. 77 1 page
	November	Slow-Scan TV Proposed (Happenings)	p. 78 2 pages
1968	February	ARRL Comments on Slow-Scan TV (Happenings)	p. 72 3 pages



	September	Slow-Scan TV Pictures Exchanged Between Canada and Sweden	p. 71 1 page
		Slow-Scan in the U.S. and Canada (Happenings)	p. 80 1 page
		Slow-Scan Report (FCC Report and Order)	p. 84 3 pages
	December	Slow-Scan with Regular Vidicons (Refers to 1965 series) (Taggart) (TC)	p. 48 1 page
1969	May	U.S.-Europe Two-Way Slow-Scan TV QSO (Taggart)	p. 75 1 page
1970	June	Slow-Scan TV Viewing Adapter for Oscilloscopes (Briles & Gervenack) (Also see 3/72, p. 56 TC)	p. 46 5 pages
1971	March	A Solid State SSTV Monitor (Tschannen) (Feedback 8/71, p.41)	p. 35 5 pages
	November	Robot Research Model 70 SSTV Monitor and Model 80 Camera (Recent Equipment)	p. 48 4 pages
1972	January	What You Always Wanted to Know About SSTV (Hastings)	p. 61 5 pages
	March	More On The SSTV Viewing Adaptor For Oscilloscopes (Refers to 6/70 articles) (Briles & Gervenack) (TC)	p. 56 1 page
	July	A Storage-Tube Monitor for SSTV (Smith)	p. 34 3 pages
	September	Questions and Their Answers on the Solid-State SSTV Monitor (Tschannen) (TC) (Refers to 3/71)	p. 56 2 pages
	December	ATV with Motorola T44 UHF Transmitter, Part I (McLeod)	p. 28 5 pages*
1973	January	SSTV Video Inversion and Short Scan (Stavrou) (TC)	p. 42 2 pages
	February	ATV with Motorola T44 UHF	p. 36

		Transmitter, Part II (McLeod)	8 pages*
March		A Solid-State SSTV Monitor -- Mark II (Tschannen) (Feedback 5/73, p. 40)	p. 27 7 pages
August		SSTV Calling Frequencies (Macdonald) (TC)	p. 47 2 pages
October		A Tuner for ATV Applications (Bertini)	p. 34 3 pages*
1974			
April		Venue Slo-Scan TV Monitor (Recent Equipment) (Feedback 5/73, p. 64)	p. 46 2 pages
July		A Character Generator for ATV (Ellison)	p. 11 8 pages
1975	January	Practical Ideas for the ATV Enthusiast, Part I (O'Hara)	p. 11 5 pages*
	February	Practical Ideas for the ATV Enthusiast, Part II (O'Hara)	p. 30 7 pages*
	March	SSTV to Fact-Scan Converter, Part I (Steber)	p. 33 8 pages
	May	Slow-Scan to Fast-Scan Converter, Part II (Steber)	p. 28 10 pages

\* Condensed in Specialized Communications Techniques for the Radio Amateur

	July	A Crystal-Controlled SSTV Sync System (Tschannen)	p. 22 5 pages
	November	TV Backdrop (H&K)	p. 42 1 page
	December	A Tuning Aid for SSTV (Hall)	p. 38 3 pages
1976			
	May	450 MHz ATV Repeaters (FM Repeater News)	p. 45 1 page
	November	SSTV Image Processing	p. 13

		(Steber)	4 pages
1977	February	Using Still-Camera Lenses on SSTV Cameras (H&K)	p. 44 1 page
1978	April	QST Go ATV with This Transceiver	p. 22 5 pages
	October	QST Medium-Scan Television -- A New Frontier	p. 30
	October	QST SSTV Pictures from Your Microcomputer	p. 25
1980	January	QST The Microprocessor and Slow-Scan Television (Feedback: Feb., p. 17)	p. 36
	February	QST Medium-Scan Television Update	p. 27
	November	QST SSTV in Colour	p. 11
1981	January	QST Low-Cost Conversion of the Robot 400 to Color	p. 11 5 pages
	June	QST All About Amateur Television (Feedback: Sept 1981, p. 51)	p. 11 4 pages
1982	March	QST FAX and TV Permitted in Additional Frequency Bands	p. 59
	June	QST A Compatible Slow-Scan Color Television System	p. 15
	August	QST Care and Feeding of Linear Amplifiers for ATV	p. 24 5 pages
	December	QST PAL SSTV? (color SSTV compatibility)	p. 53
1983	June	QST SSTV Today	p. 11
	August	QST High-Resolution SSTV	p. 11

1984	April	QST Computerized ATV	p. 44
1985	August	QST Color SSTV and the Atari Computer	p. 13 4 pages
		QST The VIP: A VIC Image Processor	p. 25 7 pages
		QST The ATV'ers Amazing Little Grey Box	p. 32 2 pages
	December	QST In Search of the Perfect Picture	p. 14 4 pages
1986	January	QST In Search of the Perfect Picture	p. 18 7 pages
	March	QST The ROM Scanner (SSTV)	p. 21 7 pages

#### Summary

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Most people are scared away from trying SSTV because they think it HAS TO be expensive. That WAS true but it's not anymore. With 3 or 4 new color SSTV systems for use with the IBM PC, 1992 will be the year that SSTV really takes off.



Subject: Advanced License Exam Questions

4AA-1.1 What are the frequency privileges authorized to the Advanced operator in the 75-meter wavelength band?

- A. 3525 kHz to 3750 kHz and 3775 kHz to 4000 kHz
- B. 3500 kHz to 3525 kHz and 3800 kHz to 4000 kHz
- C. 3500 kHz to 3525 kHz and 3800 kHz to 3890 kHz
- D. 3525 kHz to 3775 kHz and 3800 kHz to 4000 kHz

4AA-1.2 What are the frequency privileges authorized to the Advanced operator in the 40-meter wavelength band?

- A. 7000 kHz to 7300 kHz
- B. 7025 kHz to 7300 kHz
- C. 7025 kHz to 7350 kHz
- D. 7000 kHz to 7025 kHz

4AA-1.3 What are the frequency privileges authorized to the Advanced operator in the 20-meter wavelength band?

- A. 14000 kHz to 14150 kHz and 14175 kHz to 14350 kHz
- B. 14025 kHz to 14175 kHz and 14200 kHz to 14350 kHz
- C. 14000 kHz to 14025 kHz and 14200 kHz to 14350 kHz
- D. 14025 kHz to 14150 kHz and 14175 kHz to 14350 kHz

4AA-1.4 What are the frequency privileges authorized to the Advanced operator in the 15-meter wavelength band?

- A. 21000 kHz to 21200 kHz and 21250 kHz to 21450 kHz
- B. 21000 kHz to 21200 kHz and 21300 kHz to 21450 kHz
- C. 21025 kHz to 21200 kHz and 21225 kHz to 21450 kHz
- D. 21025 kHz to 21250 kHz and 21270 kHz to 21450 kHz

4AA-2.1 What is meant by automatic retransmission from a repeater station?

- A. The repeater is actuated by a received electrical signal
- B. The repeater is actuated by a telephone control link
- C. The repeater station is actuated by a control operator
- D. The repeater station is actuated by a call sign sent in Morse code

4AA-2.2 What is the term for the operation of a repeater whereby the repeater station is actuated solely by the presence of a received signal through electrical or electromechanical means, without any direct, positive action by the control operator?

- A. Simplex retransmission
- B. Manual retransmission
- C. Linear retransmission
- D. Automatic retransmission

4AA-2.3 Under what circumstances, if any, may an amateur station automatically retransmit programs or the radio signals of other amateur stations?

- A. Only when the station licensee is present
- B. Only if the station is a repeater or space station
- C. Only when the control operator is present
- D. Only during portable operation

4AA-2.4 Which of the following stations may not be automatically

controlled?

- A. A station transmitting control signals to a model craft
- B. A station in beacon operation
- C. A station in auxiliary operation
- D. A station in repeater operation

4AA-3.1 What is meant by repeater operation?

- A. An amateur radio station employing a phone patch to pass third-party communications
- B. An apparatus for effecting remote control between a control point and a remotely controlled station
- C. Manual or simplex operation
- D. Radio communications in which amateur radio station signals are automatically retransmitted

4AA-3.2 What is a closed repeater?

- A. A repeater containing control circuitry that limits repeater access to certain users
- B. A repeater containing no special control circuitry to limit access to any licensed amateur
- C. A repeater containing a transmitter and receiver on the same frequency, a closed pair
- D. A repeater shut down by order of an FCC District Engineer-in-Charge

4AA-3.3 What frequencies in the 10-meter wavelength band are available for repeater operation?

- A. 28.0-28.7 MHz
- B. 29.0-29.7 MHz
- C. 29.5-29.7 MHz
- D. 28.5-29.7 MHz

4AA-3.4 Which of the following repeater operating and technical parameters are +++++not+++++ the responsibility of the area frequency coordinator?

- A. The repeater effective radiated power
- B. The repeater transmit and receive frequencies
- C. The repeater Height Above Average Terrain (HAAT)
- D. The repeater call sign

4AA-3.5 What frequencies in the 23-cm wavelength band are available for repeater operation?

- A. 1270-1300 MHz
- B. 1270-1295 MHz
- C. 1240-1300 MHz
- D. Repeater operation is not permitted in the 23-cm wavelength band

4AA-3.6 What is an open repeater?

- A. A repeater that does not contain control circuitry that limits repeater access to certain users
- B. A repeater available for use only by members of a club or repeater group
- C. A repeater that continuously transmits a signal to indicate that it is available for use
- D. A repeater whose frequency pair has been properly coordinated

4AA-3.7 What frequencies in the 6-meter wavelength band are available for repeater operation?

- A. 51.00-52.00 MHz
- B. 50.25-52.00 MHz
- C. 52.00-53.00 MHz
- D. 51.00-54.00 MHz

4AA-3.8 What frequencies in the 2-meter wavelength band are available for repeater operation?

- A. 144.50-145.50 and 146-148.00 MHz
- B. 144.50-148.00 MHz
- C. 144.75-146.00 and 146-148.00 MHz
- D. 146.00-148.00 MHz

4AA-3.9 What frequencies in the 1.25-meter wavelength band are available for repeater operation?

- A. 220.25-225.00 MHz
- B. 220.50-225.00 MHz
- C. 221.00-225.00 MHz
- D. 223.00-225.00 MHz

4AA-3.10 What frequencies in the 0.70-meter wavelength band are available for repeater operation?

- A. 420.0-431, 433-435 and 438-450 MHz
- B. 420.5-440 and 445-450 MHz
- C. 420.5-435 and 438-450 MHz
- D. 420.5-433, 435-438 and 439-450 MHz

4AA-4.1 What is meant by auxiliary station operation?

- A. Radio communication from a location more than 50 miles from that indicated on the station license for a period of more than three months
- B. Remote control of model airplanes or boats using frequencies above 50.1 MHz
- C. Remote control of model airplanes or boats using frequencies above 29.5 MHz
- D. Transmission of communications point-to-point within a system of cooperating amateur stations

4AA-4.2 What is one use for a station in auxiliary operation?

- A. Point-to-point radio communications within a system of cooperating amateur stations
- B. Remote control of model craft
- C. Passing of international third-party communications
- D. The retransmission of NOAA weather broadcasts

4AA-4.3 A station in auxiliary operation may only communicate with which stations?

- A. Stations in the public safety service
- B. Other amateur stations within a system of cooperating amateur stations
- C. Amateur radio stations in space satellite operation
- D. Amateur radio stations other than those under manual control

4AA-4.4 What frequencies are authorized for stations in auxiliary



operation?

- A. All amateur frequency bands above 220.5 MHz, except 432-433 MHz and 436-438 MHz
- B. All amateur frequency bands above 220.5 MHz, except 431-432 MHz and 435-437 MHz
- C. All amateur frequency bands above 220.5 MHz, except 431-433 MHz and 435-438 MHz
- D. All amateur frequency bands above 220.5 MHz, except 430-432 MHz and 434-437 MHz

4AA-5.1 What is meant by +++remote control+++ of an amateur radio station?

- A. Amateur communications conducted from a specific geographical location other than that shown on the station license
- B. Automatic operation of a station from a control point located elsewhere than at the station transmitter
- C. An amateur radio station operating under automatic control
- D. A control operator indirectly manipulating the operating adjustments in the station through a control link

4AA-5.2 What is one responsibility of a control operator of a station under remote control?

- A. Provisions must be made to limit transmissions to no more than 3 minutes if the control link malfunctions
- B. Provisions must be made to limit transmissions to no more than 4 minutes if the control link malfunctions
- C. Provisions must be made to limit transmissions to no more than 5 minutes if the control link malfunctions
- D. Provisions must be made to limit transmissions to no more than 10 minutes if the control link malfunctions

4AA-5.3 If the control link for a station under remote control malfunctions, there must be a provision to limit transmission to what time length?

- A. 5 seconds
- B. 10 minutes
- C. 3 minutes
- D. 5 minutes

4AA-5.4 What frequencies are authorized for radio remote control of an amateur radio station?

- A. All amateur frequency bands above 220.5 MHz, except 432-433 MHz and 436-438 MHz
- B. All amateur frequency bands above 220.5 MHz, except 431-432 MHz and 435-437 MHz
- C. All amateur frequency bands above 220.5 MHz, except 431-433 MHz and 435-438 MHz
- D. All amateur frequency bands above 220.5 MHz, except 430-432 MHz and 434-437 MHz

4AA-5.5 What frequencies are authorized for radio remote control of a station in repeater operation?

- A. All amateur frequency bands above 220.5 MHz, except 432-433 MHz and 436-438 MHz
- B. All amateur frequency bands above 220.5 MHz, except 431-432 MHz and 435-437 MHz

C. All amateur frequency bands above 220.5 MHz, except 430-432 MHz and 434-437 MHz

D. All amateur frequency bands above 220.5 MHz, except 431-433 MHz and 435-438 MHz

4AA-6.1 What is meant by +++automatic control+++ of an amateur radio station?

A. The use of devices and procedures for control so that a control operator does not have to be present at a control point

B. Radio communication for remotely controlling another amateur radio station

C. Remotely controlling a station such that a control operator does not have to be present at the control point at all times

D. The use of a control link between a control point and a remotely controlled station

4AA-6.2 How do the responsibilities of the control operator of a station under automatic control differ from one under local control?

A. Under local control, there is no control operator

B. Under automatic control, a control operator is not required to be present at a control point

C. Under automatic control, there is no control operator

D. Under local control, a control operator is not required to be present at the control point at all times

4AA-6.3 Which of the following amateur stations may be operated by automatic control?

A. Stations without a control operator

B. Stations in repeater operation

C. Stations under remote control

D. Stations controlling model craft

4AA-7.1 What is a control link?

A. The automatic-control devices at an unattended station

B. An automatically operated link

C. The remote control apparatus between a control point and a remotely controlled station

D. A transmission-limiting timing device

4AA-7.2 What is the term for apparatus to effect remote control between the control point and a remotely controlled station?

A. Tone link

B. Wire control

C. Remote control

D. Control link

4AA-8.1 What is meant by local control?

A. The use of a control operator who directly manipulates the operating adjustments

B. The OSCAR satellite transponder

C. A carrier operated relay system

D. The use of a portable handheld to turn on or off the repeater

4AA-8.2 Who may be the control operator of an auxiliary station?

A. Any amateur operator

- B. Any Technician, General, Advanced or Amateur Extra class operator
- C. Any General, Advanced or Amateur Extra class operator
- D. Any Advanced or Amateur Extra class operator

4AA-9.1 How may a repeater station be identified?

- A. By a burst of digitized information
- B. Only voice may be used for identification
- C. By CW or voice
- D. Only CW may be used for identification

4AA-9.2 When a repeater station is identified in Morse code using an automatic keying device, what is the maximum code speed permitted?

- A. 13 words per minute
- B. 30 words per minute
- C. 20 words per minute
- D. There is no limitation

4AA-9.3 How often must a beacon station be identified?

- A. Every eight minutes
- B. Only at the end of the series of transmissions
- C. At the beginning of a series of transmissions
- D. At least once every ten minutes during and at the end of activity

4AA-9.4 When may a repeater be identified using digital codes?

- A. Any time that particular code is used for at least part of the communication
- B. Digital identification is not allowed
- C. Only voice may be allowed
- D. No identification is needed in digital transmissions

4AA-10.1 When is prior FCC approval required before constructing or altering an amateur station antenna structure?

- A. When the antenna structure violates local building codes
- B. When the height above ground will exceed 200 feet
- C. When an antenna located 23000 feet from an airport runway will be 150 feet high
- D. When an antenna located 23000 feet from an airport runway will be 100 feet high

4AA-10.2 What must an amateur radio operator obtain from the FCC before constructing or altering an antenna structure more than 200 feet high?

- A. An Environmental Impact Statement
- B. A Special Temporary Authorization
- C. Prior approval
- D. An effective radiated power statement

4AA-11.1 Without special FCC approval, what maximum height above ground level (excluding airport proximity effects) is permitted for any amateur antenna support structure, including the radiating elements, tower, supports, etc.?

- A. 46 m (150 feet)
- B. 61 m (200 feet)
- C. 76 m (250 feet)

D. 91 m (300 feet)

4AA-11.2 From what government agencies must permission be obtained if you wish to erect an amateur antenna structure that exceeds 200 feet above ground level?

- A. Federal Aviation Administration and Federal Communications Commission
- B. Environmental Protection Agency and Federal Communications Commission
- C. Federal Aviation Administration and Environmental Protection Agency
- D. Environmental Protection Agency and National Aeronautics and Space Administration

4AA-12.1 Which of the following types of amateur communications is +not+ a "prohibited transmission" as defined in Part 97?

- A. Transmission of messages into a disaster area for hire or for material compensation
- B. Transmissions ensuring safety on a highway, such as calling a commercial tow truck service
- C. Transmission of communications that facilitate the regular business or commercial affairs of any party
- D. Transmission of communications concerning moving, supplying and quartering participants in a charity event as long as the sponsoring charity is the principal beneficiary of such communications, not the public

4AA-12.2 May an amateur operator inform other amateur operators of the availability of apparatus for sale or trade over the airwaves?

- A. You are not allowed to sell or trade equipment on the air
- B. You are allowed to derive a profit by buying or selling equipment on the air on a regular basis
- C. This is a permissible activity if the apparatus can normally be used at an amateur station and is not done for profit by the offering individual on a regular basis
- D. This is allowed only if you also give the serial number of the equipment

4AA-12.3 Under what conditions, if any, may communications be transmitted to a commercial business by an amateur station?

- A. When the total remuneration does not exceed 25
- B. When the control operator is employed by the FCC
- C. When transmitting international third-party communications
- D. When the immediate safety of human life or immediate protection of property is involved

4AA-13.1 What are the only types of messages that may be transmitted to an amateur station in a foreign country?

- A. Supplies needed, on a routine schedule
- B. Emergency messages or business messages
- C. Business messages or messages of a technical nature
- D. Personal remarks, tests, or messages of a technical nature

4AA-13.2 What are the limitations on international amateur radio communications regarding the types of messages transmitted?

- A. Emergency communications only

- B. Technical or personal messages only
- C. Business communications only
- D. Call sign and signal reports only

4AA-14.1 Under what circumstances, if any, may amateur operators accept payment for using their own stations (other than a club station) to send messages?

- A. When employed by the FCC
- B. When passing emergency traffic
- C. Under no circumstances
- D. When passing international third-party communications

4AA-14.2 Under what circumstances, if any, may the licensee of an amateur station in repeater operation accept remuneration for providing communication services to another party?

- A. When the repeater is operating under portable power
- B. When the repeater is under local control
- C. During Red Cross or other emergency service drills
- D. Under no circumstances

4AA-15.1 Who is responsible for preparing an Element 1(A) telegraphy examination?

- A. The volunteer examiners or a qualified supplier
- B. The FCC
- C. The VEC
- D. Any Novice licensee

4AA-15.2 What must the Element 1(A) telegraphy examination prove?

- A. The applicant's ability to send and receive text in international Morse code at a rate of not less than 13 words per minute
- B. The applicant's ability to send and receive text in international Morse code at a rate of not less than 5 words per minute
- C. The applicant's ability to send and receive text in international Morse code at a rate of not less than 20 words per minute
- D. The applicant's ability to send text in international Morse code at a rate of not less than 13 words per minute

4AA-15.3 Which telegraphy characters are used in an Element 1(A) telegraphy examination?

- A. The letters A through Z, 0/ through 9, the period, the comma, the question mark, AR, SK, BT and DN
- B. The letters A through Z, 0/ through 9, the period, the comma, the open and closed parenthesis, the question mark, AR, SK, BT and DN
- C. The letters A through Z, 0/ through 9, the period, the comma, the dollar sign, the question mark, AR, SK, BT and DN
- D. A through Z, 0/ through 9, the period, the comma, and the question mark

4AA-16.1 Who is responsible for preparing an Element 2 written examination?

- A. The FCC
- B. Any Novice licensee
- C. The volunteer examiners or a qualified supplier

D. The VEC

4AA-16.2 Where do volunteer examiners obtain the questions for preparing an Element 2 written examination?

- A. They must prepare the examination from material contained in the +ARRL Handbook+ or obtain a question set from the FCC
- B. They must prepare the examination from material contained in a question pool maintained by the FCC in Washington
- C. They must prepare the examination from material contained in a question pool maintained by the local FCC field office
- D. They must prepare the examination from a common question pool maintained by the VECs or obtain a question set from a supplier

4AA-17.1 Who is eligible for administering an examination for the Novice operator license?

- A. An amateur radio operator holding a General, Advanced or Extra class license and at least 18 years old
- B. An amateur radio operator holding a Technician, General, Advanced or Extra class license and at least 18 years old
- C. An amateur radio operator holding a General, Advanced or Extra class license and at least 16 years old
- D. An amateur radio operator holding a Technician, General, Advanced or Extra class license and at least 16 years old

4AA-17.2 Within how many days after the administration of a successful Novice examination must the examiners submit the application to the FCC?

- A. Within one week of the administration date
- B. Within 10 days of the administration date
- C. Within 5 days of the administration date
- D. Within 30 days of the administration date

4AA-17.3 Where must the completed Form 610 be submitted after the administration of a successful Novice examination?

- A. To the nearest FCC Field Office
- B. To the FCC in Washington, DC
- C. To the FCC in Gettysburg, PA
- D. To any VEC

4AA-18.1 What is the minimum passing score on a written examination element for the Novice operator license?

- A. A minimum of 19 correct answers
- B. A minimum of 22 correct answers
- C. A minimum of 21 correct answers
- D. A minimum of 24 correct answers

4AA-18.2 How many questions must an Element 2 written examination contain?

- A. 25
- B. 50
- C. 40
- D. 30

4AA-18.3 In a telegraphy examination, how many characters are counted as one word?

- A. 2

- B. 5
- C. 8
- D. 10

4AA-19.1 What is the minimum age to be a volunteer examiner?

- A. 16 years old
- B. 21 years old
- C. 18 years old
- D. 13 years old

4AA-19.2 Under what circumstances, if any, may volunteer examiners be compensated for their services?

- A. Under no circumstances
- B. When out-of-pocket expenses exceed 25
- C. The volunteer examiner may be compensated when traveling over 25 miles to the test site
- D. Only when there are more than 20 applicants attending the examination session

4AA-19.3 Under what circumstances, if any, may a person whose amateur station license or amateur operator license has ever been revoked or suspended be a volunteer examiner?

- A. Under no circumstances
- B. Only if five or more years have elapsed since the revocation or suspension
- C. Only if 3 or more years have elapsed since the revocation or suspension
- D. Only after review and subsequent approval by the VEC

4AA-19.4 Under what circumstances, if any, may an employee of a company which is engaged in the distribution of equipment used in connection with amateur radio transmissions be a volunteer examiner?

- A. If the employee is employed in the amateur radio sales part of the company
- B. If the employee does not normally communicate with the manufacturing or distribution part of the company
- C. If the employee serves as a volunteer examiner for his/her customers
- D. If the employee does not normally communicate with the benefits and policies part of the company

4AA-20.1 What are the penalties for fraudulently administering examinations?

- A. The VE's amateur station license may be suspended for a period not to exceed 3 months
- B. The VE is subject to a monetary fine not to exceed 500 for each day the offense was committed
- C. The VE's amateur station license may be revoked and the operator's license suspended
- D. The VE may be restricted to administering only Novice class license examinations

4AA-20.2 What are the penalties for administering examinations for money or other considerations?

- A. The VE's amateur station license may be suspended for a period not to exceed 3 months

- B. The VE is subject to a monetary fine not to exceed 500 for each day the offense was committed
- C. The VE will be restricted to administering only Novice class license examinations
- D. The VE's amateur station license may be revoked and the operator's license suspended

4AB-1.1 What is ++++facsimile++++?

- A. The transmission of characters by radioteletype that form a picture when printed
- B. The transmission of still pictures by slow-scan television
- C. The transmission of video by amateur television
- D. The transmission of printed pictures for permanent display on paper

4AB-1.2 What is the modern standard scan rate for a facsimile picture transmitted by an amateur station?

- A. The modern standard is 240 lines per minute
- B. The modern standard is 50 lines per minute
- C. The modern standard is 150 lines per second
- D. The modern standard is 60 lines per second

4AB-1.3 What is the approximate transmission time for a facsimile picture transmitted by an amateur station?

- A. Approximately 6 minutes per frame at 240 lpm
- B. Approximately 3.3 minutes per frame at 240 lpm
- C. Approximately 6 seconds per frame at 240 lpm
- D. 1/60 second per frame at 240 lpm

4AB-1.4 What is the term for the transmission of printed pictures by radio?

- A. Television
- B. Facsimile
- C. Xerography
- D. ACSSB

4AB-1.5 In facsimile, how are variations in picture brightness and darkness converted into voltage variations?

- A. With an LED
- B. With a Hall-effect transistor
- C. With a photodetector
- D. With an optoisolator

4AB-2.1 What is ++++slow-scan++++ television?

- A. The transmission of Baudot or ASCII signals by radio
- B. The transmission of pictures for permanent display on paper
- C. The transmission of moving pictures by radio
- D. The transmission of still pictures by radio

4AB-2.2 What is the scan rate commonly used for amateur slow-scan television?

- A. 20 lines per minute
- B. 15 lines per second
- C. 4 lines per minute
- D. 240 lines per minute

4AB-2.3 How many lines are there in each frame of an amateur



slow-scan television picture?

- A. 30
- B. 60
- C. 120
- D. 180

4AB-2.4 What is the audio frequency for black in an amateur slow-scan television picture?

- A. 2300 Hz
- B. 2000 Hz
- C. 1500 Hz
- D. 120 Hz

4AB-2.5 What is the audio frequency for white in an amateur slow-scan television picture?

- A. 120 Hz
- B. 1500 Hz
- C. 2000 Hz
- D. 2300 Hz

4AC-1.1 What is a ++++sporadic-E++++ condition?

- A. Variations in E-layer height caused by sunspot variations
- B. A brief increase in VHF signal levels from meteor trails at E-layer height
- C. Patches of dense ionization at E-layer height
- D. Partial tropospheric ducting at E-layer height

4AC-1.2 What is the propagation condition called where scattered patches of relatively dense ionization develop seasonally at E layer heights?

- A. Auroral propagation
- B. Ducting
- C. Scatter
- D. Sporadic-E

4AC-1.3 In what region of the world is ++++sporadic-E++++ most prevalent?

- A. The equatorial regions
- B. The arctic regions
- C. The northern hemisphere
- D. The polar regions

4AC-1.4 On which amateur frequency band is the extended-distance propagation effect of sporadic-E most often observed?

- A. 2 meters
- B. 6 meters
- C. 20 meters
- D. 160 meters

4AC-1.5 What appears to be the major cause of the ++++sporadic-E++++ condition?

- A. Wind shear
- B. Sunspots
- C. Temperature inversions
- D. Meteors

4AC-2.1 What is a ++++selective fading++++ effect?

- A. A fading effect caused by small changes in beam heading at

the receiving station

B. A fading effect caused by phase differences between radio wave components of the same transmission, as experienced at the receiving station

C. A fading effect caused by large changes in the height of the ionosphere, as experienced at the receiving station

D. A fading effect caused by time differences between the receiving and transmitting stations

4AC-2.2 What is the propagation effect called when phase differences between radio wave components of the same transmission are experienced at the receiving station?

A. Faraday rotation

B. Diversity reception

C. Selective fading

D. Phase shift

4AC-2.3 What is the major cause of +++selective fading+++?

A. Small changes in beam heading at the receiving station

B. Large changes in the height of the ionosphere, as experienced at the receiving station

C. Time differences between the receiving and transmitting stations

D. Phase differences between radio wave components of the same transmission, as experienced at the receiving station

4AC-2.4 Which emission modes suffer the most from +++selective fading+++?

A. CW and SSB

B. FM and double sideband AM

C. SSB and AMTOR

D. SSTV and CW

4AC-2.5 How does the bandwidth of the transmitted signal affect +++selective fading+++?

A. It is more pronounced at wide bandwidths

B. It is more pronounced at narrow bandwidths

C. It is equally pronounced at both narrow and wide bandwidths

D. The receiver bandwidth determines the selective fading effect

4AC-3.1 What effect does +++auroral activity+++ have upon radio communications?

A. The readability of SSB signals increases

B. FM communications are clearer

C. CW signals have a clearer tone

D. CW signals have a fluttery tone

4AC-3.2 What is the cause of +++auroral activity+++?

A. A high sunspot level

B. A low sunspot level

C. The emission of charged particles from the sun

D. Meteor showers concentrated in the northern latitudes

4AC-3.3 In the northern hemisphere, in which direction should a directional antenna be pointed to take maximum advantage of auroral propagation?

- A. South
- B. North
- C. East
- D. West

4AC-3.4 Where in the ionosphere does auroral activity occur?

- A. At F-layer height
- B. In the equatorial band
- C. At D-layer height
- D. At E-layer height

4AC-3.5 Which emission modes are best for auroral propagation?

- A. CW and SSB
- B. SSB and FM
- C. FM and CW
- D. RTTY and AM

4AC-4.1 Why does the radio-path horizon distance exceed the geometric horizon?

- A. E-layer skip
- B. D-layer skip
- C. Auroral skip
- D. Radio waves may be bent

4AC-4.2 How much farther does the radio-path horizon distance exceed the geometric horizon?

- A. By approximately 15% of the distance
- B. By approximately twice the distance
- C. By approximately one-half the distance
- D. By approximately four times the distance

4AC-4.3 To what distance is VHF propagation ordinarily limited?

- A. Approximately 1000 miles
- B. Approximately 500 miles
- C. Approximately 1500 miles
- D. Approximately 2000 miles

4AC-4.4 What propagation condition is usually indicated when a VHF signal is received from a station over 500 miles away?

- A. D-layer absorption
- B. Faraday rotation
- C. Tropospheric ducting
- D. Moonbounce

4AC-4.5 What happens to a radio wave as it travels in space and collides with other particles?

- A. Kinetic energy is given up by the radio wave
- B. Kinetic energy is gained by the radio wave
- C. Aurora is created
- D. Nothing happens since radio waves have no physical substance

4AD-1.1 What is a ++++frequency standard++++?

- A. A net frequency
- B. A device used to produce a highly accurate reference frequency
- C. A device for accurately measuring frequency to within 1 Hz

D. A device used to generate wideband random frequencies

4AD-1.2 What is a frequency-marker generator?

- A. A device used to produce a highly accurate reference frequency
- B. A sweep generator
- C. A broadband white noise generator
- D. A device used to generate wideband random frequencies

4AD-1.3 How is a frequency-marker generator used?

- A. In conjunction with a grid-dip meter
- B. To provide reference points on a receiver dial
- C. As the basic frequency element of a transmitter
- D. To directly measure wavelength

4AD-1.4 What is a frequency counter?

- A. A frequency measuring device
- B. A frequency marker generator
- C. A device that determines whether or not a given frequency is in use before automatic transmissions are made
- D. A broadband white noise generator

4AD-1.5 How is a frequency counter used?

- A. To provide reference points on an analog receiver dial
- B. To generate a frequency standard
- C. To measure the deviation in an FM transmitter
- D. To measure frequency

4AD-1.6 What is the most the actual transmitter frequency could differ from a reading of 146,520,000-Hertz on a frequency counter with a time base accuracy of +/- 1.0 ppm?

- A. 165.2 Hz
- B. 14.652 kHz
- C. 146.52 Hz
- D. 1.4652 MHz

4AD-1.7 What is the most the actual transmitter frequency could differ from a reading of 146,520,000-Hertz on a frequency counter with a time base accuracy of +/- 0.1 ppm?

- A. 14.652 Hz
- B. 0.1 MHz
- C. 1.4652 Hz
- D. 1.4652 kHz

4AD-1.8 What is the most the actual transmitter frequency could differ from a reading of 146,520,000-Hertz on a frequency counter with a time base accuracy of +/- 10 ppm?

- A. 146.52 Hz
- B. 10 Hz
- C. 146.52 kHz
- D. 1465.20 Hz

4AD-1.9 What is the most the actual transmitter frequency could differ from a reading of 432,100,000-Hertz on a frequency counter with a time base accuracy of +/- 1.0 ppm?

- A. 43.21 MHz
- B. 10 Hz

- C. 1.0 MHz
- D. 432.1 Hz

4AD-1.10 What is the most the actual transmit frequency could differ from a reading of 432,100,000-Hertz on a frequency counter with a time base accuracy of +/- 0.1 ppm?

- A. 43.21 Hz
- B. 0.1 MHz
- C. 432.1 Hz
- D. 0.2 MHz

4AD-1.11 What is the most the actual transmit frequency could differ from a reading of 432,100,000-Hertz on a frequency counter with a time base accuracy of +/- 10 ppm?

- A. 10 MHz
- B. 10 Hz
- C. 4321 Hz
- D. 432.1 Hz

4AD-2.1 What is a ++++dip-meter++++?

- A. A field strength meter
- B. An SWR meter
- C. A variable LC oscillator with metered feedback current
- D. A marker generator

4AD-2.2 Why is a dip-meter used by many amateur operators?

- A. It can measure signal strength accurately
- B. It can measure frequency accurately
- C. It can measure transmitter output power accurately
- D. It can give an indication of the resonant frequency of a circuit

4AD-2.3 How does a dip-meter function?

- A. Reflected waves at a specific frequency desensitize the detector coil
- B. Power coupled from an oscillator causes a decrease in metered current
- C. Power from a transmitter cancels feedback current
- D. Harmonics of the oscillator cause an increase in resonant circuit Q

4AD-2.4 What two ways could a dip-meter be used in an amateur station?

- A. To measure resonant frequency of antenna traps and to measure percentage of modulation
- B. To measure antenna resonance and to measure percentage of modulation
- C. To measure antenna resonance and to measure antenna impedance
- D. To measure resonant frequency of antenna traps and to measure a tuned circuit resonant frequency

4AD-2.5 What types of coupling occur between a dip-meter and a tuned circuit being checked?

- A. Resistive and inductive
- B. Inductive and capacitive
- C. Resistive and capacitive

D. Strong field

4AD-2.6 How tight should the dip-meter be coupled with the tuned circuit being checked?

- A. As loosely as possible, for best accuracy
- B. As tightly as possible, for best accuracy
- C. First loose, then tight, for best accuracy
- D. With a soldered jumper wire between the meter and the circuit to be checked, for best accuracy

4AD-2.7 What happens in a dip-meter when it is too tightly coupled with the tuned circuit being checked?

- A. Harmonics are generated
- B. A less accurate reading results
- C. Cross modulation occurs
- D. Intermodulation distortion occurs

4AD-3.1 What factors limit the accuracy, frequency response, and stability of an oscilloscope?

- A. Sweep oscillator quality and deflection amplifier bandwidth
- B. Tube face voltage increments and deflection amplifier voltage
- C. Sweep oscillator quality and tube face voltage increments
- D. Deflection amplifier output impedance and tube face frequency increments

4AD-3.2 What factors limit the accuracy, frequency response, and stability of a D'Arsonval movement type meter?

- A. Calibration, coil impedance and meter size
- B. Calibration, series resistance and electromagnet current
- C. Coil impedance, electromagnet voltage and movement mass
- D. Calibration, mechanical tolerance and coil impedance

4AD-3.3 What factors limit the accuracy, frequency response, and stability of a frequency counter?

- A. Number of digits in the readout, speed of the logic and time base stability
- B. Time base accuracy, speed of the logic and time base stability
- C. Time base accuracy, temperature coefficient of the logic and time base stability
- D. Number of digits in the readout, external frequency reference and temperature coefficient of the logic

4AD-3.4 How can the frequency response of an oscilloscope be improved?

- A. By using a triggered sweep and a crystal oscillator as the time base
- B. By using a crystal oscillator as the time base and increasing the vertical sweep rate
- C. By increasing the vertical sweep rate and the horizontal amplifier frequency response
- D. By increasing the horizontal sweep rate and the vertical amplifier frequency response

4AD-3.5 How can the accuracy of a frequency counter be improved?

- A. By using slower digital logic

- B. By improving the accuracy of the frequency response
- C. By increasing the accuracy of the time base
- D. By using faster digital logic

4AD-4.1 What is the condition called which occurs when the signals of two transmitters in close proximity mix together in one or both of their final amplifiers, and unwanted signals at the sum and difference frequencies of the original transmissions are generated?

- A. Amplifier desensitization
- B. Neutralization
- C. Adjacent channel interference
- D. Intermodulation interference

4AD-4.2 How does intermodulation interference between two transmitters usually occur?

- A. When the signals from the transmitters are reflected out of phase from airplanes passing overhead
- B. When they are in close proximity and the signals mix in one or both of their final amplifiers
- C. When they are in close proximity and the signals cause feedback in one or both of their final amplifiers
- D. When the signals from the transmitters are reflected in phase from airplanes passing overhead

4AD-4.3 How can intermodulation interference between two transmitters in close proximity often be reduced or eliminated?

- A. By using a Class C final amplifier with high driving power
- B. By installing a terminated circulator or ferrite isolator in the feed line to the transmitter and duplexer
- C. By installing a band-pass filter in the antenna feed line
- D. By installing a low-pass filter in the antenna feed line

4AD-4.4 What can occur when a non-linear amplifier is used with a single-sideband phone transmitter?

- A. Reduced amplifier efficiency
- B. Increased intelligibility
- C. Sideband inversion
- D. Distortion

4AD-4.5 How can even-order harmonics be reduced or prevented in transmitter amplifier design?

- A. By using a push-push amplifier
- B. By using a push-pull amplifier
- C. By operating class C
- D. By operating class AB

4AD-5.1 What is receiver desensitizing?

- A. A burst of noise when the squelch is set too low
- B. A burst of noise when the squelch is set too high
- C. A reduction in receiver sensitivity because of a strong signal on a nearby frequency
- D. A reduction in receiver sensitivity when the AF gain control is turned down

4AD-5.2 What is the term used to refer to the reduction of

receiver gain caused by the signals of a nearby station transmitting in the same frequency band?

- A. Desensitizing
- B. Quieting
- C. Cross modulation interference
- D. Squelch gain rollback

4AD-5.3 What is the term used to refer to a reduction in receiver sensitivity caused by unwanted high-level adjacent channel signals?

- A. Intermodulation distortion
- B. Quieting
- C. Desensitizing
- D. Overloading

4AD-5.4 What causes +++receiver desensitizing+++?

- A. Audio gain adjusted too low
- B. Squelch gain adjusted too high
- C. The presence of a strong signal on a nearby frequency
- D. Squelch gain adjusted too low

4AD-5.5 How can +++receiver desensitizing+++ be reduced?

- A. Ensure good RF shielding between the transmitter and receiver
- B. Increase the transmitter audio gain
- C. Decrease the receiver squelch gain
- D. Increase the receiver bandwidth

4AD-6.1 What is +++cross-modulation interference+++?

- A. Interference between two transmitters of different modulation type
- B. Interference caused by audio rectification in the receiver preamp
- C. Harmonic distortion of the transmitted signal
- D. Modulation from an unwanted signal is heard in addition to the desired signal

4AD-6.2 What is the term used to refer to the condition where the signals from a very strong station are superimposed on other signals being received?

- A. Intermodulation distortion
- B. Cross-modulation interference
- C. Receiver quieting
- D. Capture effect

4AD-6.3 How can +++cross-modulation+++ in a receiver be reduced?

- A. By installing a filter at the receiver
- B. By using a better antenna
- C. By increasing the receiver's RF gain while decreasing the AF gain
- D. By adjusting the pass-band tuning

4AD-6.4 What is the result of +++cross-modulation+++?

- A. A decrease in modulation level of transmitted signals
- B. Receiver quieting
- C. The modulation of an unwanted signal is heard on the desired signal



D. Inverted sidebands in the final stage of the amplifier

4AD-7.1 What is the +++capture effect+++?

- A. All signals on a frequency are demodulated by an FM receiver
- B. All signals on a frequency are demodulated by an AM receiver
- C. The loudest signal received is the only demodulated signal
- D. The weakest signal received is the only demodulated signal

4AD-7.2 What is the term used to refer to the reception blockage of one FM-phone signal by another FM-phone signal?

- A. Desensitization
- B. Cross-modulation interference
- C. Capture effect
- D. Frequency discrimination

4AD-7.3 With which emission type is the capture-effect most pronounced?

- A. FM
- B. SSB
- C. AM
- D. CW

4AE-1.1 What is +++reactive power+++?

- A. Wattless, non-productive power
- B. Power consumed in wire resistance in an inductor
- C. Power lost because of capacitor leakage
- D. Power consumed in circuit Q

4AE-1.2 What is the term for an out-of-phase, non-productive power associated with inductors and capacitors?

- A. Effective power
- B. True power
- C. Peak envelope power
- D. Reactive power

4AE-1.3 What is the term for energy that is stored in an electromagnetic or electrostatic field?

- A. Potential energy
- B. Amperes-joules
- C. Joules-coulombs
- D. Kinetic energy

4AE-1.4 What is responsible for the phenomenon when voltages across reactances in series can often be larger than the voltages applied to them?

- A. Capacitance
- B. Resonance
- C. Conductance
- D. Resistance

4AE-2.1 What is +++resonance+++ in an electrical circuit?

- A. The highest frequency that will pass current
- B. The lowest frequency that will pass current
- C. The frequency at which capacitive reactance equals inductive reactance

D. The frequency at which power factor is at a minimum

4AE-2.2 Under what conditions does resonance occur in an electrical circuit?

- A. When the power factor is at a minimum
- B. When inductive and capacitive reactances are equal
- C. When the square root of the sum of the capacitive and inductive reactances is equal to the resonant frequency
- D. When the square root of the product of the capacitive and inductive reactances is equal to the resonant frequency

4AE-2.3 What is the term for the phenomena which occurs in an electrical circuit when the inductive reactance equals the capacitive reactance?

- A. Reactive quiescence
- B. High Q
- C. Reactive equilibrium
- D. Resonance

4AE-2.4 What is the approximate magnitude of the impedance of a series R-L-C circuit at resonance?

- A. High, as compared to the circuit resistance
- B. Approximately equal to the circuit resistance
- C. Approximately equal to  $X_L$
- D. Approximately equal to  $X_C$

4AE-2.5 What is the approximate magnitude of the impedance of a parallel R-L-C circuit at resonance?

- A. Approximately equal to the circuit resistance
- B. Approximately equal to  $X_L$
- C. Low, as compared to the circuit resistance
- D. Approximately equal to  $X_C$

4AE-2.6 What is the characteristic of the current flow in a series R-L-C circuit at resonance?

- A. It is at a minimum
- B. It is at a maximum
- C. It is DC
- D. It is zero

4AE-2.7 What is the characteristic of the current flow in a parallel R-L-C circuit at resonance?

- A. The current circulating in the parallel elements is at a minimum
- B. The current circulating in the parallel elements is at a maximum
- C. The current circulating in the parallel elements is DC
- D. The current circulating in the parallel elements is zero

4AE-3.1 What is the skin effect?

- A. The phenomenon where RF current flows in a thinner layer of the conductor, close to the surface, as frequency increases
- B. The phenomenon where RF current flows in a thinner layer of the conductor, close to the surface, as frequency decreases
- C. The phenomenon where thermal effects on the surface of the conductor increase the impedance
- D. The phenomenon where thermal effects on the surface of the

conductor decrease the impedance

4AE-3.2 What is the term for the phenomenon where most of an RF current flows along the surface of the conductor?

- A. Layer effect
- B. Seeburg Effect
- C. Skin effect
- D. Resonance

4AE-3.3 Where does practically all of the RF current flow in a conductor?

- A. Along the surface
- B. In the center of the conductor
- C. In the magnetic field around the conductor
- D. In the electromagnetic field in the conductor center

4AE-3.4 Why does practically all of an RF current flow within a few thousandths-of-an-inch of the conductor's surface?

- A. Because of skin effect
- B. Because the RF resistance of the conductor is much less than the DC resistance
- C. Because of heating of the metal at the conductor's interior
- D. Because of the AC-resistance of the conductor's self inductance

4AE-3.5 Why is the resistance of a conductor different for RF current than for DC?

- A. Because the insulation conducts current at radio frequencies
- B. Because of the Heisenburg Effect
- C. Because of skin effect
- D. Because conductors are non-linear devices

4AE-4.1 What is a magnetic field?

- A. Current flow through space around a permanent magnet
- B. A force set up when current flows through a conductor
- C. The force between the plates of a charged capacitor
- D. The force that drives current through a resistor

4AE-4.2 In what direction is the magnetic field about a conductor when current is flowing?

- A. In the same direction as the current
- B. In a direction opposite to the current flow
- C. In all directions; omnidirectional
- D. In a direction determined by the left hand rule

4AE-4.3 What device is used to store electrical energy in an electrostatic field?

- A. A battery
- B. A transformer
- C. A capacitor
- D. An inductor

4AE-4.4 What is the term used to express the amount of electrical energy stored in an electrostatic field?

- A. Coulombs
- B. Joules
- C. Watts

D. Volts

4AE-4.5 What factors determine the capacitance of a capacitor?

- A. Area of the plates, voltage on the plates and distance between the plates
- B. Area of the plates, distance between the plates and the dielectric constant of the material between the plates
- C. Area of the plates, voltage on the plates and the dielectric constant of the material between the plates
- D. Area of the plates, amount of charge on the plates and the dielectric constant of the material between the plates

4AE-4.6 What is the dielectric constant for air?

- A. Approximately 1
- B. Approximately 2
- C. Approximately 4
- D. Approximately 0

4AE-4.7 What determines the strength of the magnetic field around a conductor?

- A. The resistance divided by the current
- B. The ratio of the current to the resistance
- C. The diameter of the conductor
- D. The amount of current

4AE-5.1 What is the resonant frequency of the circuit in Figure

4AE-5-1 when L is 50 microhenrys and C is 40 picofarads

[see graphics addendum]?

- A. 79.6 MHz
- B. 1.78 MHz
- C. 3.56 MHz
- D. 7.96 MHz

4AE-5.2 What is the resonant frequency of the circuit in Figure

4AE-5-1 when L is 40 microhenrys and C is 200 picofarads

[see graphics addendum]?

- A. 1.99 kHz
- B. 1.78 MHz
- C. 1.99 MHz
- D. 1.78 kHz

4AE-5.3 What is the resonant frequency of the circuit in Figure

4AE-5-1 when L is 50 microhenrys and C is 10 picofarads

[see graphics addendum]?

- A. 3.18 MHz
- B. 3.18 kHz
- C. 7.12 MHz
- D. 7.12 kHz

4AE-5.4 What is the resonant frequency of the circuit in Figure

4AE-5-1 when L is 25 microhenrys and C is 10 picofarads

[see graphics addendum]?

- A. 10.1 MHz
- B. 63.7 MHz
- C. 10.1 kHz
- D. 63.7 kHz

4AE-5.5 What is the resonant frequency of the circuit in Figure 4AE-5-1 when L is 3 microhenrys and C is 40 picofarads [see graphics addendum]?

- A. 13.1 MHz
- B. 14.5 MHz
- C. 14.5 kHz
- D. 13.1 kHz

4AE-5.6 What is the resonant frequency of the circuit in Figure 4AE-5-1 when L is 4 microhenrys and C is 20 picofarads [see graphics addendum]?

- A. 19.9 kHz
- B. 17.8 kHz
- C. 19.9 MHz
- D. 17.8 MHz

4AE-5.7 What is the resonant frequency of the circuit in Figure 4AE-5-1 when L is 8 microhenrys and C is 7 picofarads [see graphics addendum]?

- A. 2.84 MHz
- B. 28.4 MHz
- C. 21.3 MHz
- D. 2.13 MHz

4AE-5.8 What is the resonant frequency of the circuit in Figure 4AE-5-1 when L is 3 microhenrys and C is 15 picofarads [see graphics addendum]?

- A. 23.7 MHz
- B. 23.7 kHz
- C. 35.4 kHz
- D. 35.4 MHz

4AE-5.9 What is the resonant frequency of the circuit in Figure 4AE-5-1 when L is 4 microhenrys and C is 8 picofarads [see graphics addendum]?

- A. 28.1 kHz
- B. 28.1 MHz
- C. 49.7 MHz
- D. 49.7 kHz

4AE-5.10 What is the resonant frequency of the circuit in Figure 4AE-5-1 when L is 1 microhenry and C is 9 picofarads [see graphics addendum]?

- A. 17.7 MHz
- B. 17.7 kHz
- C. 53.1 MHz
- D. 53.1 kHz

4AE-5.11 What is the resonant frequency of the circuit in Figure 4AE-5-2 when L is 1 microhenry and C is 10 picofarads [see graphics addendum]?

- A. 50.3 MHz
- B. 15.9 MHz
- C. 15.9 kHz
- D. 50.3 kHz

4AE-5.12 What is the resonant frequency of the circuit in Figure

4AE-5-2 when L is 2 microhenrys and C is 15 picofarads  
[see graphics addendum]?

- A. 29.1 kHz
- B. 29.1 MHz
- C. 5.31 MHz
- D. 5.31 kHz

4AE-5.13 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 5 microhenrys and C is 9 picofarads  
[see graphics addendum]?

- A. 23.7 kHz
- B. 3.54 kHz
- C. 23.7 MHz
- D. 3.54 MHz

4AE-5.14 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 2 microhenrys and C is 30 picofarads  
[see graphics addendum]?

- A. 2.65 kHz
- B. 20.5 kHz
- C. 2.65 MHz
- D. 20.5 MHz

4AE-5.15 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 15 microhenrys and C is 5 picofarads  
[see graphics addendum]?

- A. 18.4 MHz
- B. 2.12 MHz
- C. 18.4 kHz
- D. 2.12 kHz

4AE-5.16 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 3 microhenrys and C is 40 picofarads  
[see graphics addendum]?

- A. 1.33 kHz
- B. 14.5 MHz
- C. 1.33 MHz
- D. 14.5 kHz

4AE-5.17 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 40 microhenrys and C is 6 picofarads  
[see graphics addendum]?

- A. 6.63 MHz
- B. 6.63 kHz
- C. 10.3 MHz
- D. 10.3 kHz

4AE-5.18 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 10 microhenrys and C is 50 picofarads  
[see graphics addendum]?

- A. 3.18 MHz
- B. 3.18 kHz
- C. 7.12 kHz
- D. 7.12 MHz

4AE-5.19 What is the resonant frequency of the circuit in Figure  
4AE-5-2 when L is 200 microhenrys and C is 10 picofarads

[see graphics addendum]?

- A. 3.56 MHz
- B. 7.96 kHz
- C. 3.56 kHz
- D. 7.96 MHz

4AE-5.20 What is the resonant frequency of the circuit in Figure 4AE-5-2 when L is 90 microhenrys and C is 100 picofarads

[see graphics addendum]?

- A. 1.77 MHz
- B. 1.68 MHz
- C. 1.77 kHz
- D. 1.68 kHz

4AE-5.21 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 1.8 MHz and a Q of 95?

- A. 18.9 kHz
- B. 1.89 kHz
- C. 189 Hz
- D. 58.7 kHz

4AE-5.22 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 3.6 MHz and a Q of 218?

- A. 58.7 kHz
- B. 606 kHz
- C. 47.3 kHz
- D. 16.5 kHz

4AE-5.23 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 7.1 MHz and a Q of 150?

- A. 211 kHz
- B. 16.5 kHz
- C. 47.3 kHz
- D. 21.1 kHz

4AE-5.24 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 12.8 MHz and a Q of 218?

- A. 21.1 kHz
- B. 27.9 kHz
- C. 17 kHz
- D. 58.7 kHz

4AE-5.25 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 14.25 MHz and a Q of 150?

- A. 95 kHz
- B. 10.5 kHz
- C. 10.5 MHz
- D. 17 kHz

4AE-5.26 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 21.15 MHz and a Q of 95?

- A. 4.49 kHz
- B. 44.9 kHz
- C. 22.3 kHz

D. 222.6 kHz

4AE-5.27 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 10.1 MHz and a Q of 225?

- A. 4.49 kHz
- B. 44.9 kHz
- C. 22.3 kHz
- D. 223 kHz

4AE-5.28 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 18.1 MHz and a Q of 195?

- A. 92.8 kHz
- B. 10.8 kHz
- C. 22.3 kHz
- D. 44.9 kHz

4AE-5.29 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 3.7 MHz and a Q of 118?

- A. 22.3 kHz
- B. 76.2 kHz
- C. 31.4 kHz
- D. 10.8 kHz

4AE-5.30 What is the half-power bandwidth of a parallel resonant circuit which has a resonant frequency of 14.25 MHz and a Q of 187?

- A. 22.3 kHz
- B. 10.8 kHz
- C. 13.1 kHz
- D. 76.2 kHz

4AE-5.31 What is the Q of the circuit in Figure 4AE-5-3 when the resonant frequency is 14.128 MHz, the inductance is 2.7 microhenrys and the resistance is 18,000 ohms [see graphics addendum]?

- A. 75.1
- B. 7.51
- C. 71.5
- D. 0.013

4AE-5.32 What is the Q of the circuit in Figure 4AE-5-3 when the resonant frequency is 14.128 MHz, the inductance is 4.7 microhenrys and the resistance is 18,000 ohms [see graphics addendum]?

- A. 4.31
- B. 43.1
- C. 13.3
- D. 0.023

4AE-5.33 What is the Q of the circuit in Figure 4AE-5-3 when the resonant frequency is 4.468 MHz, the inductance is 47 microhenrys and the resistance is 180 ohms [see graphics addendum]?

- A. 0.00735
- B. 7.35



- C. 0.136
- D. 13.3

4AE-5.34 What is the  $Q$  of the circuit in Figure 4AE-5-3 when the resonant frequency is 14.225 MHz, the inductance is 3.5 microhenrys and the resistance is 10,000 ohms [see graphics addendum]?

- A. 7.35
- B. 0.0319
- C. 71.5
- D. 31.9

4AE-5.35 What is the  $Q$  of the circuit in Figure 4AE-5-3 when the resonant frequency is 7.125 MHz, the inductance is 8.2 microhenrys and the resistance is 1,000 ohms [see graphics addendum]?

- A. 36.8
- B. 0.273
- C. 0.368
- D. 2.73

4AE-5.36 What is the  $Q$  of the circuit in Figure 4AE-5-3 when the resonant frequency is 7.125 MHz, the inductance is 10.1 microhenrys and the resistance is 100 ohms [see graphics addendum]?

- A. 0.221
- B. 4.52
- C. 0.00452
- D. 22.1

4AE-5.37 What is the  $Q$  of the circuit in Figure 4AE-5-3 when the resonant frequency is 7.125 MHz, the inductance is 12.6 microhenrys and the resistance is 22,000 ohms [see graphics addendum]?

- A. 22.1
- B. 39
- C. 25.6
- D. 0.0256

4AE-5.38 What is the  $Q$  of the circuit in Figure 4AE-5-3 when the resonant frequency is 3.625 MHz, the inductance is 3 microhenrys and the resistance is 2,200 ohms [see graphics addendum]?

- A. 0.031
- B. 32.2
- C. 31.1
- D. 25.6

4AE-5.39 What is the  $Q$  of the circuit in Figure 4AE-5-3 when the resonant frequency is 3.625 MHz, the inductance is 42 microhenrys and the resistance is 220 ohms [see graphics addendum]?

- A. 23
- B. 0.00435
- C. 4.35
- D. 0.23

4AE-5.40 What is the Q of the circuit in Figure 4AE-5-3 when the resonant frequency is 3.625 MHz, the inductance is 43 microhenrys and the resistance is 1,800 ohms

[see graphics addendum]?

- A. 1.84
- B. 0.543
- C. 54.3
- D. 23

4AE-6.1 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 25 ohms,  $R$  is 100 ohms, and  $X_l$  is 100 ohms [see graphics addendum]?

- A. 36.9 degrees with the voltage leading the current
- B. 53.1 degrees with the voltage lagging the current
- C. 36.9 degrees with the voltage lagging the current
- D. 53.1 degrees with the voltage leading the current

4AE-6.2 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 25 ohms,  $R$  is 100 ohms, and  $X_l$  is 50 ohms [see graphics addendum]?

- A. 14 degrees with the voltage lagging the current
- B. 14 degrees with the voltage leading the current
- C. 76 degrees with the voltage lagging the current
- D. 76 degrees with the voltage leading the current

4AE-6.3 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 500 ohms,  $R$  is 1000 ohms, and  $X_l$  is 250 ohms [see graphics addendum]?

- A. 68.2 degrees with the voltage leading the current
- B. 14.1 degrees with the voltage leading the current
- C. 14.1 degrees with the voltage lagging the current
- D. 68.2 degrees with the voltage lagging the current

4AE-6.4 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 75 ohms,  $R$  is 100 ohms, and  $X_l$  is 100 ohms [see graphics addendum]?

- A. 76 degrees with the voltage leading the current
- B. 14 degrees with the voltage leading the current
- C. 14 degrees with the voltage lagging the current
- D. 76 degrees with the voltage lagging the current

4AE-6.5 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 50 ohms,  $R$  is 100 ohms, and  $X_l$  is 25 ohms [see graphics addendum]?

- A. 76 degrees with the voltage lagging the current
- B. 14 degrees with the voltage leading the current
- C. 76 degrees with the voltage leading the current
- D. 14 degrees with the voltage lagging the current

4AE-6.6 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 75 ohms,  $R$  is 100 ohms, and  $X_l$  is 50 ohms [see graphics addendum]?

- A. 76 degrees with the voltage lagging the current
- B. 14 degrees with the voltage lagging the current
- C. 14 degrees with the voltage leading the current
- D. 76 degrees with the voltage leading the current

4AE-6.7 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 100 ohms,  $R$  is 100 ohms, and  $X_l$  is 75 ohms [see graphics addendum]?

- A. 14 degrees with the voltage lagging the current
- B. 14 degrees with the voltage leading the current
- C. 76 degrees with the voltage leading the current
- D. 76 degrees with the voltage lagging the current

4AE-6.8 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 250 ohms,  $R$  is 1000 ohms, and  $X_l$  is 500 ohms [see graphics addendum]?

- A. 81.47 degrees with the voltage lagging the current
- B. 81.47 degrees with the voltage leading the current
- C. 14.04 degrees with the voltage lagging the current
- D. 14.04 degrees with the voltage leading the current

4AE-6.9 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 50 ohms,  $R$  is 100 ohms, and  $X_l$  is 75 ohms [see graphics addendum]?

- A. 76 degrees with the voltage leading the current
- B. 76 degrees with the voltage lagging the current
- C. 14 degrees with the voltage lagging the current
- D. 14 degrees with the voltage leading the current

4AE-6.10 What is the phase angle between the voltage across and the current through the circuit in Figure 4AE-6, when  $X_c$  is 100 ohms,  $R$  is 100 ohms, and  $X_l$  is 25 ohms [see graphics addendum]?

- A. 36.9 degrees with the voltage leading the current
- B. 53.1 degrees with the voltage lagging the current
- C. 36.9 degrees with the voltage lagging the current
- D. 53.1 degrees with the voltage leading the current

4AE-7.1 Why would the rate at which electrical energy is used in a circuit be less than the product of the magnitudes of the AC voltage and current?

- A. Because there is a phase angle that is greater than zero between the current and voltage
- B. Because there are only resistances in the circuit
- C. Because there are no reactances in the circuit
- D. Because there is a phase angle that is equal to zero between the current and voltage

4AE-7.2 In a circuit where the AC voltage and current are out of phase, how can the true power be determined?

- A. By multiplying the apparent power times the power factor
- B. By subtracting the apparent power from the power factor
- C. By dividing the apparent power by the power factor
- D. By multiplying the RMS voltage times the RMS current

4AE-7.3 What does the power factor equal in an R-L circuit having a 60 degree phase angle between the voltage and the current?

- A. 1.414
- B. 0.866
- C. 0.5

D. 1.73

4AE-7.4 What does the power factor equal in an R-L circuit having a 45 degree phase angle between the voltage and the current?

- A. 0.866
- B. 1.0
- C. 0.5
- D. 0.707

4AE-7.5 What does the power factor equal in an R-L circuit having a 30 degree phase angle between the voltage and the current?

- A. 1.73
- B. 0.5
- C. 0.866
- D. 0.577

4AE-7.6 How many watts are being consumed in a circuit having a power factor of 0.2 when the input is 100-V AC and 4-amperes is being drawn?

- A. 400 watts
- B. 80 watts
- C. 2000 watts
- D. 50 watts

4AE-7.7 How many watts are being consumed in a circuit having a power factor of 0.6 when the input is 200-V AC and 5-amperes is being drawn?

- A. 200 watts
- B. 1000 watts
- C. 1600 watts
- D. 600 watts

4AE-8.1 What is the effective radiated power of a station in repeater operation with 50 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 6 dB antenna gain?

- A. 158 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 39.7 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 251 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 69.9 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.2 What is the effective radiated power of a station in repeater operation with 50 watts transmitter power output, 5 dB feedline loss, 4 dB duplexer and circulator loss, and 7 dB antenna gain?

- A. 300 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 315 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 31.5 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 69.9 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.3 What is the effective radiated power of a station in repeater operation with 75 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 10 dB antenna gain?

- A. 600 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 75 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 18.75 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 150 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.4 What is the effective radiated power of a station in repeater operation with 75 watts transmitter power output, 5 dB feedline loss, 4 dB duplexer and circulator loss, and 6 dB antenna gain?

- A. 37.6 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 237 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 150 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 23.7 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.5 What is the effective radiated power of a station in repeater operation with 100 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 7 dB antenna gain?

- A. 631 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 400 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 25 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 100 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.6 What is the effective radiated power of a station in repeater operation with 100 watts transmitter power output, 5 dB feedline loss, 4 dB duplexer and circulator loss, and 10 dB antenna gain?

- A. 800 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 126 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 12.5 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 1260 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.7 What is the effective radiated power of a station in repeater operation with 120 watts transmitter power output, 5 dB feedline loss, 4 dB duplexer and circulator loss, and 6 dB antenna gain?

- A. 601 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 240 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 60 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 379 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.8 What is the effective radiated power of a station in repeater operation with 150 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 7 dB antenna gain?

- A. 946 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 37.5 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 600 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 150 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.9 What is the effective radiated power of a station in repeater operation with 200 watts transmitter power output, 4 dB feedline loss, 4 dB duplexer and circulator loss, and 10 dB antenna gain?

- A. 317 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 2000 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 126 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 260 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-8.10 What is the effective radiated power of a station in repeater operation with 200 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 6 dB antenna gain?

- A. 252 watts, assuming the antenna gain is referenced to a half-wave dipole
- B. 63.2 watts, assuming the antenna gain is referenced to a half-wave dipole
- C. 632 watts, assuming the antenna gain is referenced to a half-wave dipole
- D. 159 watts, assuming the antenna gain is referenced to a half-wave dipole

4AE-9.1 In Figure 4AE-9, what values of V2 and R3 result in the same voltage and current characteristics as when V1 is 8-volts, R1 is 8 kilohms, and R2 is 8 kilohms [see graphics addendum]?

- A. R3 = 4 kilohms and V2 = 8 volts
- B. R3 = 4 kilohms and V2 = 4 volts
- C. R3 = 16 kilohms and V2 = 8 volts
- D. R3 = 16 kilohms and V2 = 4 volts

4AE-9.2 In Figure 4AE-9, what values of V2 and R3 result in the

same voltage and current characteristics as when  $V_1$  is 8-volts,  $R_1$  is 16 kilohms, and  $R_2$  is 8 kilohms [see graphics addendum]?

- A.  $R_3 = 24$  kilohms and  $V_2 = 5.33$  volts
- B.  $R_3 = 5.33$  kilohms and  $V_2 = 8$  volts
- C.  $R_3 = 5.33$  kilohms and  $V_2 = 2.67$  volts
- D.  $R_3 = 24$  kilohms and  $V_2 = 8$  volts

4AE-9.3 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 8-volts,  $R_1$  is 8 kilohms, and  $R_2$  is 16 kilohms [see graphics addendum]?

- A.  $R_3 = 24$  kilohms and  $V_2 = 8$  volts
- B.  $R_3 = 8$  kilohms and  $V_2 = 4$  volts
- C.  $R_3 = 5.33$  kilohms and  $V_2 = 5.33$  volts
- D.  $R_3 = 5.33$  kilohms and  $V_2 = 8$  volts

4AE-9.4 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 10-volts,  $R_1$  is 10 kilohms, and  $R_2$  is 10 kilohms [see graphics addendum]?

- A.  $R_3 = 10$  kilohms and  $V_2 = 5$  volts
- B.  $R_3 = 20$  kilohms and  $V_2 = 5$  volts
- C.  $R_3 = 20$  kilohms and  $V_2 = 10$  volts
- D.  $R_3 = 5$  kilohms and  $V_2 = 5$  volts

4AE-9.5 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 10-volts,  $R_1$  is 20 kilohms, and  $R_2$  is 10 kilohms [see graphics addendum]?

- A.  $R_3 = 30$  kilohms and  $V_2 = 10$  volts
- B.  $R_3 = 6.67$  kilohms and  $V_2 = 10$  volts
- C.  $R_3 = 6.67$  kilohms and  $V_2 = 3.33$  volts
- D.  $R_3 = 30$  kilohms and  $V_2 = 3.33$  volts

4AE-9.6 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 10-volts,  $R_1$  is 10 kilohms, and  $R_2$  is 20 kilohms [see graphics addendum]?

- A.  $R_3 = 6.67$  kilohms and  $V_2 = 6.67$  volts
- B.  $R_3 = 6.67$  kilohms and  $V_2 = 10$  volts
- C.  $R_3 = 30$  kilohms and  $V_2 = 6.67$  volts
- D.  $R_3 = 30$  kilohms and  $V_2 = 10$  volts

4AE-9.7 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 12-volts,  $R_1$  is 10 kilohms, and  $R_2$  is 10 kilohms [see graphics addendum]?

- A.  $R_3 = 20$  kilohms and  $V_2 = 12$  volts
- B.  $R_3 = 5$  kilohms and  $V_2 = 6$  volts
- C.  $R_3 = 5$  kilohms and  $V_2 = 12$  volts
- D.  $R_3 = 30$  kilohms and  $V_2 = 6$  volts

4AE-9.8 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 12-volts,  $R_1$  is 20 kilohms, and  $R_2$  is 10 kilohms [see graphics addendum]?

- A.  $R_3 = 30$  kilohms and  $V_2 = 4$  volts
- B.  $R_3 = 6.67$  kilohms and  $V_2 = 4$  volts
- C.  $R_3 = 30$  kilohms and  $V_2 = 12$  volts
- D.  $R_3 = 6.67$  kilohms and  $V_2 = 12$  volts

4AE-9.9 In Figure 4AE-9, what values of  $V_2$  and  $R_3$  result in the same voltage and current characteristics as when  $V_1$  is 12-volts,

R1 is 10 kilohms, and R2 is 20 kilohms [see graphics addendum]?

- A. R3 = 6.67 kilohms and V2 = 12 volts
- B. R3 = 30 kilohms and V2 = 12 volts
- C. R3 = 6.67 kilohms and V2 = 8 volts
- D. R3 = 30 kilohms and V2 = 8 volts

4AE-9.10 In Figure 4AE-9, what values of V2 and R3 result in the same voltage and current characteristics as when V1 is 12-volts, R1 is 20 kilohms, and R2 is 20 kilohms [see graphics addendum]?

- A. R3 = 40 kilohms and V2 = 12 volts
- B. R3 = 40 kilohms and V2 = 6 volts
- C. R3 = 10 kilohms and V2 = 6 volts
- D. R3 = 10 kilohms and V2 = 12 volts

4AF-1.1 What is the schematic symbol for a semiconductor diode/rectifier [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-1.2 Structurally, what are the two main categories of semiconductor diodes?

- A. Junction and point contact
- B. Electrolytic and junction
- C. Electrolytic and point contact
- D. Vacuum and point contact

4AF-1.3 What is the schematic symbol for a Zener diode [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-1.4 What are the two primary classifications of Zener diodes?

- A. Hot carrier and tunnel
- B. Varactor and rectifying
- C. Voltage regulator and voltage reference
- D. Forward and reversed biased

4AF-1.5 What is the principal characteristic of a Zener diode?

- A. A constant current under conditions of varying voltage
- B. A constant voltage under conditions of varying current
- C. A negative resistance region
- D. An internal capacitance that varies with the applied

voltage

4AF-1.6 What is the range of voltage ratings available in Zener diodes?

- A. 2.4 volts to 200 volts
- B. 1.2 volts to 7 volts
- C. 3 volts to 2000 volts
- D. 1.2 volts to 5.6 volts

4AF-1.7 What is the schematic symbol for a tunnel diode [see graphics addendum]?



- A. 1
- B. 2
- C. 3
- D. 4

4AF-1.8 What is the principal characteristic of a tunnel diode?

- A. A high forward resistance
- B. A very high PIV
- C. A negative resistance region
- D. A high forward current rating

4AF-1.9 What special type of diode is capable of both amplification and oscillation?

- A. Point contact diodes
- B. Zener diodes
- C. Tunnel diodes
- D. Junction diodes

4AF-1.10 What is the schematic symbol for a varactor diode [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-1.11 What type of semiconductor diode varies its internal capacitance as the voltage applied to its terminals varies?

- A. A varactor diode
- B. A tunnel diode
- C. A silicon-controlled rectifier
- D. A Zener diode

4AF-1.12 What is the principal characteristic of a varactor diode?

- A. It has a constant voltage under conditions of varying current
- B. Its internal capacitance varies with the applied voltage
- C. It has a negative resistance region
- D. It has a very high PIV

4AF-1.13 What is a common use of a varactor diode?

- A. As a constant current source
- B. As a constant voltage source
- C. As a voltage controlled inductance
- D. As a voltage controlled capacitance

4AF-1.14 What is a common use of a hot-carrier diode?

- A. As balanced mixers in SSB generation
- B. As a variable capacitance in an automatic frequency control circuit
- C. As a constant voltage reference in a power supply
- D. As VHF and UHF mixers and detectors

4AF-1.15 What limits the maximum forward current in a junction diode?

- A. The peak inverse voltage
- B. The junction temperature

- C. The forward voltage
- D. The back EMF

4AF-1.16 How are junction diodes rated?

- A. Maximum forward current and capacitance
- B. Maximum reverse current and PIV
- C. Maximum reverse current and capacitance
- D. Maximum forward current and PIV

4AF-1.17 What is a common use for point contact diodes?

- A. As a constant current source
- B. As a constant voltage source
- C. As an RF detector
- D. As a high voltage rectifier

4AF-1.18 What type of diode is made of a metal whisker touching a very small semi-conductor die?

- A. Zener diode
- B. Varactor diode
- C. Junction diode
- D. Point contact diode

4AF-1.19 What is one common use for PIN diodes?

- A. As a constant current source
- B. As a constant voltage source
- C. As an RF switch
- D. As a high voltage rectifier

4AF-1.20 What special type of diode is often used in RF switches, attenuators, and various types of phase shifting devices?

- A. Tunnel diodes
- B. Varactor diodes
- C. PIN diodes
- D. Junction diodes

4AF-2.1 What is the schematic symbol for a PNP transistor [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-2.2 What is the schematic symbol for an NPN transistor [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-2.3 What are the three terminals of a bipolar transistor?

- A. Cathode, plate and grid
- B. Base, collector and emitter
- C. Gate, source and sink
- D. Input, output and ground

4AF-2.4 What is the meaning of the term  $\alpha$  with regard to bipolar transistors?

- A. The change of collector current with respect to base current
- B. The change of base current with respect to collector current
- C. The change of collector current with respect to emitter current
- D. The change of collector current with respect to gate current

4AF-2.5 What is the term used to express the ratio of change in DC collector current to a change in emitter current in a bipolar transistor?

- A. Gamma
- B. Epsilon
- C. Alpha
- D. Beta

4AF-2.6 What is the meaning of the term  $\beta$  with regard to bipolar transistors?

- A. The change of collector current with respect to base current
- B. The change of base current with respect to emitter current
- C. The change of collector current with respect to emitter current
- D. The change in base current with respect to gate current

4AF-2.7 What is the term used to express the ratio of change in the DC collector current to a change in base current in a bipolar transistor?

- A. Alpha
- B. Beta
- C. Gamma
- D. Delta

4AF-2.8 What is the meaning of the term  $f_{\alpha}$  with regard to bipolar transistors?

- A. The practical lower frequency limit of a transistor in common emitter configuration
- B. The practical upper frequency limit of a transistor in common base configuration
- C. The practical lower frequency limit of a transistor in common base configuration
- D. The practical upper frequency limit of a transistor in common emitter configuration

4AF-2.9 What is the term used to express that frequency at which the grounded base current gain has decreased to 0.7 of the gain obtainable at 1 kHz in a transistor?

- A. Corner frequency
- B. Alpha cutoff frequency
- C. Beta cutoff frequency
- D. Alpha rejection frequency

4AF-2.10 What is the meaning of the term  $f_{\beta}$  with regard to a bipolar transistor?

- A. That frequency at which the grounded base current gain has decreased to 0.7 of that obtainable at 1 kHz in a transistor

- B. That frequency at which the grounded emitter current gain has decreased to 0.7 of that obtainable at 1 kHz in a transistor
- C. That frequency at which the grounded collector current gain has decreased to 0.7 of that obtainable at 1 kHz in a transistor
- D. That frequency at which the grounded gate current gain has decreased to 0.7 of that obtainable at 1 kHz in a transistor

4AF-2.11 What is the meaning of the term ++++transition region++++ with regard to a transistor?

- A. An area of low charge density around the P-N junction
- B. The area of maximum P-type charge
- C. The area of maximum N-type charge
- D. The point where wire leads are connected to the P- or N-type material

4AF-2.12 What does it mean for a transistor to be ++++fully saturated++++?

- A. The collector current is at its maximum value
- B. The collector current is at its minimum value
- C. The transistor's Alpha is at its maximum value
- D. The transistor's Beta is at its maximum value

4AF-2.13 What does it mean for a transistor to be ++++cut off++++?

- A. There is no base current
- B. The transistor is at its operating point
- C. No current flows from emitter to collector
- D. Maximum current flows from emitter to collector

4AF-2.14 What is the schematic symbol for a unijunction transistor [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-2.15 What are the elements of a unijunction transistor?

- A. Base 1, base 2 and emitter
- B. Gate, cathode and anode
- C. Gate, base 1 and base 2
- D. Gate, source and sink

4AF-2.16 For best efficiency and stability, where on the load-line should a solid-state power amplifier be operated?

- A. Just below the saturation point
- B. Just above the saturation point
- C. At the saturation point
- D. At 1.414 times the saturation point

4AF-2.17 What two elements widely used in semiconductor devices exhibit both metallic and non-metallic characteristics?

- A. Silicon and gold
- B. Silicon and germanium
- C. Galena and germanium
- D. Galena and bismuth

4AF-3.1 What is the schematic symbol for a silicon controlled rectifier [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-3.2 What are the three terminals of an SCR?

- A. Anode, cathode and gate
- B. Gate, source and sink
- C. Base, collector and emitter
- D. Gate, base 1 and base 2

4AF-3.3 What are the two stable operating conditions of an SCR?

- A. Conducting and nonconducting
- B. Oscillating and quiescent
- C. Forward conducting and reverse conducting
- D. NPN conduction and PNP conduction

4AF-3.4 When an SCR is in the ++++triggered++++ or ++++on++++ condition, its electrical characteristics are similar to what other solid-state device (as measured between its cathode and anode)?

- A. The junction diode
- B. The tunnel diode
- C. The hot-carrier diode
- D. The varactor diode

4AF-3.5 Under what operating condition does an SCR exhibit electrical characteristics similar to a forward-biased silicon rectifier?

- A. During a switching transition
- B. When it is used as a detector
- C. When it is gated "off"
- D. When it is gated "on"

4AF-3.6 What is the schematic symbol for a TRIAC [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-3.7 What is the transistor called which is fabricated as two complementary SCRs in parallel with a common gate terminal?

- A. TRIAC
- B. Bilateral SCR
- C. Unijunction transistor
- D. Field effect transistor

4AF-3.8 What are the three terminals of a TRIAC?

- A. Emitter, base 1 and base 2
- B. Gate, anode 1 and anode 2
- C. Base, emitter and collector
- D. Gate, source and sink

4AF-4.1 What is the schematic symbol for a light-emitting diode [see graphics addendum]?

- A. 1
- B. 2
- C. 3

D. 4

4AF-4.2 What is the normal operating voltage and current for a light-emitting diode?

- A. 60 volts and 20 mA
- B. 5 volts and 50 mA
- C. 1.7 volts and 20 mA
- D. 0.7 volts and 60 mA

4AF-4.3 What type of bias is required for an LED to produce luminescence?

- A. Reverse bias
- B. Forward bias
- C. Zero bias
- D. Inductive bias

4AF-4.4 What are the advantages of using an LED?

- A. Low power consumption and long life
- B. High lumens per cm per cm and low power consumption
- C. High lumens per cm per cm and low voltage requirement
- D. A current flows when the device is exposed to a light source

4AF-4.5 What colors are available in LEDs?

- A. Yellow, blue, red and brown
- B. Red, violet, yellow and peach
- C. Violet, blue, orange and red
- D. Red, green, orange and yellow

4AF-4.6 What is the schematic symbol for a neon lamp [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4AF-4.7 What type neon lamp is usually used in amateur radio work?

- A. NE-1
- B. NE-2
- C. NE-3
- D. NE-4

4AF-4.8 What is the DC starting voltage for an NE-2 neon lamp?

- A. Approximately 67 volts
- B. Approximately 5 volts
- C. Approximately 5.6 volts
- D. Approximately 110 volts

4AF-4.9 What is the AC starting voltage for an NE-2 neon lamp?

- A. Approximately 110-V AC RMS
- B. Approximately 5-V AC RMS
- C. Approximately 5.6-V AC RMS
- D. Approximately 48-V AC RMS

4AF-4.10 How can a neon lamp be used to check for the presence of RF?

- A. A neon lamp will go out in the presence of RF

- B. A neon lamp will change color in the presence of RF
- C. A neon lamp will light only in the presence of very low frequency RF
- D. A neon lamp will light in the presence of RF

4AF-5.1 What would be the bandwidth of a good crystal lattice band-pass filter for a single-sideband phone emission?

- A. 6 kHz at -6 dB
- B. 2.1 kHz at -6 dB
- C. 500 Hz at -6 dB
- D. 15 kHz at -6 dB

4AF-5.2 What would be the bandwidth of a good crystal lattice band-pass filter for a double-sideband phone emission?

- A. 1 kHz at -6 dB
- B. 500 Hz at -6 dB
- C. 6 kHz at -6 dB
- D. 15 kHz at -6 dB

4AF-5.3 What is a crystal lattice filter?

- A. A power supply filter made with crisscrossed quartz crystals
- B. An audio filter made with 4 quartz crystals at 1-kHz intervals
- C. A filter with infinitely wide and shallow skirts made using quartz crystals
- D. A filter with narrow bandwidth and steep skirts made using quartz crystals

4AF-5.4 What technique can be used to construct low cost, high performance crystal lattice filters?

- A. Splitting and tumbling
- B. Tumbling and grinding
- C. Etching and splitting
- D. Etching and grinding

4AF-5.5 What determines the bandwidth and response shape in a crystal lattice filter?

- A. The relative frequencies of the individual crystals
- B. The center frequency chosen for the filter
- C. The amplitude of the RF stage preceding the filter
- D. The amplitude of the signals passing through the filter

4AG-1.1 What is a ++++linear electronic voltage regulator++++?

- A. A regulator that has a ramp voltage as its output
- B. A regulator in which the pass transistor switches from the "off" state to the "on" state
- C. A regulator in which the control device is switched on or off, with the duty cycle proportional to the line or load conditions
- D. A regulator in which the conduction of a control element is varied in direct proportion to the line voltage or load current

4AG-1.2 What is a ++++switching electronic voltage regulator++++?

- A. A regulator in which the conduction of a control element is varied in direct proportion to the line voltage or load current

- B. A regulator that provides more than one output voltage
- C. A regulator in which the control device is switched on or off, with the duty cycle proportional to the line or load conditions
- D. A regulator that gives a ramp voltage at its output

4AG-1.3 What device is usually used as a stable reference voltage in a linear voltage regulator?

- A. A Zener diode
- B. A tunnel diode
- C. An SCR
- D. A varactor diode

4AG-1.4 What type of linear regulator is used in applications requiring efficient utilization of the primary power source?

- A. A constant current source
- B. A series regulator
- C. A shunt regulator
- D. A shunt current source

4AG-1.5 What type of linear voltage regulator is used in applications where the load on the unregulated voltage source must be kept constant?

- A. A constant current source
- B. A series regulator
- C. A shunt current source
- D. A shunt regulator

4AG-1.6 To obtain the best temperature stability, what should be the operating voltage of the reference diode in a linear voltage regulator?

- A. Approximately 2.0 volts
- B. Approximately 3.0 volts
- C. Approximately 6.0 volts
- D. Approximately 10.0 volts

4AG-1.7 What is the meaning of the term +++remote sensing+++ with regard to a linear voltage regulator?

- A. The feedback connection to the error amplifier is made directly to the load
- B. Sensing is accomplished by wireless inductive loops
- C. The load connection is made outside the feedback loop
- D. The error amplifier compares the input voltage to the reference voltage

4AG-1.8 What is a +++three-terminal regulator+++?

- A. A regulator that supplies three voltages with variable current
- B. A regulator that supplies three voltages at a constant current
- C. A regulator containing three error amplifiers and sensing transistors
- D. A regulator containing a voltage reference, error amplifier, sensing resistors and transistors, and a pass element

4AG-1.9 What are the important characteristics of a three-terminal regulator?



- A. Maximum and minimum input voltage, minimum output current and voltage
- B. Maximum and minimum input voltage, maximum output current and voltage
- C. Maximum and minimum input voltage, minimum output current and maximum output voltage
- D. Maximum and minimum input voltage, minimum output voltage and maximum output current

4AG-2.1 What is the distinguishing feature of a Class A amplifier?

- A. Output for less than 180 degrees of the signal cycle
- B. Output for the entire 360 degrees of the signal cycle
- C. Output for more than 180 degrees and less than 360 degrees of the signal cycle
- D. Output for exactly 180 degrees of the input signal cycle

4AG-2.2 What class of amplifier is distinguished by the presence of output throughout the entire signal cycle and the input never goes into the cutoff region?

- A. Class A
- B. Class B
- C. Class C
- D. Class D

4AG-2.3 What is the distinguishing characteristic of a Class B amplifier?

- A. Output for the entire input signal cycle
- B. Output for greater than 180 degrees and less than 360 degrees of the input signal cycle
- C. Output for less than 180 degrees of the input signal cycle
- D. Output for 180 degrees of the input signal cycle

4AG-2.4 What class of amplifier is distinguished by the flow of current in the output essentially in 180 degree pulses?

- A. Class A
- B. Class B
- C. Class C
- D. Class D

4AG-2.5 What is a ++++Class AB amplifier++++?

- A. Output is present for more than 180 degrees but less than 360 degrees of the signal input cycle
- B. Output is present for exactly 180 degrees of the input signal cycle
- C. Output is present for the entire input signal cycle
- D. Output is present for less than 180 degrees of the input signal cycle

4AG-2.6 What is the distinguishing feature of a ++++Class C amplifier++++?

- A. Output is present for less than 180 degrees of the input signal cycle
- B. Output is present for exactly 180 degrees of the input signal cycle
- C. Output is present for the entire input signal cycle
- D. Output is present for more than 180 degrees but less than

360 degrees of the input signal cycle

4AG-2.7 What class of amplifier is distinguished by the bias being set well beyond cutoff?

- A. Class A
- B. Class B
- C. Class C
- D. Class AB

4AG-2.8 Which class of amplifier provides the highest efficiency?

- A. Class A
- B. Class B
- C. Class C
- D. Class AB

4AG-2.9 Which class of amplifier has the highest linearity and least distortion?

- A. Class A
- B. Class B
- C. Class C
- D. Class AB

4AG-2.10 Which class of amplifier has an operating angle of more than 180 degrees but less than 360 degrees when driven by a sine wave signal?

- A. Class A
- B. Class B
- C. Class C
- D. Class AB

4AG-3.1 What is an ++++L-network++++?

- A. A network consisting entirely of four inductors
- B. A network consisting of an inductor and a capacitor
- C. A network used to generate a leading phase angle
- D. A network used to generate a lagging phase angle

4AG-3.2 What is a ++++pi-network++++?

- A. A network consisting entirely of four inductors or four capacitors
- B. A Power Incidence network
- C. An antenna matching network that is isolated from ground
- D. A network consisting of one inductor and two capacitors or two inductors and one capacitor

4AG-3.3 What is a ++++pi-L-network++++?

- A. A Phase Inverter Load network
- B. A network consisting of two inductors and two capacitors
- C. A network with only three discrete parts
- D. A matching network in which all components are isolated from ground

4AG-3.4 Does the L-, pi-, or pi-L-network provide the greatest harmonic suppression?

- A. L-network
- B. Pi-network
- C. Inverse L-network
- D. Pi-L-network

4AG-3.5 What are the three most commonly used networks to accomplish a match between an amplifying device and a transmission line?

- A. M-network, pi-network and T-network
- B. T-network, M-network and Q-network
- C. L-network, pi-network and pi-L-network
- D. L-network, M-network and C-network

4AG-3.6 How are networks able to transform one impedance to another?

- A. Resistances in the networks substitute for resistances in the load
- B. The matching network introduces negative resistance to cancel the resistive part of an impedance
- C. The matching network introduces transconductance to cancel the reactive part of an impedance
- D. The matching network can cancel the reactive part of an impedance and change the value of the resistive part of an impedance

4AG-3.7 Which type of network offers the greater transformation ratio?

- A. L-network
- B. Pi-network
- C. Constant-K
- D. Constant-M

4AG-3.8 Why is the L-network of limited utility in impedance matching?

- A. It matches a small impedance range
- B. It has limited power handling capabilities
- C. It is thermally unstable
- D. It is prone to self resonance

4AG-3.9 What is an advantage of using a pi-L-network instead of a pi-network for impedance matching between the final amplifier of a vacuum-tube type transmitter and a multiband antenna?

- A. Greater transformation range
- B. Higher efficiency
- C. Lower losses
- D. Greater harmonic suppression

4AG-3.10 Which type of network provides the greatest harmonic suppression?

- A. L-network
- B. Pi-network
- C. Pi-L-network
- D. Inverse-Pi network

4AG-4.1 What are the three general groupings of filters?

- A. High-pass, low-pass and band-pass
- B. Inductive, capacitive and resistive
- C. Audio, radio and capacitive
- D. Hartley, Colpitts and Pierce

4AG-4.2 What is a ++++constant-K filter++++?

- A. A filter that uses Boltzmann's constant
- B. A filter whose velocity factor is constant over a wide range of frequencies
- C. A filter whose product of the series- and shunt-element impedances is a constant for all frequencies
- D. A filter whose input impedance varies widely over the design bandwidth

4AG-4.3 What is an advantage of a constant-k filter?

- A. It has high attenuation for signals on frequencies far removed from the passband
- B. It can match impedances over a wide range of frequencies
- C. It uses elliptic functions
- D. The ratio of the cutoff frequency to the trap frequency can be varied

4AG-4.4 What is an m-derived filter?

- A. A filter whose input impedance varies widely over the design bandwidth
- B. A filter whose product of the series- and shunt-element impedances is a constant for all frequencies
- C. A filter whose schematic shape is the letter "M"
- D. A filter that uses a trap to attenuate undesired frequencies too near cutoff for a constant-k filter.

4AG-4.5 What are the distinguishing features of a Butterworth filter?

- A. A filter whose product of the series- and shunt-element impedances is a constant for all frequencies
- B. It only requires capacitors
- C. It has a maximally flat response over its passband
- D. It requires only inductors

4AG-4.6 What are the distinguishing features of a Chebyshev filter?

- A. It has a maximally flat response over its passband
- B. It allows ripple in the passband
- C. It only requires inductors
- D. A filter whose product of the series- and shunt-element impedances is a constant for all frequencies

4AG-4.7 When would it be more desirable to use an m-derived filter over a constant-k filter?

- A. When the response must be maximally flat at one frequency
- B. When you need more attenuation at a certain frequency that is too close to the cut-off frequency for a constant-k filter
- C. When the number of components must be minimized
- D. When high power levels must be filtered

4AG-5.1 What condition must exist for a circuit to oscillate?

- A. It must have a gain of less than 1
- B. It must be neutralized
- C. It must have positive feedback sufficient to overcome losses
- D. It must have negative feedback sufficient to cancel the input

4AG-5.2 What are three major oscillator circuits often used in amateur radio equipment?

- A. Taft, Pierce and negative feedback
- B. Colpitts, Hartley and Taft
- C. Taft, Hartley and Pierce
- D. Colpitts, Hartley and Pierce

4AG-5.3 How is the positive feedback coupled to the input in a Hartley oscillator?

- A. Through a neutralizing capacitor
- B. Through a capacitive divider
- C. Through link coupling
- D. Through a tapped coil

4AG-5.4 How is the positive feedback coupled to the input in a Colpitts oscillator?

- A. Through a tapped coil
- B. Through link coupling
- C. Through a capacitive divider
- D. Through a neutralizing capacitor

4AG-5.5 How is the positive feedback coupled to the input in a Pierce oscillator?

- A. Through a tapped coil
- B. Through link coupling
- C. Through a capacitive divider
- D. Through capacitive coupling

4AG-5.6 Which of the three major oscillator circuits used in amateur radio equipment utilizes a quartz crystal?

- A. Negative feedback
- B. Hartley
- C. Colpitts
- D. Pierce

4AG-5.7 What is the ++++piezoelectric effect++++?

- A. Mechanical vibration of a crystal by the application of a voltage
- B. Mechanical deformation of a crystal by the application of a magnetic field
- C. The generation of electrical energy by the application of light
- D. Reversed conduction states when a P-N junction is exposed to light

4AG-5.8 What is the major advantage of a Pierce oscillator?

- A. It is easy to neutralize
- B. It doesn't require an LC tank circuit
- C. It can be tuned over a wide range
- D. It has a high output power

4AG-5.9 Which type of oscillator circuit is commonly used in a VFO?

- A. Pierce
- B. Colpitts
- C. Hartley
- D. Negative feedback

4AG-5.10 Why is the Colpitts oscillator circuit commonly used in a VFO?

- A. The frequency is a linear function of the load impedance
- B. It can be used with or without crystal lock-in
- C. It is stable
- D. It has high output power

4AG-6.1 What is meant by the term +++modulation+++?

- A. The squelching of a signal until a critical signal-to-noise ratio is reached
- B. Carrier rejection through phase nulling
- C. A linear amplification mode
- D. A mixing process whereby information is imposed upon a carrier

4AG-6.2 How is an F3E FM-phone emission produced?

- A. With a balanced modulator on the audio amplifier
- B. With a reactance modulator on the oscillator
- C. With a reactance modulator on the final amplifier
- D. With a balanced modulator on the oscillator

4AG-6.3 What is a +++reactance modulator+++?

- A. A circuit that acts as a variable resistance or capacitance to produce FM signals
- B. A circuit that acts as a variable resistance or capacitance to produce AM signals
- C. A circuit that acts as a variable inductance or capacitance to produce FM signals
- D. A circuit that acts as a variable inductance or capacitance to produce AM signals

4AG-6.4 What is a +++balanced modulator+++?

- A. An FM modulator that produces a balanced deviation
- B. A modulator that produces a double sideband, suppressed carrier signal
- C. A modulator that produces a single sideband, suppressed carrier signal
- D. A modulator that produces a full carrier signal

4AG-6.5 How can a single-sideband phone signal be generated?

- A. By driving a product detector with a DSB signal
- B. By using a reactance modulator followed by a mixer
- C. By using a loop modulator followed by a mixer
- D. By using a balanced modulator followed by a filter

4AG-6.6 How can a double-sideband phone signal be generated?

- A. By feeding a phase modulated signal into a low pass filter
- B. By using a balanced modulator followed by a filter
- C. By detuning a Hartley oscillator
- D. By modulating the plate voltage of a class C amplifier

4AG-7.1 How is the efficiency of a power amplifier determined?

- A. Efficiency = (RF power out / DC power in) X 100%
- B. Efficiency = (RF power in / RF power out) X 100%
- C. Efficiency = (RF power in / DC power in) X 100%
- D. Efficiency = (DC power in / RF power in) X 100%

4AG-7.2 For reasonably efficient operation of a vacuum-tube Class C amplifier, what should the plate-load resistance be with 1500-volts at the plate and 500-milliamperes plate current?

- A. 2000 ohms
- B. 1500 ohms
- C. 4800 ohms
- D. 480 ohms

4AG-7.3 For reasonably efficient operation of a vacuum-tube Class B amplifier, what should the plate-load resistance be with 800-volts at the plate and 75-milliamperes plate current?

- A. 679.4 ohms
- B. 60 ohms
- C. 6794 ohms
- D. 10,667 ohms

4AG-7.4 For reasonably efficient operation of a vacuum-tube Class A amplifier, what should the plate-load resistance be with 250-volts at the plate and 25-milliamperes plate current?

- A. 7692 ohms
- B. 3250 ohms
- C. 325 ohms
- D. 769.2 ohms

4AG-7.5 For reasonably efficient operation of a transistor amplifier, what should the load resistance be with 12-volts at the collector and 5 watts power output?

- A. 100.3 ohms
- B. 14.4 ohms
- C. 10.3 ohms
- D. 144 ohms

4AG-7.6 What is the ++++flywheel effect++++?

- A. The continued motion of a radio wave through space when the transmitter is turned off
- B. The back and forth oscillation of electrons in an LC circuit
- C. The use of a capacitor in a power supply to filter rectified AC
- D. The transmission of a radio signal to a distant station by several hops through the ionosphere

4AG-7.7 How can a power amplifier be neutralized?

- A. By increasing the grid drive
- B. By feeding back an in-phase component of the output to the input
- C. By feeding back an out-of-phase component of the output to the input
- D. By feeding back an out-of-phase component of the input to the output

4AG-7.8 What order of  $Q$  is required by a tank-circuit sufficient to reduce harmonics to an acceptable level?

- A. Approximately 120
- B. Approximately 12
- C. Approximately 1200

D. Approximately 1.2

4AG-7.9 How can parasitic oscillations be eliminated from a power amplifier?

- A. By tuning for maximum SWR
- B. By tuning for maximum power output
- C. By neutralization
- D. By tuning the output

4AG-7.10 What is the procedure for tuning a power amplifier having an output pi-network?

- A. Adjust the loading capacitor to maximum capacitance and then dip the plate current with the tuning capacitor
- B. Alternately increase the plate current with the tuning capacitor and dip the plate current with the loading capacitor
- C. Adjust the tuning capacitor to maximum capacitance and then dip the plate current with the loading capacitor
- D. Alternately increase the plate current with the loading capacitor and dip the plate current with the tuning capacitor

4AG-8.1 What is the process of +++detection+++?

- A. The process of masking out the intelligence on a received carrier to make an S-meter operational
- B. The recovery of intelligence from the modulated RF signal
- C. The modulation of a carrier
- D. The mixing of noise with the received signal

4AG-8.2 What is the principle of detection in a diode detector?

- A. Rectification and filtering of RF
- B. Breakdown of the Zener voltage
- C. Mixing with noise in the transition region of the diode
- D. The change of reactance in the diode with respect to frequency

4AG-8.3 What is a +++product detector+++?

- A. A detector that provides local oscillations for input to the mixer
- B. A detector that amplifies and narrows the band-pass frequencies
- C. A detector that uses a mixing process with a locally generated carrier
- D. A detector used to detect cross-modulation products

4AG-8.4 How are FM-phone signals detected?

- A. By a balanced modulator
- B. By a frequency discriminator
- C. By a product detector
- D. By a phase splitter

4AG-8.5 What is a +++frequency discriminator+++?

- A. A circuit for detecting FM signals
- B. A circuit for filtering two closely adjacent signals
- C. An automatic bandswitching circuit
- D. An FM generator

4AG-8.6 What is the +++mixing process+++?

- A. The elimination of noise in a wideband receiver by phase



comparison

- B. The elimination of noise in a wideband receiver by phase differentiation
- C. Distortion caused by auroral propagation
- D. The combination of two signals to produce sum and difference frequencies

4AG-8.7 What are the principal frequencies which appear at the output of a mixer circuit?

- A. Two and four times the original frequency
- B. The sum, difference and square root of the input frequencies
- C. The original frequencies and the sum and difference frequencies
- D. 1.414 and 0.707 times the input frequency

4AG-8.8 What are the advantages of the frequency-conversion process?

- A. Automatic squelching and increased selectivity
- B. Increased selectivity and optimal tuned-circuit design
- C. Automatic soft limiting and automatic squelching
- D. Automatic detection in the RF amplifier and increased selectivity

4AG-8.9 What occurs in a receiver when an excessive amount of signal energy reaches the mixer circuit?

- A. Spurious mixer products are generated
- B. Mixer blanking occurs
- C. Automatic limiting occurs
- D. A beat frequency is generated

4AG-9.1 How much gain should be used in the RF amplifier stage of a receiver?

- A. As much gain as possible short of self oscillation
- B. Sufficient gain to allow weak signals to overcome noise generated in the first mixer stage
- C. Sufficient gain to keep weak signals below the noise of the first mixer stage
- D. It depends on the amplification factor of the first IF stage

4AG-9.2 Why should the RF amplifier stage of a receiver only have sufficient gain to allow weak signals to overcome noise generated in the first mixer stage?

- A. To prevent the sum and difference frequencies from being generated
- B. To prevent bleed-through of the desired signal
- C. To prevent the generation of spurious mixer products
- D. To prevent bleed-through of the local oscillator

4AG-9.3 What is the primary purpose of an RF amplifier in a receiver?

- A. To provide most of the receiver gain
- B. To vary the receiver image rejection by utilizing the AGC
- C. To improve the receiver's noise figure
- D. To develop the AGC voltage

4AG-9.4 What is an +i-f amplifier stage+?

- A. A fixed-tuned pass-band amplifier
- B. A receiver demodulator
- C. A receiver filter
- D. A buffer oscillator

4AG-9.5 What factors should be considered when selecting an intermediate frequency?

- A. Cross-modulation distortion and interference
- B. Interference to other services
- C. Image rejection and selectivity
- D. Noise figure and distortion

4AG-9.6 What is the primary purpose of the first i-f amplifier stage in a receiver?

- A. Noise figure performance
- B. Tune out cross-modulation distortion
- C. Dynamic response
- D. Selectivity

4AG-9.7 What is the primary purpose of the final i-f amplifier stage in a receiver?

- A. Dynamic response
- B. Gain
- C. Noise figure performance
- D. Bypass undesired signals

4AG-10.1 What type of circuit is shown in Figure 4AG-10 [see graphics addendum]?

- A. Switching voltage regulator
- B. Linear voltage regulator
- C. Common emitter amplifier
- D. Emitter follower amplifier

4AG-10.2 In Figure 4AG-10, what is the purpose of R1 and R2 [see graphics addendum]?

- A. Load resistors
- B. Fixed bias
- C. Self bias
- D. Feedback

4AG-10.3 In Figure 4AG-10, what is the purpose of C1 [see graphics addendum]?

- A. Decoupling
- B. Output coupling
- C. Self bias
- D. Input coupling

4AG-10.4 In Figure 4AG-10, what is the purpose of C3 [see graphics addendum]?

- A. AC feedback
- B. Input coupling
- C. Power supply decoupling
- D. Emitter bypass

4AG-10.5 In Figure 4AG-10, what is the purpose of R3 [see graphics addendum]?

- A. Fixed bias
- B. Emitter bypass
- C. Output load resistor

D. Self bias

4AG-11.1 What type of circuit is shown in Figure 4AG-11 [see graphics addendum]?

- A. High-gain amplifier
- B. Common-collector amplifier
- C. Linear voltage regulator
- D. Grounded-emitter amplifier

4AG-11.2 In Figure 4AG-11, what is the purpose of R [see graphics addendum]?

- A. Emitter load
- B. Fixed bias
- C. Collector load
- D. Voltage regulation

4AG-11.3 In Figure 4AG-11, what is the purpose of C1 [see graphics addendum]?

- A. Input coupling
- B. Output coupling
- C. Emitter bypass
- D. Collector bypass

4AG-11.4 In Figure 4AG-11, what is the purpose of C2 [see graphics addendum]?

- A. Output coupling
- B. Emitter bypass
- C. Input coupling
- D. Hum filtering

4AG-12.1 What type of circuit is shown in Figure 4AG-12 [see graphics addendum]?

- A. Switching voltage regulator
- B. Grounded emitter amplifier
- C. Linear voltage regulator
- D. Emitter follower

4AG-12.2 What is the purpose of D1 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. Line voltage stabilization
- B. Voltage reference
- C. Peak clipping
- D. Hum filtering

4AG-12.3 What is the purpose of Q1 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. It increases the output ripple
- B. It provides a constant load for the voltage source
- C. It increases the current handling capability
- D. It provides D1 with current

4AG-12.4 What is the purpose of C1 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. It resonates at the ripple frequency
- B. It provides fixed bias for Q1
- C. It decouples the output
- D. It filters the supply voltage

4AG-12.5 What is the purpose of C2 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. It bypasses hum around D1
- B. It is a brute force filter for the output
- C. To self resonate at the hum frequency
- D. To provide fixed DC bias for Q1

4AG-12.6 What is the purpose of C3 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. It prevents self-oscillation
- B. It provides brute force filtering of the output
- C. It provides fixed bias for Q1
- D. It clips the peaks of the ripple

4AG-12.7 What is the purpose of R1 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. It provides a constant load to the voltage source
- B. It couples hum to D1
- C. It supplies current to D1
- D. It bypasses hum around D1

4AG-12.8 What is the purpose of R2 in the circuit shown in Figure 4AG-12 [see graphics addendum]?

- A. It provides fixed bias for Q1
- B. It provides fixed bias for D1
- C. It decouples hum from D1
- D. It provides a constant minimum load for Q1

4AG-13.1 What value capacitor would be required to tune a 20-microhenry inductor to resonate in the 80-meter wavelength band?

- A. 150 picofarads
- B. 200 picofarads
- C. 100 picofarads
- D. 100 microfarads

4AG-13.2 What value inductor would be required to tune a 100-picofarad capacitor to resonate in the 40-meter wavelength band?

- A. 200 microhenrys
- B. 150 microhenrys
- C. 5 millihenrys
- D. 5 microhenrys

4AG-13.3 What value capacitor would be required to tune a 2-microhenry inductor to resonate in the 20-meter wavelength band?

- A. 64 picofarads
- B. 6 picofarads
- C. 12 picofarads
- D. 88 microfarads

4AG-13.4 What value inductor would be required to tune a 15-picofarad capacitor to resonate in the 15-meter wavelength band?

- A. 2 microhenrys
- B. 30 microhenrys
- C. 4 microhenrys
- D. 15 microhenrys

4AG-13.5 What value capacitor would be required to tune a 100-microhenry inductor to resonate in the 160-meter wavelength band?

- A. 78 picofarads

- B. 25 picofarads
- C. 405 picofarads
- D. 40.5 microfarads

4AH-1.1 What is emission ++++A3C++++?

- A. Facsimile
- B. RTTY
- C. ATV
- D. Slow Scan TV

4AH-1.2 What type of emission is produced when an amplitude modulated transmitter is modulated by a facsimile signal?

- A. A3F
- B. A3C
- C. F3F
- D. F3C

4AH-1.3 What is ++++facsimile++++?

- A. The transmission of tone-modulated telegraphy
- B. The transmission of a pattern of printed characters designed to form a picture
- C. The transmission of printed pictures by electrical means
- D. The transmission of moving pictures by electrical means

4AH-1.4 What is emission ++++F3C++++?

- A. Voice transmission
- B. Slow Scan TV
- C. RTTY
- D. Facsimile

4AH-1.5 What type of emission is produced when a frequency modulated transmitter is modulated by a facsimile signal?

- A. F3C
- B. A3C
- C. F3F
- D. A3F

4AH-1.6 What is emission ++++A3F++++?

- A. RTTY
- B. Television
- C. SSB
- D. Modulated CW

4AH-1.7 What type of emission is produced when an amplitude modulated transmitter is modulated by a television signal?

- A. F3F
- B. A3F
- C. A3C
- D. F3C

4AH-1.8 What is emission ++++F3F++++?

- A. Modulated CW
- B. Facsimile
- C. RTTY
- D. Television

4AH-1.9 What type of emission is produced when a frequency

modulated transmitter is modulated by a television signal?

- A. A3F
- B. A3C
- C. F3F
- D. F3C

4AH-1.10 What type of emission results when a single sideband transmitter is used for slow-scan television?

- A. J3A
- B. F3F
- C. A3F
- D. J3F

4AH-2.1 How can an FM-phone signal be produced?

- A. By modulating the supply voltage to a class-B amplifier
- B. By modulating the supply voltage to a class-C amplifier
- C. By using a reactance modulator on an oscillator
- D. By using a balanced modulator on an oscillator

4AH-2.2 How can a double-sideband phone signal be produced?

- A. By using a reactance modulator on an oscillator
- B. By varying the voltage to the varactor in an oscillator circuit
- C. By using a phase detector, oscillator and filter in a feedback loop
- D. By modulating the plate supply voltage to a class C amplifier

4AH-2.3 How can a single-sideband phone signal be produced?

- A. By producing a double sideband signal with a balanced modulator and then removing the unwanted sideband by filtering
- B. By producing a double sideband signal with a balanced modulator and then removing the unwanted sideband by heterodyning
- C. By producing a double sideband signal with a balanced modulator and then removing the unwanted sideband by mixing
- D. By producing a double sideband signal with a balanced modulator and then removing the unwanted sideband by neutralization

4AH-3.1 What is meant by the term +++deviation ratio+++?

- A. The ratio of the audio modulating frequency to the center carrier frequency
- B. The ratio of the maximum carrier frequency deviation to the highest audio modulating frequency
- C. The ratio of the carrier center frequency to the audio modulating frequency
- D. The ratio of the highest audio modulating frequency to the average audio modulating frequency

4AH-3.2 In an FM-phone signal, what is the term for the maximum deviation from the carrier frequency divided by the maximum audio modulating frequency?

- A. Deviation index
- B. Modulation index
- C. Deviation ratio
- D. Modulation ratio

4AH-3.3 What is the deviation ratio for an FM-phone signal having a maximum frequency swing of plus or minus 5 kHz and accepting a maximum modulation rate of 3 kHz?

- A. 60
- B. 0.16
- C. 0.6
- D. 1.66

4AH-3.4 What is the deviation ratio of an FM-phone signal having a maximum frequency swing of plus or minus 7.5 kHz and accepting a maximum modulation rate of 3.5 kHz?

- A. 2.14
- B. 0.214
- C. 0.47
- D. 47

4AH-4.1 What is meant by the term +++modulation index+++?

- A. The processor index
- B. The ratio between the deviation of a frequency modulated signal and the modulating frequency
- C. The FM signal-to-noise ratio
- D. The ratio of the maximum carrier frequency deviation to the highest audio modulating frequency

4AH-4.2 In an FM-phone signal, what is the term for the ratio between the deviation of the frequency-modulated signal and the modulating frequency?

- A. FM compressibility
- B. Quieting index
- C. Percentage of modulation
- D. Modulation index

4AH-4.3 How does the modulation index of a phase-modulated emission vary with the modulated frequency?

- A. The modulation index increases as the RF carrier frequency (the modulated frequency) increases
- B. The modulation index decreases as the RF carrier frequency (the modulated frequency) increases
- C. The modulation index varies with the square root of the RF carrier frequency (the modulated frequency)
- D. The modulation index does not depend on the RF carrier frequency (the modulated frequency)

4AH-4.4 In an FM-phone signal having a maximum frequency deviation of 3000 Hz either side of the carrier frequency, what is the modulation index when the modulating frequency is 1000 Hz?

- A. 3
- B. 0.3
- C. 3000
- D. 1000

4AH-4.5 What is the modulation index of an FM-phone transmitter producing an instantaneous carrier deviation of 6 kHz when modulated with a 2-kHz modulating frequency?

- A. 6000
- B. 3
- C. 2000

D. 1/3

4AH-5.1 What are +++electromagnetic waves+++?

- A. Alternating currents in the core of an electromagnet
- B. A wave consisting of two electric fields at right angles to each other
- C. A wave consisting of an electric field and a magnetic field at right angles to each other
- D. A wave consisting of two magnetic fields at right angles to each other

4AH-5.2 What is a +++wave front+++?

- A. A voltage pulse in a conductor
- B. A current pulse in a conductor
- C. A voltage pulse across a resistor
- D. A fixed point in an electromagnetic wave

4AH-5.3 At what speed do electromagnetic waves travel in free space?

- A. Approximately 300 million meters per second
- B. Approximately 468 million meters per second
- C. Approximately 186,300 feet per second
- D. Approximately 300 million miles per second

4AH-5.4 What are the two interrelated fields considered to make up an electromagnetic wave?

- A. An electric field and a current field
- B. An electric field and a magnetic field
- C. An electric field and a voltage field
- D. A voltage field and a current field

4AH-5.5 Why do electromagnetic waves not penetrate a good conductor to any great extent?

- A. The electromagnetic field induces currents in the insulator
- B. The oxide on the conductor surface acts as a shield
- C. Because of Eddy currents
- D. The resistivity of the conductor dissipates the field

4AH-6.1 What is meant by referring to electromagnetic waves traveling in free space?

- A. The electric and magnetic fields eventually become aligned
- B. Propagation in a medium with a high refractive index
- C. The electromagnetic wave encounters the ionosphere and returns to its source
- D. Propagation of energy across a vacuum by changing electric and magnetic fields

4AH-6.2 What is meant by referring to electromagnetic waves as +++horizontally polarized+++?

- A. The electric field is parallel to the earth
- B. The magnetic field is parallel to the earth
- C. Both the electric and magnetic fields are horizontal
- D. Both the electric and magnetic fields are vertical

4AH-6.3 What is meant by referring to electromagnetic waves as having +++circular polarization+++?

- A. The electric field is bent into a circular shape



- B. The electric field rotates
- C. The electromagnetic wave continues to circle the earth
- D. The electromagnetic wave has been generated by a quad antenna

4AH-6.4 When the electric field is perpendicular to the surface of the earth, what is the polarization of the electromagnetic wave?

- A. Circular
- B. Horizontal
- C. Vertical
- D. Elliptical

4AH-6.5 When the magnetic field is parallel to the surface of the earth, what is the polarization of the electromagnetic wave?

- A. Circular
- B. Horizontal
- C. Elliptical
- D. Vertical

4AH-6.6 When the magnetic field is perpendicular to the surface of the earth, what is the polarization of the electromagnetic field?

- A. Horizontal
- B. Circular
- C. Elliptical
- D. Vertical

4AH-6.7 When the electric field is parallel to the surface of the earth, what is the polarization of the electromagnetic wave?

- A. Vertical
- B. Horizontal
- C. Circular
- D. Elliptical

4AH-7.1 What is a ++++sine wave++++?

- A. A constant-voltage, varying-current wave
- B. A wave whose amplitude at any given instant can be represented by a point on a wheel rotating at a uniform speed
- C. A wave following the laws of the trigonometric tangent function
- D. A wave whose polarity changes in a random manner

4AH-7.2 How many times does a sine wave cross the zero axis in one complete cycle?

- A. 180 times
- B. 4 times
- C. 2 times
- D. 360 times

4AH-7.3 How many degrees are there in one complete sine wave cycle?

- A. 90 degrees
- B. 270 degrees
- C. 180 degrees
- D. 360 degrees

4AH-7.4 What is the +++++period++++ of a wave?

- A. The time required to complete one cycle
- B. The number of degrees in one cycle
- C. The number of zero crossings in one cycle
- D. The amplitude of the wave

4AH-7.5 What is a +++++square++++ wave?

- A. A wave with only 300 degrees in one cycle
- B. A wave which abruptly changes back and forth between two voltage levels and which remains an equal time at each level
- C. A wave that makes four zero crossings per cycle
- D. A wave in which the positive and negative excursions occupy unequal portions of the cycle time

4AH-7.6 What is a wave called which abruptly changes back and forth between two voltage levels and which remains an equal time at each level?

- A. A sine wave
- B. A cosine wave
- C. A square wave
- D. A rectangular wave

4AH-7.7 Which sine waves make up a square wave?

- A. 0.707 times the fundamental frequency
- B. The fundamental frequency and all odd and even harmonics
- C. The fundamental frequency and all even harmonics
- D. The fundamental frequency and all odd harmonics

4AH-7.8 What type of wave is made up of sine waves of the fundamental frequency and all the odd harmonics?

- A. Square wave
- B. Sine wave
- C. Cosine wave
- D. Tangent wave

4AH-7.9 What is a +++++sawtooth++++ wave?

- A. A wave that alternates between two values and spends an equal time at each level
- B. A wave with a straight line rise time faster than the fall time (or vice versa)
- C. A wave that produces a phase angle tangent to the unit circle
- D. A wave whose amplitude at any given instant can be represented by a point on a wheel rotating at a uniform speed

4AH-7.10 What type of wave is characterized by a rise time significantly faster than the fall time (or vice versa)?

- A. A cosine wave
- B. A square wave
- C. A sawtooth wave
- D. A sine wave

4AH-7.11 Which sine waves make up a sawtooth wave?

- A. The fundamental frequency and all prime harmonics
- B. The fundamental frequency and all even harmonics
- C. The fundamental frequency and all odd harmonics
- D. The fundamental frequency and all harmonics

4AH-7.12 What type of wave is made up of sine waves at the fundamental frequency and all the harmonics?

- A. A sawtooth wave
- B. A square wave
- C. A sine wave
- D. A cosine wave

4AH-8.1 What is the meaning of the term **root mean square** value of an AC voltage?

- A. The value of an AC voltage found by squaring the average value of the peak AC voltage
- B. The value of a DC voltage that would cause the same heating effect in a given resistor as a peak AC voltage
- C. The value of an AC voltage that would cause the same heating effect in a given resistor as a DC voltage of the same value
- D. The value of an AC voltage found by taking the square root of the average AC value

4AH-8.2 What is the term used in reference to a DC voltage that would cause the same heating in a resistor as a certain value of AC voltage?

- A. Cosine voltage
- B. Power factor
- C. Root mean square
- D. Average voltage

4AH-8.3 What would be the most accurate way of determining the rms voltage of a complex waveform?

- A. By using a grid dip meter
- B. By measuring the voltage with a D'Arsonval meter
- C. By using an absorption wavemeter
- D. By measuring the heating effect in a known resistor

4AH-8.4 What is the rms voltage at a common household electrical power outlet?

- A. 117-V AC
- B. 331-V AC
- C. 82.7-V AC
- D. 165.5-V AC

4AH-8.5 What is the peak voltage at a common household electrical outlet?

- A. 234 volts
- B. 165.5 volts
- C. 117 volts
- D. 331 volts

4AH-8.6 What is the peak-to-peak voltage at a common household electrical outlet?

- A. 234 volts
- B. 117 volts
- C. 331 volts
- D. 165.5 volts

4AH-8.7 What is the rms voltage of a 165-volt peak pure sine

wave?

- A. 233-V AC
- B. 330-V AC
- C. 58.3-V AC
- D. 117-V AC

4AH-8.8 What is the rms value of a 331-volt peak-to-peak pure sine wave?

- A. 117-V AC
- B. 165-V AC
- C. 234-V AC
- D. 300-V AC

4AH-9.1 For many types of voices, what is the ratio of PEP to average power during a modulation peak in a single-sideband phone signal?

- A. Approximately 1.0 to 1
- B. Approximately 25 to 1
- C. Approximately 2.5 to 1
- D. Approximately 100 to 1

4AH-9.2 In a single-sideband phone signal, what determines the PEP-to-average power ratio?

- A. The frequency of the modulating signal
- B. The degree of carrier suppression
- C. The speech characteristics
- D. The amplifier power

4AH-9.3 What is the approximate DC input power to a Class B RF power amplifier stage in an FM-phone transmitter when the PEP output power is 1500 watts?

- A. Approximately 900 watts
- B. Approximately 1765 watts
- C. Approximately 2500 watts
- D. Approximately 3000 watts

4AH-9.4 What is the approximate DC input power to a Class C RF power amplifier stage in a RTTY transmitter when the PEP output power is 1000 watts?

- A. Approximately 850 watts
- B. Approximately 1250 watts
- C. Approximately 1667 watts
- D. Approximately 2000 watts

4AH-9.5 What is the approximate DC input power to a Class AB RF power amplifier stage in an unmodulated carrier transmitter when the PEP output power is 500 watts?

- A. Approximately 250 watts
- B. Approximately 600 watts
- C. Approximately 800 watts
- D. Approximately 1000 watts

4AH-10.1 Where is the noise generated which primarily determines the signal-to-noise ratio in a 160-meter wavelength band receiver?

- A. In the detector
- B. Man-made noise

- C. In the receiver front end
- D. In the atmosphere

4AH-10.2 Where is the noise generated which primarily determines the signal-to-noise ratio in a 2-meter wavelength band receiver?

- A. In the receiver front end
- B. Man-made noise
- C. In the atmosphere
- D. In the ionosphere

4AH-10.3 Where is the noise generated which primarily determines the signal-to-noise ratio in a 1.25-meter wavelength band receiver?

- A. In the audio amplifier
- B. In the receiver front end
- C. In the ionosphere
- D. Man-made noise

4AH-10.4 Where is the noise generated which primarily determines the signal-to-noise ratio in a 0.70-meter wavelength band receiver?

- A. In the atmosphere
- B. In the ionosphere
- C. In the receiver front end
- D. Man-made noise

4AI-1.1 What is meant by the term +++antenna gain+++?

- A. The numerical ratio relating the radiated signal strength of an antenna to that of another antenna
- B. The ratio of the signal in the forward direction to the signal in the back direction
- C. The ratio of the amount of power produced by the antenna compared to the output power of the transmitter
- D. The final amplifier gain minus the transmission line losses (including any phasing lines present)

4AI-1.2 What is the term for a numerical ratio which relates the performance of one antenna to that of another real or theoretical antenna?

- A. Effective radiated power
- B. Antenna gain
- C. Conversion gain
- D. Peak effective power

4AI-1.3 What is meant by the term +++antenna bandwidth+++?

- A. Antenna length divided by the number of elements
- B. The frequency range over which an antenna can be expected to perform well
- C. The angle between the half-power radiation points
- D. The angle formed between two imaginary lines drawn through the ends of the elements

4AI-1.4 How can the approximate beamwidth of a rotatable beam antenna be determined?

- A. Note the two points where the signal strength of the antenna is down 3 dB from the maximum signal point and compute the angular difference

- B. Measure the ratio of the signal strengths of the radiated power lobes from the front and rear of the antenna
- C. Draw two imaginary lines through the ends of the elements and measure the angle between the lines
- D. Measure the ratio of the signal strengths of the radiated power lobes from the front and side of the antenna

4AI-2.1 What is a trap antenna?

- A. An antenna for rejecting interfering signals
- B. A highly sensitive antenna with maximum gain in all directions
- C. An antenna capable of being used on more than one band because of the presence of parallel LC networks
- D. An antenna with a large capture area

4AI-2.2 What is an advantage of using a trap antenna?

- A. It has high directivity in the high-frequency amateur bands
- B. It has high gain
- C. It minimizes harmonic radiation
- D. It may be used for multiband operation

4AI-2.3 What is a disadvantage of using a trap antenna?

- A. It will radiate harmonics
- B. It can only be used for single band operation
- C. It is too sharply directional at the lower amateur frequencies
- D. It must be neutralized

4AI-2.4 What is the principle of a trap antenna?

- A. Beamwidth may be controlled by non-linear impedances
- B. The traps form a high impedance to isolate parts of the antenna
- C. The effective radiated power can be increased if the space around the antenna "sees" a high impedance
- D. The traps increase the antenna gain

4AI-3.1 What is a parasitic element of an antenna?

- A. An element polarized 90 degrees opposite the driven element
- B. An element dependent on the antenna structure for support
- C. An element that receives its excitation from mutual coupling rather than from a transmission line
- D. A transmission line that radiates radio-frequency energy

4AI-3.2 How does a parasitic element generate an electromagnetic field?

- A. By the RF current received from a connected transmission line
- B. By interacting with the earth's magnetic field
- C. By altering the phase of the current on the driven element
- D. By currents induced into the element from a surrounding electric field

4AI-3.3 How does the length of the reflector element of a parasitic element beam antenna compare with that of the driven element?

- A. It is about 5% longer
- B. It is about 5% shorter

- C. It is twice as long
- D. It is one-half as long

4AI-3.4 How does the length of the director element of a parasitic element beam antenna compare with that of the driven element?

- A. It is about 5% longer
- B. It is about 5% shorter
- C. It is one-half as long
- D. It is twice as long

4AI-4.1 What is meant by the term +++radiation resistance+++ for an antenna?

- A. Losses in the antenna elements and feed line
- B. The specific impedance of the antenna
- C. An equivalent resistance that would dissipate the same amount of power as that radiated from an antenna
- D. The resistance in the trap coils to received signals

4AI-4.2 What is the term used for an equivalent resistance which would dissipate the same amount of energy as that radiated from an antenna?

- A. Space resistance
- B. Loss resistance
- C. Transmission line loss
- D. Radiation resistance

4AI-4.3 Why is the value of the radiation resistance of an antenna important?

- A. Knowing the radiation resistance makes it possible to match impedances for maximum power transfer
- B. Knowing the radiation resistance makes it possible to measure the near-field radiation density from a transmitting antenna
- C. The value of the radiation resistance represents the front-to-side ratio of the antenna
- D. The value of the radiation resistance represents the front-to-back ratio of the antenna

4AI-4.4 What are the factors that determine the radiation resistance of an antenna?

- A. Transmission line length and height of antenna
- B. The location of the antenna with respect to nearby objects and the length/diameter ratio of the conductors
- C. It is a constant for all antennas since it is a physical constant
- D. Sunspot activity and the time of day

4AI-5.1 What is a +++driven element+++ of an antenna?

- A. Always the rearmost element
- B. Always the forwardmost element
- C. The element fed by the transmission line
- D. The element connected to the rotator

4AI-5.2 What is the usual electrical length of a driven element in an HF beam antenna?

- A. 1/4 wavelength

- B. 1/2 wavelength
- C. 3/4 wavelength
- D. 1 wavelength

4AI-5.3 What is the term for an antenna element which is supplied power from a transmitter through a transmission line?

- A. Driven element
- B. Director element
- C. Reflector element
- D. Parasitic element

4AI-6.1 What is meant by the term antenna efficiency?

- A. Efficiency = (radiation resistance / transmission resistance) X 100%
- B. Efficiency = (radiation resistance / total resistance) X 100%
- C. Efficiency = (total resistance / radiation resistance) X 100%
- D. Efficiency = (effective radiated power / transmitter output) X 100%

4AI-6.2 What is the term for the ratio of the radiation resistance of an antenna to the total resistance of the system?

- A. Effective radiated power
- B. Radiation conversion loss
- C. Antenna efficiency
- D. Beamwidth

4AI-6.3 What is included in the total resistance of an antenna system?

- A. Radiation resistance plus space impedance
- B. Radiation resistance plus transmission resistance
- C. Transmission line resistance plus radiation resistance
- D. Radiation resistance plus ohmic resistance

4AI-6.4 How can the antenna efficiency of an HF grounded vertical antenna be made comparable to that of a half-wave antenna?

- A. By installing a good ground radial system
- B. By isolating the coax shield from ground
- C. By shortening the vertical
- D. By lengthening the vertical

4AI-6.5 Why does a half-wave antenna operate at very high efficiency?

- A. Because it is non-resonant
- B. Because the conductor resistance is low compared to the radiation resistance
- C. Because earth-induced currents add to its radiated power
- D. Because it has less corona from the element ends than other types of antennas

4AI-7.1 What is a folded dipole antenna?

- A. A dipole that is one-quarter wavelength long
- B. A ground plane antenna
- C. A dipole whose ends are connected by another one-half wavelength piece of wire
- D. A fictional antenna used in theoretical discussions to replace the radiation resistance

4AI-7.2 How does the bandwidth of a folded dipole antenna compare with that of a simple dipole antenna?



- A. It is 0.707 times the simple dipole bandwidth
- B. It is essentially the same
- C. It is less than 50% that of a simple dipole
- D. It is greater

4AI-7.3 What is the input terminal impedance at the center of a folded dipole antenna?

- A. 300 ohms
- B. 72 ohms
- C. 50 ohms
- D. 450 ohms

4AI-8.1 What is the meaning of the term +++velocity factor+++ of a transmission line?

A. The ratio of the characteristic impedance of the line to the terminating impedance

B. The index of shielding for coaxial cable

C. The velocity of the wave on the transmission line multiplied by the velocity of light in a vacuum

D. The velocity of the wave on the transmission line divided by the velocity of light in a vacuum

4AI-8.2 What is the term for the ratio of actual velocity at which a signal travels through a line to the speed of light in a vacuum?

- A. Velocity factor
- B. Characteristic impedance
- C. Surge impedance
- D. Standing wave ratio

4AI-8.3 What is the velocity factor for a typical coaxial cable?

- A. 2.70
- B. 0.66
- C. 0.30
- D. 0.10

4AI-8.4 What determines the velocity factor in a transmission line?

- A. The termination impedance
- B. The line length
- C. Dielectrics in the line
- D. The center conductor resistivity

4AI-8.5 Why is the physical length of a coaxial cable transmission line shorter than its electrical length?

A. Skin effect is less pronounced in the coaxial cable

B. RF energy moves slower along the coaxial cable

C. The surge impedance is higher in the parallel feed line

D. The characteristic impedance is higher in the parallel feed line

4AI-9.1 What would be the physical length of a typical coaxial transmission line which is electrically one-quarter wavelength long at 14.1 MHz?

- A. 20 meters
- B. 3.51 meters
- C. 2.33 meters

D. 0.25 meters

4AI-9.2 What would be the physical length of a typical coaxial transmission line which is electrically one-quarter wavelength long at 7.2 MHz?

- A. 10.5 meters
- B. 6.88 meters
- C. 24 meters
- D. 50 meters

4AI-9.3 What is the physical length of a parallel antenna feedline which is electrically one-half wavelength long at 14.10 MHz? (assume a velocity factor of 0.82.)

- A. 15 meters
- B. 24.3 meters
- C. 8.7 meters
- D. 70.8 meters

4AI-9.4 What is the physical length of a twin lead transmission feedline at 3.65 MHz? (assume a velocity factor of 0.80.)

- A. Electrical length times 0.8
- B. Electrical length divided by 0.8
- C. 80 meters
- D. 160 meters

4AI-10.1 In a half-wave antenna, where are the current nodes?

- A. At the ends
- B. At the center
- C. Three-quarters of the way from the feed point toward the end
- D. One-half of the way from the feed point toward the end

4AI-10.2 In a half-wave antenna, where are the voltage nodes?

- A. At the ends
- B. At the feed point
- C. Three-quarters of the way from the feed point toward the end
- D. One-half of the way from the feed point toward the end

4AI-10.3 At the ends of a half-wave antenna, what values of current and voltage exist compared to the remainder of the antenna?

- A. Equal voltage and current
- B. Minimum voltage and maximum current
- C. Maximum voltage and minimum current
- D. Minimum voltage and minimum current

4AI-10.4 At the center of a half-wave antenna, what values of voltage and current exist compared to the remainder of the antenna?

- A. Equal voltage and current
- B. Maximum voltage and minimum current
- C. Minimum voltage and minimum current
- D. Minimum voltage and maximum current

4AI-11.1 Why is the inductance required for a base loaded HF mobile antenna less than that for an inductance placed further up

the whip?

- A. The capacitance to ground is less farther away from the base
- B. The capacitance to ground is greater farther away from the base
- C. The current is greater at the top
- D. The voltage is less at the top

4AI-11.2 What happens to the base feed point of a fixed length HF mobile antenna as the frequency of operation is lowered?

- A. The resistance decreases and the capacitive reactance decreases
- B. The resistance decreases and the capacitive reactance increases
- C. The resistance increases and the capacitive reactance decreases
- D. The resistance increases and the capacitive reactance increases

4AI-11.3 Why should an HF mobile antenna loading coil have a high ratio of reactance to resistance?

- A. To swamp out harmonics
- B. To maximize losses
- C. To minimize losses
- D. To minimize the Q

4AI-11.4 Why is a loading coil often used with an HF mobile antenna?

- A. To improve reception
- B. To lower the losses
- C. To lower the Q
- D. To tune out the capacitive reactance

4AI-12.1 For a shortened vertical antenna, where should a loading coil be placed to minimize losses and produce the most effective performance?

- A. Near the center of the vertical radiator
- B. As low as possible on the vertical radiator
- C. As close to the transmitter as possible
- D. At a voltage node

4AI-12.2 What happens to the bandwidth of an antenna as it is shortened through the use of loading coils?

- A. It is increased
- B. It is decreased
- C. No change occurs
- D. It becomes flat

4AI-12.3 Why are self-resonant antennas popular in amateur stations?

- A. They are very broad banded
- B. They have high gain in all azimuthal directions
- C. They are the most efficient radiators
- D. They require no calculations

4AI-12.4 What is an advantage of using top loading in a shortened HF vertical antenna?

- A. Lower Q
- B. Greater structural strength
- C. Higher losses
- D. Improved radiation efficiency

Answers

4AA-1.1	A
4AA-1.2	B
4AA-1.3	D
4AA-1.4	C
4AA-2.1	A
4AA-2.2	D
4AA-2.3	B
4AA-2.4	A
4AA-3.1	D
4AA-3.2	A
4AA-3.3	C
4AA-3.4	D
4AA-3.5	C
4AA-3.6	A
4AA-3.7	D
4AA-3.8	A
4AA-3.9	B
4AA-3.10	A
4AA-4.1	D
4AA-4.2	A
4AA-4.3	B
4AA-4.4	C
4AA-5.1	D
4AA-5.2	A
4AA-5.3	C
4AA-5.4	C
4AA-5.5	D
4AA-6.1	A
4AA-6.2	B
4AA-6.3	B
4AA-7.1	C
4AA-7.2	D
4AA-8.1	A
4AA-8.2	B
4AA-9.1	C
4AA-9.2	C
4AA-9.3	D
4AA-9.4	A
4AA-10.1	B
4AA-10.2	C
4AA-11.1	B
4AA-11.2	A
4AA-12.1	B
4AA-12.2	C
4AA-12.3	D
4AA-13.1	D

4AA-13.2	B
4AA-14.1	C
4AA-14.2	D
4AA-15.1	A
4AA-15.2	B
4AA-15.3	A
4AA-16.1	C
4AA-16.2	D
4AA-17.1	A
4AA-17.2	B
4AA-17.3	C
4AA-18.1	B
4AA-18.2	D
4AA-18.3	B
4AA-19.1	C
4AA-19.2	A
4AA-19.3	A
4AA-19.4	B
4AA-20.1	C
4AA-20.2	D
4AB-1.1	D
4AB-1.2	A
4AB-1.3	B
4AB-1.4	B
4AB-1.5	C
4AB-2.1	D
4AB-2.2	B
4AB-2.3	C
4AB-2.4	C
4AB-2.5	D
4AC-1.1	C
4AC-1.2	D
4AC-1.3	A
4AC-1.4	B
4AC-1.5	A
4AC-2.1	B
4AC-2.2	C
4AC-2.3	D
4AC-2.4	B
4AC-2.5	A
4AC-3.1	D
4AC-3.2	C
4AC-3.3	B
4AC-3.4	D
4AC-3.5	A
4AC-4.1	D
4AC-4.2	A
4AC-4.3	B
4AC-4.4	C
4AC-4.5	A
4AD-1.1	B
4AD-1.2	A
4AD-1.3	B
4AD-1.4	A
4AD-1.5	D
4AD-1.6	C
4AD-1.7	A

4AD-1.8	D
4AD-1.9	D
4AD-1.10	A
4AD-1.11	C
4AD-2.1	C
4AD-2.2	D
4AD-2.3	B
4AD-2.4	D
4AD-2.5	B
4AD-2.6	A
4AD-2.7	B
4AD-3.1	A
4AD-3.2	D
4AD-3.3	B
4AD-3.4	D
4AD-3.5	C
4AD-4.1	D
4AD-4.2	B
4AD-4.3	B
4AD-4.4	D
4AD-4.5	B
4AD-5.1	C
4AD-5.2	A
4AD-5.3	C
4AD-5.4	C
4AD-5.5	A
4AD-6.1	D
4AD-6.2	B
4AD-6.3	A
4AD-6.4	C
4AD-7.1	C
4AD-7.2	C
4AD-7.3	A
4AE-1.1	A
4AE-1.2	D
4AE-1.3	A
4AE-1.4	B
4AE-2.1	C
4AE-2.2	B
4AE-2.3	D
4AE-2.4	B
4AE-2.5	A
4AE-2.6	B
4AE-2.7	B
4AE-3.1	A
4AE-3.2	C
4AE-3.3	A
4AE-3.4	A
4AE-3.5	C
4AE-4.1	B
4AE-4.2	D
4AE-4.3	C
4AE-4.4	B
4AE-4.5	B
4AE-4.6	A
4AE-4.7	D
4AE-5.1	C

4AE-5.2	B
4AE-5.3	C
4AE-5.4	A
4AE-5.5	B
4AE-5.6	D
4AE-5.7	C
4AE-5.8	A
4AE-5.9	B
4AE-5.10	C
4AE-5.11	A
4AE-5.12	B
4AE-5.13	C
4AE-5.14	D
4AE-5.15	A
4AE-5.16	B
4AE-5.17	C
4AE-5.18	D
4AE-5.19	A
4AE-5.20	B
4AE-5.21	A
4AE-5.22	D
4AE-5.23	C
4AE-5.24	D
4AE-5.25	A
4AE-5.26	D
4AE-5.27	B
4AE-5.28	A
4AE-5.29	C
4AE-5.30	D
4AE-5.31	A
4AE-5.32	B
4AE-5.33	C
4AE-5.34	D
4AE-5.35	D
4AE-5.36	A
4AE-5.37	B
4AE-5.38	B
4AE-5.39	D
4AE-5.40	A
4AE-6.1	A
4AE-6.2	B
4AE-6.3	C
4AE-6.4	B
4AE-6.5	D
4AE-6.6	B
4AE-6.7	A
4AE-6.8	D
4AE-6.9	D
4AE-6.10	C
4AE-7.1	A
4AE-7.2	A
4AE-7.3	C
4AE-7.4	D
4AE-7.5	C
4AE-7.6	B
4AE-7.7	D
4AE-8.1	B

4AE-8.2	C
4AE-8.3	D
4AE-8.4	A
4AE-8.5	D
4AE-8.6	B
4AE-8.7	C
4AE-8.8	D
4AE-8.9	A
4AE-8.10	D
4AE-9.1	B
4AE-9.2	C
4AE-9.3	C
4AE-9.4	D
4AE-9.5	C
4AE-9.6	A
4AE-9.7	B
4AE-9.8	B
4AE-9.9	C
4AE-9.10	C
4AF-1.1	D
4AF-1.2	A
4AF-1.3	D
4AF-1.4	C
4AF-1.5	B
4AF-1.6	A
4AF-1.7	C
4AF-1.8	C
4AF-1.9	C
4AF-1.10	D
4AF-1.11	A
4AF-1.12	B
4AF-1.13	D
4AF-1.14	D
4AF-1.15	B
4AF-1.16	D
4AF-1.17	C
4AF-1.18	D
4AF-1.19	C
4AF-1.20	C
4AF-2.1	C
4AF-2.2	B
4AF-2.3	B
4AF-2.4	C
4AF-2.5	C
4AF-2.6	A
4AF-2.7	B
4AF-2.8	B
4AF-2.9	B
4AF-2.10	B
4AF-2.11	A
4AF-2.12	A
4AF-2.13	C
4AF-2.14	C
4AF-2.15	A
4AF-2.16	A
4AF-2.17	B
4AF-3.1	D



4AF-3.2	A
4AF-3.3	A
4AF-3.4	A
4AF-3.5	D
4AF-3.6	A
4AF-3.7	A
4AF-3.8	B
4AF-4.1	B
4AF-4.2	C
4AF-4.3	B
4AF-4.4	A
4AF-4.5	D
4AF-4.6	C
4AF-4.7	B
4AF-4.8	A
4AF-4.9	D
4AF-4.10	D
4AF-5.1	B
4AF-5.2	C
4AF-5.3	D
4AF-5.4	D
4AF-5.5	A
4AG-1.1	D
4AG-1.2	C
4AG-1.3	A
4AG-1.4	B
4AG-1.5	D
4AG-1.6	C
4AG-1.7	A
4AG-1.8	D
4AG-1.9	B
4AG-2.1	B
4AG-2.2	A
4AG-2.3	D
4AG-2.4	B
4AG-2.5	A
4AG-2.6	A
4AG-2.7	C
4AG-2.8	C
4AG-2.9	A
4AG-2.10	D
4AG-3.1	B
4AG-3.2	D
4AG-3.3	B
4AG-3.4	D
4AG-3.5	C
4AG-3.6	D
4AG-3.7	B
4AG-3.8	A
4AG-3.9	D
4AG-3.10	C
4AG-4.1	A
4AG-4.2	C
4AG-4.3	A
4AG-4.4	D
4AG-4.5	C
4AG-4.6	B

4AG-4.7	B
4AG-5.1	C
4AG-5.2	D
4AG-5.3	D
4AG-5.4	C
4AG-5.5	D
4AG-5.6	D
4AG-5.7	A
4AG-5.8	B
4AG-5.9	B
4AG-5.10	C
4AG-6.1	D
4AG-6.2	B
4AG-6.3	C
4AG-6.4	B
4AG-6.5	D
4AG-6.6	D
4AG-7.1	A
4AG-7.2	B
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4AG-7.5	B
4AG-7.6	B
4AG-7.7	C
4AG-7.8	B
4AG-7.9	C
4AG-7.10	D
4AG-8.1	B
4AG-8.2	A
4AG-8.3	C
4AG-8.4	B
4AG-8.5	A
4AG-8.6	D
4AG-8.7	C
4AG-8.8	B
4AG-8.9	A
4AG-9.1	B
4AG-9.2	C
4AG-9.3	C
4AG-9.4	A
4AG-9.5	C
4AG-9.6	D
4AG-9.7	B
4AG-10.1	C
4AG-10.2	B
4AG-10.3	D
4AG-10.4	D
4AG-10.5	D
4AG-11.1	B
4AG-11.2	A
4AG-11.3	D
4AG-11.4	A
4AG-12.1	C
4AG-12.2	B
4AG-12.3	C
4AG-12.4	D
4AG-12.5	A

4AG-12.6	A
4AG-12.7	C
4AG-12.8	D
4AG-13.1	C
4AG-13.2	D
4AG-13.3	A
4AG-13.4	C
4AG-13.5	A
4AH-1.1	A
4AH-1.2	B
4AH-1.3	C
4AH-1.4	D
4AH-1.5	A
4AH-1.6	B
4AH-1.7	B
4AH-1.8	D
4AH-1.9	C
4AH-1.10	D
4AH-2.1	C
4AH-2.2	D
4AH-2.3	A
4AH-3.1	B
4AH-3.2	C
4AH-3.3	D
4AH-3.4	A
4AH-4.1	B
4AH-4.2	D
4AH-4.3	D
4AH-4.4	A
4AH-4.5	B
4AH-5.1	C
4AH-5.2	D
4AH-5.3	A
4AH-5.4	B
4AH-5.5	C
4AH-6.1	D
4AH-6.2	A
4AH-6.3	B
4AH-6.4	C
4AH-6.5	D
4AH-6.6	A
4AH-6.7	B
4AH-7.1	B
4AH-7.2	C
4AH-7.3	D
4AH-7.4	A
4AH-7.5	B
4AH-7.6	C
4AH-7.7	D
4AH-7.8	A
4AH-7.9	B
4AH-7.10	C
4AH-7.11	D
4AH-7.12	A
4AH-8.1	C
4AH-8.2	C
4AH-8.3	D

4AH-8.4	A
4AH-8.5	B
4AH-8.6	C
4AH-8.7	D
4AH-8.8	A
4AH-9.1	C
4AH-9.2	C
4AH-9.3	C
4AH-9.4	B
4AH-9.5	D
4AH-10.1	D
4AH-10.2	A
4AH-10.3	B
4AH-10.4	C
4AI-1.1	A
4AI-1.2	B
4AI-1.3	B
4AI-1.4	A
4AI-2.1	C
4AI-2.2	D
4AI-2.3	A
4AI-2.4	B
4AI-3.1	C
4AI-3.2	D
4AI-3.3	A
4AI-3.4	B
4AI-4.1	C
4AI-4.2	D
4AI-4.3	A
4AI-4.4	B
4AI-5.1	C
4AI-5.2	B
4AI-5.3	A
4AI-6.1	B
4AI-6.2	C
4AI-6.3	D
4AI-6.4	A
4AI-6.5	B
4AI-7.1	C
4AI-7.2	D
4AI-7.3	A
4AI-8.1	D
4AI-8.2	A
4AI-8.3	B
4AI-8.4	C
4AI-8.5	B
4AI-9.1	B
4AI-9.2	B
4AI-9.3	C
4AI-9.4	A
4AI-10.1	A
4AI-10.2	B
4AI-10.3	C
4AI-10.4	D
4AI-11.1	A
4AI-11.2	B
4AI-11.3	C

4AI-11.4	D
4AI-12.1	A
4AI-12.2	B
4AI-12.3	C
4AI-12.4	D



Subject: Extra License Exam Questions

4BA-1A.1 What exclusive frequency privileges in the 80-meter wavelength band are authorized to Amateur Extra control operators?

- A. 3525-3775 kHz
- B. 3500-3525 kHz
- C. 3700-3750 kHz
- D. 3500-3550 kHz

4BA-1A.2 What exclusive frequency privileges in the 75-meter wavelength band are authorized to Amateur Extra control operators?

- A. 3750-3775 kHz
- B. 3800-3850 kHz
- C. 3775-3800 kHz
- D. 3800-3825 kHz

4BA-1A.3 What exclusive frequency privileges in the 40-meter wavelength band are authorized to Amateur Extra control operators?

- A. 7000-7025 kHz
- B. 7000-7050 kHz
- C. 7025-7050 kHz
- D. 7100-7150 kHz

4BA-1A.4 What exclusive frequency privileges in the 20-meter wavelength band are authorized to Amateur Extra control operators?

- A. 14.100-14.175 MHz and 14.150-14.175 MHz
- B. 14.000-14.125 MHz and 14.250-14.300 MHz
- C. 14.025-14.050 MHz and 14.100-14.150 MHz
- D. 14.000-14.025 MHz and 14.150-14.175 MHz

4BA-1A.5 What exclusive frequency privileges in the 15-meter wavelength band are authorized to Amateur Extra control operators?

- A. 21.000-21.200 MHz and 21.250-21.270 MHz
- B. 21.050-21.100 MHz and 21.150-21.175 MHz
- C. 21.000-21.025 MHz and 21.200-21.225 MHz
- D. 21.000-21.025 MHz and 21.250-21.275 MHz

4BA-1B.1 What is a +++spurious emission+++ as defined in Part 97?

- A. An emission, on frequencies outside the necessary bandwidth of a transmission, the level of which may be reduced without affecting the information being transmitted
- B. An emission, on frequencies outside the necessary bandwidth of a transmission, the level of which exceeds 25 microwatts
- C. An emission, on frequencies outside the necessary bandwidth of a transmission, the level of which exceeds 10 microwatts
- D. An emission, on frequencies outside the amateur bands, the level of which exceeds 10 microwatts

4BA-1B.2 How much must the mean power of any spurious emission from an amateur transmitter be attenuated when the carrier frequency is below 30 MHz and the mean transmitted power is equal

to or greater than 5 watts?

- A. At least 30 dB below the mean power of the fundamental, and less than 25 mW
- B. At least 40 dB below the mean power of the fundamental, and less than 50 mW
- C. At least 30 dB below the mean power of the fundamental, and less than 50 mW
- D. At least 40 dB below the mean power of the fundamental, and less than 25 mW

4BA-1B.3 How much must the mean power of any spurious emission from an amateur transmitter be attenuated when the carrier frequency is above 30 MHz but below 225 MHz and the mean transmitted power is greater than 25 watts?

- A. At least 30 dB below mean power of the fundamental
- B. At least 40 dB below mean power of the fundamental
- C. At least 50 dB below mean power of the fundamental
- D. At least 60 dB below mean power of the fundamental

4BA-1B.4 What can the FCC require the licensee to do if any spurious emission from an amateur station causes harmful interference to the reception of another radio station?

- A. Reduce the spurious emissions to 0 dB below the fundamental
- B. Observe quiet hours and pay a fine
- C. Forfeit the station license and pay a fine
- D. Eliminate or reduce the interference

4BA-1C.1 What are the points of communication for an amateur station?

- A. Other amateur stations only
- B. Other amateur stations and other stations authorized by the FCC to communicate with amateurs
- C. Other amateur stations and stations in the Personal Radio Service
- D. Other amateur stations and stations in the Aviation or Private Land Mobile Radio Services

4BA-1C.2 With which stations may an amateur station communicate?

- A. Amateur, RACES, and FCC Monitoring stations
- B. Amateur stations and any other station authorized by the FCC to communicate with amateur stations
- C. Amateur stations only
- D. Amateur stations and US Government stations

4BA-1C.3 Under what circumstances, if any, may an amateur station communicate with a non-amateur station?

- A. Only during emergencies and when the Commission has authorized the non-amateur station to communicate with amateur stations
- B. Under no circumstances
- C. Only when the state governor has authorized that station to communicate with amateurs
- D. Only during Public Service events in connection with REACT groups

4BA-1D.1 With what rules must US citizens comply when operating an amateur station aboard any craft or vessel that is registered



in the US while in international waters or airspace?

- A. The FCC rules contained in Part 15
- B. The FCC rules contained in Part 97
- C. The IARU rules governing international operation
- D. There are no rules governing Amateur Radio operation in international waters

4BA-1E.1 An amateur station is installed on board a ship or aircraft in a compartment separate from the main radio installation. What other conditions must the amateur operator comply with?

- A. The Amateur Radio operation must be approved by the master of the ship or the captain of the aircraft
- B. There must be an approved antenna switch included, so the amateur can use the ship or aircraft antennas, transmitting only when the main radios are not in use
- C. The amateur station must have a power supply that is completely independent of the ship or aircraft power
- D. The amateur operator must have an FCC Marine or Aircraft endorsement on his or her amateur license

4BA-1E.2 What types of licenses or permits are required before an amateur operator may transmit from a vessel registered in the US?

- A. No amateur license is required outside of international waters
- B. Any amateur operator/primary station license or reciprocal permit for alien amateur licensee issued by the FCC
- C. Only amateurs holding General class or higher licenses may transmit from a vessel registered in the US
- D. Only an Amateur Extra class licensee may operate aboard a vessel registered in the US

4BA-2A.1 What is an FCC ++++reciprocal permit for alien amateur licensee++++?

- A. An FCC authorization to a holder of an amateur license issued by certain foreign governments to operate an amateur station in the United States and its possessions
- B. An FCC permit to allow a United States licensed amateur to operate his station in a foreign nation, except Canada
- C. An FCC permit allowing a foreign licensed amateur to handle traffic between the United States and the amateur's own nation, subject to the FCC rules on traffic-handling and third-party messages
- D. An FCC permit to a commercial telecommunications company allowing that company to pay amateurs to handle traffic during emergencies

4BA-2B.1 Who is eligible for an FCC ++++reciprocal permit for alien amateur licensee++++?

- A. Anyone holding a valid amateur operator/primary station license issued by a foreign government
- B. Anyone holding a valid amateur operator/primary station license issued by a foreign government with which the United States has a reciprocal operating agreement, providing that person is not a United States citizen
- C. Anyone who holds a valid amateur operator/primary station

license issued by a foreign government with which the United States has a reciprocal operating agreement

D. Anyone other than a United States citizen who holds a valid Amateur Radio or shortwave listeners license issued by a foreign government

4BA-2B.2 Under what circumstances, if any, is a US citizen holding a foreign Amateur Radio license eligible to obtain an FCC ++++Reciprocal Operating Permit++++?

A. A US Citizen is not eligible to obtain a Reciprocal Operating Permit for use in the United States

B. Only if the applicant brings his or her equipment with them from the foreign country

C. Only if that person is unable to qualify for a United States amateur license

D. If the applicant does not hold an FCC license as of the date of application, but had held a US amateur license other than Novice class less than 10 years before the date of application

4BA-2C.1 What are the operator frequency privileges authorized by an FCC ++++reciprocal permit for alien amateur licensee++++?

A. Those authorized to a holder of the equivalent United States amateur license, unless the FCC specifies otherwise by endorsement on the permit

B. Those that the holder of the reciprocal permit for alien amateur licensee would have if he were in his own country

C. Only those frequencies permitted to United States amateurs that the holder of the reciprocal permit for alien amateur licensee would have in his own country, unless the FCC specifies otherwise

D. Only those frequencies approved by the International Amateur Radio Union, unless the FCC specifies otherwise

4BA-2D.1 How does an alien operator identify an amateur station when operating under an FCC ++++reciprocal permit for alien amateur licensee++++?

A. By using only his or her own call

B. By using his or her own call, followed by the city and state in the United States or possessions closest to his or her present location

C. By using the letter(s) and number indicating the United States call-letter district of his or her location at the time of the contact, followed by a slant bar (or the word "stroke") and his or her own call. The city and state nearest the operating location must be specified once during each contact

D. By using his or her own call sign, followed by the serial number of the reciprocal permit for alien amateur licensee and the call-letter district number of his or her present location

4BA-3A.1 What is ++++RACES++++?

A. An Amateur Radio network for providing emergency communications during long-distance athletic contests

B. The radio amateur civil emergency service

C. The Radio Amateur Corps for Engineering Services

D. An Amateur Radio network providing emergency communications for transoceanic boat or aircraft races

4BA-3B.1 What is the purpose of ++++RACES++++?

- A. To provide civil-defense communications during emergencies
- B. To provide emergency communications for transoceanic boat or aircraft races
- C. To provide routine and emergency communications for long-distance athletic events
- D. To provide routine and emergency communications for large-scale international events, such as the Olympic games

4BA-3C.1 With what other organization must an amateur station be registered before ++++RACES++++ registration is permitted?

- A. The Amateur Radio Emergency Service
- B. The US Department of Defense
- C. A civil defense organization
- D. The Amateur Auxiliary to the FCC Field Operations Bureau

4BA-3D.1 Who may be the control operator of a ++++RACES++++ station?

- A. Anyone who holds a valid FCC amateur operator's license other than Novice
- B. Only an Amateur Extra class licensee
- C. Anyone who holds an FCC amateur operator/primary station license other than Novice and is certified by a civil defense organization
- D. Anyone who holds an FCC amateur operator/primary station license and is certified by a civil defense organization

4BA-3E.1 What additional operator privileges are granted to an Amateur Extra class operator registered with ++++RACES++++?

- A. None
- B. Permission to operate CW on 5167.5 kHz
- C. Permission to operate an unattended HF packet radio station
- D. Permission to operate on the 237-MHz civil defense band

4BA-3F.1 What frequencies are normally available for ++++RACES++++ operation?

- A. Only those frequencies authorized by the ARRL Section Emergency Coordinator
- B. Only those frequencies listed in Section 97.8
- C. Only transmitting frequencies in the top 25 kHz of each amateur band
- D. All frequencies available to the amateur service

4BA-3G.1 What type of emergency can cause a limitation on the frequencies available for ++++RACES++++ operation?

- A. An emergency in which the President invokes the War Emergency Powers under the provisions of the Communications Act of 1934
- B. RACES operations must be confined to a single frequency band if the emergency is contained within a single state
- C. RACES operations must be conducted on a VHF band if the emergency is confined to an area 25 miles or less in radius
- D. The Red Cross may limit available frequencies if the emergency involves no immediate danger of loss of life

4BA-3H.1 Which amateur stations may be operated in ++++RACES++++?

- A. Only Extra class amateur stations
- B. Any licensed amateur station except a station licensed to a

Novice

C. Any licensed amateur station certified by the responsible civil defense organization

D. Any licensed amateur station other than a station licensed to a Novice, providing the station is certified by the responsible civil defense organization

4BA-3H.2 What are the points of communications for amateur stations operated in ++++RACES++++ and certified by the responsible civil defense organization as registered with that organization?

A. RACES stations and certain other stations authorized by the responsible civil defense official

B. Any RACES stations and any FCC licensed amateur stations except stations licensed to Novices

C. Any FCC licensed amateur station or a station in the Disaster Communications Service

D. Any FCC licensed amateur station except stations licensed to Novices

4BA-3I.1 What are permissible communications in ++++RACES++++?

A. Any communications concerning local traffic nets

B. Any communications concerning the Amateur Radio Emergency Service

C. Any communications concerning national defense and security or immediate safety of people and property that are authorized by the area civil defense organization

D. Any communications concerning national defense or security or immediate safety of people or property but only when a state of emergency has been declared by the President, the governor, or other authorized official, and then only so long as the state of emergency endures

4BA-4A.1 What are the purposes of the Amateur Satellite Service?

A. It is a radionavigation service using stations on earth satellites for the same purposes as those of the amateur service

B. It is a radio communication service using stations on earth satellites for weather information

C. It is a radio communication service using stations on earth satellites for the same purpose as those of the amateur service

D. It is a radiolocation service using stations on earth satellites for amateur operators engaged in satellite radar experimentation

4BA-4B.1 What are some frequencies available for ++++space operation++++?

A. 7.0-7.1, 14.00-14.25, 21.00-21.45, 24.890-24.990, 28.00-29.70, 144-146, 435-438 and 24,000-24,050 MHz

B. 7.0-7.3, 21.00-21.45, 28.00-29.70, 144-146, 432-438 and 24,000-24,050 MHz

C. All frequencies available to the amateur service, providing license-class, power and emission-type restrictions are observed

D. Only frequencies available to Amateur Extra class licensees

4BA-4C-1.1 What is the term used to describe the operation of an amateur station which transmits communications used to initiate, modify or terminate the functions of a space station?

A. Space operation

B. Telecommand operation

- C. Earth operation
- D. Control operation

4BA-4C-2.1 Which amateur stations are eligible to be telecommand stations?

- A. Any Amateur Radio licensee except Novice
- B. Amateur Extra class licensees only
- C. Telecommand operation is not permitted in the amateur satellite service
- D. Any amateur station designated by the space station licensee

4BA-4D-1.1 What term describes the space-to-earth transmissions used to communicate the results of measurements made by a space station?

- A. Data transmission
- B. Frame check sequence
- C. Telemetry
- D. Telecommand operation

4BA-4E-1.1 What is the term used to describe the operation of an amateur station that is more than 50 km above the Earth's surface?

- A. EME operation
- B. Exospheric operation
- C. Downlink operation
- D. Space station operation

4BA-4E-2.1 Which amateur stations are eligible for +++++space operation++++?

- A. Any licensee except Novice
- B. General, Advanced and Extra class licensees only
- C. Advanced and Extra class licensees only
- D. Amateur Extra class licensees only

4BA-4E-4.1 When must the licensee of a station scheduled for space operation give the FCC written pre-space notification?

- A. Both 3 months and 72 hours prior to initiating space station transmissions
- B. Both 6 months and 3 months prior to initiating space station transmissions
- C. Both 12 months and 3 months prior to initiating space station transmissions
- D. Both 27 months and 5 months prior to initiating space station transmissions

4BA-4E-4.2 When must the licensee of a station in +++++space operation++++ give the FCC written in-space notification?

- A. No later than 24 hours following initiation of space operation
- B. No later than 72 hours following initiation of space operation
- C. No later than 7 days following initiation of space operation
- D. No later than 30 days following initiation of space operation

4BA-4E-4.3 When must the licensee of a station in ++++space operation++++ give the FCC written post-space notification?

- A. No later than 48 hours after termination is complete, under normal circumstances
- B. No later than 72 hours after termination is complete, under normal circumstances
- C. No later than 7 days after termination is complete, under normal circumstances
- D. No later than 3 months after termination is complete, under normal circumstances

4BA-4F-1.1 What term describes an amateur station located on, or within 50 km of, the earth's surface intended for communications with space stations?

- A. Earth station
- B. Telecommand station
- C. Repeater station
- D. Auxiliary station

4BA-4F-2.1 Which amateur licensees are eligible to operate an ++++earth station++++?

- A. Any amateur licensee
- B. Amateur Extra class licensees only
- C. Any station except those licensed to Novices
- D. A special license issued by the FCC is required before any amateur licensee may operate an earth station

4BA-5A.1 What is a Volunteer-Examiner Coordinator?

- A. An organization that volunteers to administer amateur license examinations to candidates for the Novice license
- B. An organization that volunteers to administer amateur license examinations for any class of license other than Novice
- C. An organization that has entered into an agreement with the FCC to coordinate efforts of Volunteer Examiners in preparing and administering examinations for Technician, General, Advanced and Amateur Extra class operator licenses
- D. An organization that has entered into an agreement with the FCC to coordinate efforts of Volunteer Examiners in preparing and administering examinations for Novice class amateur operator licenses

4BA-5B.1 What are some of the requirements to be a ++++VEC++++?

- A. Be engaged in the manufacture and/or sale of amateur equipment or in the coordination of amateur activities throughout at least one call letter district, and agree to abide by FCC Rules concerning administration of amateur license examinations
- B. Be an organization that exists for the purpose of furthering the amateur service; be at least regional in scope; agree to coordinate examinations for Technician, General, Advanced and Amateur Extra class operator licenses
- C. Be an organization that exists for the purpose of furthering the amateur service; be, at the most, county-wide in scope; and agree to coordinate examinations for all classes of amateur operator licenses
- D. Be engaged in a business related to Amateur Radio and agree to administer amateur license examinations in accordance with FCC Rules throughout at least one call letter district

4BA-5C.1 What are the functions of a ++++VEC++++?

A. Accredit Volunteer Examiners; collect candidates' application forms, answer sheets and test results and forward the applications to the FCC; maintain pools of questions for Amateur Radio examinations; and perform other clerical tasks in accordance with FCC Rules

B. Assemble, print and sell FCC-approved examination forms; accredit Volunteer Examiners; collect candidates' answer sheets and forward them to the FCC; screen applications for completeness and authenticity; and perform other clerical tasks in accordance with FCC Rules

C. Accredit Volunteer Examiners; certify that examiners' equipment is type-accepted by the FCC; assemble, print and distribute FCC-approved examination forms; and perform other clerical tasks in accordance with FCC Rules

D. Maintain pools of questions for Amateur Radio examinations; administer code and theory examinations; score and forward the test papers to the FCC so that the appropriate license may be issued to each successful candidate

4BA-5C.2 Where are the questions listed that must be used in written examinations?

- A. In the appropriate VEC question pool
- B. In PR Bulletin 1035C
- C. In PL 97-259
- D. In the appropriate FCC Report and Order

4BA-5C.3 How is an Element 3(A) examination prepared?

A. By General, Advanced, or Amateur Extra class Volunteer Examiners or a qualified supplier selecting questions from the appropriate VEC question pool

B. By Volunteer-Examiner Coordinators selecting questions from the appropriate FCC bulletin

C. By Extra class Volunteer Examiners selecting questions from the appropriate FCC bulletin

D. By the FCC selecting questions from the appropriate VEC question pool

4BA-5C.4 How is an Element 3(B) examination prepared?

A. By Advanced or Amateur Extra class Volunteer Examiners or a qualified supplier selecting questions from the appropriate VEC question pool

B. By Volunteer-Examiner Coordinators selecting questions from the appropriate FCC bulletin

C. By Extra class Volunteer Examiners selecting questions from the appropriate FCC bulletin

D. By the FCC selecting questions from the appropriate VEC question pool

4BA-5C.5 How is an Element 4(A) examination prepared?

A. By Extra class Volunteer Examiners or Volunteer-Examiner Coordinators selecting questions from the appropriate VEC question pool

B. By Volunteer-Examiner Coordinators selecting questions from the appropriate FCC bulletin

C. By Extra class Volunteer Examiners selecting questions from

the appropriate FCC bulletin

D. By the FCC selecting questions from the appropriate VEC question pool

4BA-5C.6 How is an Element 4(B) examination prepared?

A. By Extra class Volunteer Examiners or Volunteer-Examiner Coordinators selecting questions from the appropriate VEC question pool

B. By Volunteer-Examiner Coordinators selecting questions from the appropriate FCC bulletin

C. By Extra class Volunteer Examiners selecting questions from the appropriate FCC bulletin

D. By the FCC selecting questions from the appropriate VEC question pool

4BA-5D.1 What organization coordinates the dates and times for scheduling Amateur Radio examinations?

A. The FCC

B. A VEC

C. The IARU

D. Local radio clubs

4BA-5E.1 Under what circumstances, if any, may a VEC refuse to accredit a person as a VE on the basis of membership in an Amateur Radio organization?

A. Under no circumstances

B. Only when the prospective VE is an ARRL member

C. Only when the prospective VE is not a member of the local Amateur Radio club

D. Only when the club is at least regional in scope

4BA-5E.2 Under what circumstances, if any, may a VEC refuse to accredit a person as a VE on the basis of lack of membership in an Amateur Radio organization?

A. Under no circumstances

B. Only when the prospective VE is not an ARRL member

C. Only when the club is at least regional in scope

D. Only when the prospective VE is not a member of the local Amateur Radio club giving the examinations

4BA-5F.1 Under what circumstance, if any, may an organization engaged in the manufacture of equipment used in connection with Amateur Radio transmissions be a VEC?

A. Under no circumstances

B. If the organization's amateur-related sales are very small

C. If the organization is manufacturing very specialized amateur equipment

D. Only upon FCC approval that preventive measures have been taken to preclude any possible conflict of interest

4BA-5F.2 Under what circumstances, if any, may a person who is an employee of a company that is engaged in the distribution of equipment used in connection with Amateur Radio transmissions be a VE?

A. Under no circumstances

B. Only if the employee does not normally communicate with that part of the company engaged in the manufacture or



distribution of amateur equipment

C. Only if the employee has no financial interest in the company

D. Only if the employee is an Extra class licensee

4BA-5F.3 Under what circumstances, if any, may a person who owns a significant interest in a company that is engaged in the preparation of publications used in preparation for obtaining an amateur operator license be a VE?

A. Under no circumstances

B. Only if the organization's amateur-related sales are very small

C. Only if the organization is publishing very specialized material

D. Only if the person is an Extra class licensee

4BA-5F.4 Under what circumstances, if any, may an organization engaged in the distribution of publications used in preparation for obtaining an amateur operator license be a VEC?

A. Under no circumstances

B. Only if the organization's amateur publishing business is very small

C. Only if the organization is selling the publication at cost to examinees

D. Only upon FCC approval that preventive measures have been taken to preclude any possible conflict of interest

4BA-5G.1 Who may reimburse VEs and VECs for out-of-pocket expenses incurred in preparing, processing or administering examinations?

A. Examinees

B. FCC

C. ARRL

D. FCC and Examiners

4BA-5G.2 What action must a VEC take against a VE who accepts reimbursement and fails to provide the annual expense certification?

A. Suspend the VE's accreditation for 1 year

B. Disaccredit the VE

C. Suspend the VE's accreditation and report the information to the FCC

D. Suspend the VE's accreditation for 6 months

4BA-5G.3 What type of expense records must be maintained by a VE who accepts reimbursement?

A. All out-of-pocket expenses and reimbursements from the examinees

B. All out-of-pocket expenses only

C. Reimbursements from examiners only

D. FCC reimbursements only

4BA-5G.4 For what period of time must a VE maintain records of out-of-pocket expenses and reimbursements for each examination session for which reimbursement is accepted?

A. 1 year

B. 2 years

- C. 3 years
- D. 4 years

4BA-5G.5 By what date each year must a VE forward to the VEC a certification concerning expenses for which reimbursement was accepted?

- A. December 15 following the year for which the reimbursement was accepted
- B. January 15 following the year for which the reimbursement was accepted
- C. April 15 following the year for which the reimbursement was accepted
- D. October 15 following the year for which the reimbursement was accepted

4BA-5G.6 For what type of services may a VE be reimbursed for out-of-pocket expenses?

- A. Preparing, processing or administering examinations above the Novice class
- B. Preparing, processing or administering examinations including the Novice class
- C. A VE cannot be reimbursed for out-of-pocket expenses
- D. Only for preparation of examination elements

4BA-6A.1 What is an accredited Volunteer Examiner?

- A. A General class radio amateur who is accredited by a VEC to administer examinations to applicants for amateur operator/primary station licenses
- B. An amateur operator who is accredited by a VEC to administer examinations to applicants for amateur operator/primary station licenses
- C. An amateur operator who administers examinations to applicants for amateur operator/primary station licenses for a fee
- D. An FCC staff member who tests volunteers who want to administer amateur license examinations

4BA-6A.2 What is an accredited +++++VE++++?

- A. A General class radio amateur who is accredited by a VEC to administer examinations to applicants for amateur operator/primary station licenses
- B. An amateur operator who is accredited by a VEC to administer examinations to applicants for amateur operator/primary station licenses
- C. An amateur operator who administers examinations to applicants for amateur operator/primary station licenses for a fee
- D. An FCC staff member who tests volunteers who want to give amateur license examinations

4BA-6B.1 What are the requirements for a Volunteer Examiner administering an examination for a Technician class operator license?

- A. The Volunteer Examiner must be a Novice class licensee accredited by a Volunteer-Examiner Coordinator
- B. The Volunteer Examiner must be an Advanced or Extra class licensee accredited by a Volunteer-Examiner Coordinator

C. The Volunteer Examiner must be an Extra class licensee accredited by a Volunteer-Examiner Coordinator

D. The Volunteer Examiner must be a General class licensee accredited by a Volunteer-Examiner Coordinator

4BA-6B.2 What are the requirements for a Volunteer Examiner administering an examination for a General class operator license?

A. The examiner must hold an Advanced class license and be accredited by a VEC

B. The examiner must hold an Extra class license and be accredited by a VEC

C. The examiner must hold a General class license and be accredited by a VEC

D. The examiner must hold an Extra class license to administer the written test element, but an Advanced class examiner may administer the CW test element

4BA-6B.3 What are the requirements for a Volunteer Examiner administering an examination for an Advanced class operator license?

A. The examiner must hold an Advanced class license and be accredited by a VEC

B. The examiner must hold an Extra class license and be accredited by a VEC

C. The examiner must hold a General class license and be accredited by a VEC

D. The examiner must hold an Extra class license to administer the written test element, but an Advanced class examiner may administer the CW test element

4BA-6B.4 What are the requirements for a Volunteer Examiner administering an examination for an Amateur Extra class operator license?

A. The examiner must hold an Advanced class license and be accredited by a VEC

B. The examiner must hold an Extra class license and be accredited by a VEC

C. The examiner must hold a General class license and be accredited by a VEC

D. The examiner must hold an Extra class license to administer the written test element, but an Advanced class examiner may administer the CW test element

4BA-6B.5 When is ++++VE++++ accreditation necessary?

A. Always in order to administer a Technician or higher class license examination

B. Always in order to administer a Novice or higher class license examination

C. Sometimes in order to administer an Advanced or higher class license examination

D. VE accreditation is not necessary in order to administer a General or higher class license examination

4BA-6C.1 What is ++++VE++++ accreditation?

A. The process by which all Advanced and Extra class licensees are automatically given permission to conduct Amateur Radio

examinations

- B. The process by which the FCC tests volunteers who wish to coordinate amateur operator/primary station license examinations
- C. The process by which the prospective VE requests his or her requirements for accreditation
- D. The process by which each VEC makes sure its VEs meet FCC requirements to serve as Volunteer Examiners

4BA-6C.2 What are the requirements for ++++VE+++ accreditation?

- A. Hold an Advanced class license or higher; be at least 18 years old; not have any conflict of interest; and never had his or her amateur license suspended or revoked
- B. Hold an Advanced class license or higher; be at least 16 years old; and not have any conflict of interest
- C. Hold an Extra class license or higher; be at least 18 years old; and be a member of ARRL
- D. There are no requirements for accreditation, other than holding a General or higher class license

4BA-6C.3 The services of which persons seeking to be VEs will not be accepted by the FCC?

- A. Persons with Advanced class licenses
- B. Persons being between 18 and 21 years of age
- C. Persons who have ever had their amateur licenses suspended or revoked
- D. Persons who are employees of the Federal Government

4BA-6D.1 Under what circumstances, if any, may a person be compensated for services as a VE?

- A. When the VE spends more than 4 hours at the test session
- B. When the VE loses a day's pay to administer the exam
- C. When the VE spends many hours preparing for the test session
- D. Under no circumstances

4BA-6D.2 How much money, if any, may a person accept for services as a VE?

- A. None
- B. Up to a half day's pay if the VE spends more than 4 hours at the test session
- C. Up to a full day's pay if the VE spends more than 4 hours preparing for the test session
- D. Up to 50 if the VE spends more than 4 hours at the test session

4BA-7A-1.1 What is an ++++Element 1(A)+++ examination intended to prove?

- A. The applicant's ability to send and receive Morse code at 5 WPM
- B. The applicant's ability to send and receive Morse code at 13 WPM
- C. The applicant's knowledge of Novice class theory and regulations
- D. The applicant's ability to send and receive Morse code at 20 WPM

4BA-7A-1.2 What is an ++++Element 1(B)+++ examination intended to prove?

- A. The applicant's knowledge of Novice class theory and

regulations

B. The applicant's knowledge of General class theory and regulations

C. The applicant's ability to send and receive Morse code at 5 WPM

D. The applicant's ability to send and receive Morse code at 13 WPM

4BA-7A-1.3 What is an ++++Element 1(C)++++ examination intended to prove?

A. The applicant's ability to send and receive Morse code at 20 WPM

B. The applicant's knowledge of Amateur Extra class theory and regulations

C. The applicant's ability to send and receive Morse code at 13 WPM

D. The applicant's ability to send and receive Morse code at 5 WPM

4BA-7A-1.4 What is ++++Examination Element 2++++?

A. The 5-WPM amateur Morse code examination

B. The 13-WPM amateur Morse code examination

C. The written examination for the Novice operator license

D. The written examination for the Technician operator license

4BA-7A-1.5 What is ++++Examination Element 3(A) ++++?

A. The 5-WPM amateur Morse code examination

B. The 13-WPM amateur Morse code examination

C. The written examination for the Technician class operator license

D. The written examination for the General class operator license

4BA-7A-1.6 What is ++++Examination Element 3(B)++++?

A. The 5-WPM amateur Morse code examination

B. The 13-WPM amateur Morse code examination

C. The written examination for the Technician class operator license

D. The written examination for the General class operator license

4BA-7A-1.7 What is ++++Examination Element 4(A)++++?

A. The written examination for the Technician class operator license

B. The 20-WPM amateur Morse code examination

C. The written examination for the Advanced class operator license

D. The written examination for the Amateur Extra class operator license

4BA-7A-1.8 What is ++++Examination Element 4(B)++++?

A. The written examination for the Technician class operator license

B. The 20-WPM amateur Morse code examination

C. The written examination for the Advanced class operator license

D. The written examination for the Amateur Extra class operator license

4BA-7A-2.1 Who must prepare ++++Examination Element 1(B)++++?

- A. Amateur Extra class licensees serving as Volunteer Examiners, or a qualified supplier
- B. Advanced class licensees serving as Volunteer Examiners, or Volunteer-Examiner Coordinators
- C. The FCC
- D. The Field Operations Bureau

4BA-7A-2.2 Who must prepare ++++Examination Element 1(C)++++?

- A. The FCC
- B. The Field Operations Bureau
- C. Advanced class licensees serving as Volunteer Examiners, or Volunteer-Examiner Coordinators
- D. Amateur Extra class licensees serving as Volunteer Examiners, or a qualified supplier

4BA-7A-2.3 Who must prepare ++++Examination Element 3(A)++++?

- A. General, Advanced, or Amateur Extra class licensees serving as Volunteer Examiners, or a qualified supplier
- B. The FCC
- C. The Field Operations Bureau
- D. Advanced or General class licensees serving as Volunteer Examiners, or Volunteer-Examiner Coordinators

4BA-7A-2.4 Who must prepare ++++Examination Element 3(B)++++?

- A. Advanced or Amateur Extra class licensees serving as Volunteer Examiners, or a qualified supplier
- B. The FCC
- C. The Field Operations Bureau
- D. Advanced or General class licensees serving as Volunteer Examiners, or Volunteer-Examiner Coordinators

4BA-7A-2.5 Who must prepare ++++Examination Element 4(A)++++?

- A. Advanced or Extra class licensees serving as Volunteer Examiners, or Volunteer-Examiner Coordinators
- B. The FCC
- C. The Field Operations Bureau
- D. Amateur Extra class licensees serving as Volunteer Examiners, or a qualified supplier

4BA-7A-2.6 Who must prepare ++++Examination Element 4(B)++++?

- A. Advanced or Extra class licensees serving as Volunteer Examiners, or Volunteer-Examiner Coordinators
- B. The FCC
- C. The Field Operations Bureau
- D. Amateur Extra class licensees serving as Volunteer Examiners, or a qualified supplier

4BA-7B.1 What examination elements are required for an Amateur Extra class operator license?

- A. 1(C) and 4(B)
- B. 3(B), 4(A) and 4(B)
- C. 1(B), 2, 3(A), 3(B), 4(A) and 4(B)
- D. 1(C), 2, 3(A), 3(B), 4(A) and 4(B)

4BA-7B.2 What examination elements are required for an Advanced

class operator license?

- A. 1(A), 2, 3(A), 3(B) and 4(A)
- B. 1(B), 3(A) and 3(B)
- C. 1(B) and 4(A)
- D. 1(B), 2, 3(A), 3(B) and 4(A)

4BA-7B.3 What examination elements are required for a General class operator license?

- A. 1(B), 2, 3(A) and 3(B)
- B. 1(A), 2, 3(A) and 3(B)
- C. 1(A), 3(A) and 3(B)
- D. 1(B), 3(A) and 3(B)

4BA-7B.4 (This question has been withdrawn.)

What examination elements are required for a Technician class operator license?

- A. 1(A) and 2B
- B. 1(A) and 3(A)
- C. 1(A), 2 and 3(A)
- D. 2 and 3(A)

4BA-7C.1 What examination credit must be given to an applicant who holds a valid Novice class operator license?

- A. Credit for successful completion of elements 1(A) and 2
- B. Credit for successful completion of elements 1(B) and 3(A)
- C. Credit for successful completion of elements 1(B) and 2
- D. Credit for successful completion of elements 1(A) and 3(A)

4BA-7C.2 (This question has been withdrawn.)

What examination credit must be given to an applicant who holds a valid Technician class operator license ++++issued after March 20, 1987++++?

- A. Credit for successful completion of elements 1(A) and 2
- B. Credit for successful completion of elements 1(A), 2 and 3(A)
- C. Credit for successful completion of elements 1(B), 2 and 3(A)
- D. Credit for successful completion of elements 1(B), 3(A) and 3(B)

4BA-7C.3 What examination credit must be given to an applicant who holds a valid Technician class operator license ++++issued before March 21, 1987++++?

- A. Credit for successful completion of elements 1(A), 2 and 3(B)
- B. Credit for successful completion of elements 1(A), 2, 3(A) and 3(B)
- C. Credit for successful completion of elements 1(B), 2, 3(A) and 4(A)
- D. Credit for successful completion of elements 1(B), 3(A) and 3(B)

4BA-7C.4 What examination credit must be given to an applicant who holds a valid General class operator license?

- A. Credit for successful completion of elements 1(B), 2, 3(A), 3(B) and 4(A)
- B. Credit for successful completion of elements 1(A), 3(A),

3(B) and 4(A)

C. Credit for successful completion of elements 1(A), 2, 3(A), 3(B) and 4(B)

D. Credit for successful completion of elements 1(B), 2, 3(A) and 3(B)

4BA-7C.5 What examination credit must be given to an applicant who holds a valid Advanced class operator license?

A. Credit for successful completion of element 4(A)

B. Credit for successful completion of elements 1(B) and 4(A)

C. Credit for successful completion of elements 1(B), 2, 3(A), 3(B) and 4(A)

D. Credit for successful completion of elements 1(C), 3(A), 3(B), 4(A) and 4(B)

4BA-7C.6 What examination credit, if any, may be given to an applicant who holds a valid amateur operator license issued by another country?

A. Credit for successful completion of any elements that may be identical to those required for U.S. licensees

B. No credit

C. Credit for successful completion of elements 1(A), 1(B) and 1(C)

D. Credit for successful completion of elements 2, 3(A), 3(B), 4(A) and 4(B)

4BA-7C.7 What examination credit, if any, may be given to an applicant who holds a valid amateur operator license issued by any other United States government agency than the FCC?

A. No credit

B. Credit for successful completion of elements 1(A), 1(B) or 1(C)

C. Credit for successful completion of elements 4(A) and 4(B)

D. Credit for successful completion of element 1(C)

4BA-7C.8 What examination credit must be given to an applicant who holds an unexpired (or expired less than five years) FCC-issued commercial radiotelegraph operator license or permit?

A. No credit

B. Credit for successful completion of element 1(B) only

C. Credit for successful completion of elements 1(A), 1(B) or 1(C)

D. Credit for successful completion of element 1(A) only

4BA-7C.9 What examination credit must be given to the holder of a valid Certificate of Successful Completion of Examination?

A. Credit for previously completed written examination elements only

B. Credit for the code speed associated with the previously completed telegraphy examination elements only

C. Credit for previously completed written and telegraphy examination elements only

D. Credit for previously completed commercial examination elements only

4BA-7D.1 Who determines where and when examinations for amateur operator licenses are to be administered?



- A. The FCC
- B. The Section Manager
- C. The applicants
- D. The administering Volunteer Examiner Team

4BA-7D.2 Where must the examiners be and what must they be doing during an examination?

- A. The examiners must be present and observing the candidate(s) throughout the entire examination
- B. The examiners must be absent to allow the candidate(s) to complete the entire examination in accordance with the traditional honor system
- C. The examiners must be present to observe the candidate(s) throughout the administration of telegraphy examination elements only
- D. The examiners must be present to observe the candidate(s) throughout the administration of written examination elements only

4BA-7D.3 Who is responsible for the proper conduct and necessary supervision during an examination?

- A. The VEC
- B. The FCC
- C. The administering Volunteer Examiners
- D. The candidates and the administering Volunteer Examiners

4BA-7D.4 What should an examiner do when a candidate fails to comply with the examiner's instructions?

- A. Warn the candidate that continued failure to comply with the examiner's instructions will result in termination of the examination
- B. Immediately terminate the examination
- C. Allow the candidate to complete the examination, but refuse to issue a certificate of successful completion of examination for any elements passed by fraudulent means
- D. Immediately terminate the examination and report the violation to federal law enforcement officials

4BA-7D.5 What will the administering VEs require an examinee to do upon completion of an examination element?

- A. Complete a brief written evaluation of the session
- B. Return all test papers to the examiners
- C. Return all test papers to the VEC
- D. Pay the registration fee

4BA-7E.1 When must the test papers be graded?

- A. Within 5 days of completion of an examination element
- B. Within 30 days of completion of an examination element
- C. Immediately upon completion of an examination element
- D. Within ten days of completion of an examination element

4BA-7E.2 Who must grade the test papers?

- A. The ARRL
- B. The administering Volunteer Examiners
- C. The Volunteer-Examiner Coordinator
- D. The FCC

4BA-7E.3 How do the examiners inform a candidate who does not score a passing grade?

- A. Return the application to the examinee and inform the examinee of the grade
- B. Give the percentage of the questions answered incorrectly and return the application to the candidate
- C. Tell the candidate that he or she failed and return the application to the candidate
- D. Show how the incorrect answers should have been answered and give a copy of the corrected answer sheet to the candidate

4BA-7E.4 What must the examiners do when the candidate scores a passing grade on all examination elements needed for an upgrade?

- A. Give the percentage of the questions answered correctly and return the application to the candidate
- B. Tell the candidate that he or she passed
- C. Issue the candidate an operator license
- D. Certify on the examinee's application form that the applicant is qualified for the license and report the basis for the qualification

4BA-7E.5 Within what time limit after administering an exam must the examiners submit the applications and test papers from successful candidates to the VEC?

- A. Within 10 days
- B. Within 15 days
- C. Within 30 days
- D. Within 90 days

4BA-7E.6 To whom do the examiners submit successful candidates' applications and test papers?

- A. To the candidate
- B. To the coordinating VEC
- C. To the local radio club
- D. To the regional Section Manager

4BA-7F.1 When an applicant passes an examination to upgrade his or her operator license, under what authority may he or she be the control operator of an amateur station with the privileges of the higher operator class?

- A. That of the Certificate of Successful Completion of Examination issued by the VE Team that administered the examination
- B. That of the ARRL
- C. Applicants already licensed in the amateur service may not use their newly earned privileges until they receive their permanent amateur station and operator licenses
- D. Applicants may only use their newly earned privileges during emergencies pending issuance of their permanent amateur station and operator licenses

4BA-7F.2 What is a ++++Certificate of Successful Completion of Examination++++?

- A. A document printed by the FCC
- B. A document required for already licensed applicants operating with privileges of an amateur operator class higher than that of their permanent amateur operator licenses

C. A document a candidate may use for an indefinite period of time to receive credit for successful completion of any written element

D. A permanent amateur station and operator license certificate issued to a newly-upgraded licensee by the FCC within 90 days of the completion of the examination

4BA-7F.3 How long may a successful candidate operate a station under authority of a Certificate of Successful Completion of Examination with the rights and privileges of the higher operator class for which the applicant has passed the appropriate examinations?

A. 30 days or until issuance of a permanent operator and station license, whichever comes first

B. 3 months or until issuance of the permanent operator and station license, whichever comes first

C. 6 months or until issuance of the permanent operator and station license, whichever comes first

D. 365 days or until issuance of the permanent operator and station license, whichever comes first

4BA-7F.4 How must the station call sign be amended when operating under the temporary authority of a Certificate of Successful Completion of Examination?

A. The applicant must use an identifier code as a prefix to his or her present call sign, e.g., when using voice; "interim AE KA1MJJP"

B. The applicant must use an identifier code as a suffix to his or her present call sign, e.g., when using voice; "KA1MJJP temporary AE"

C. By adding after the call sign, when using voice, the phrase "operating temporary Technician, General, Advanced or Extra"

D. By adding to the call sign, when using CW, the slant bar followed by the letters T, G, A or E

4BB-1A.1 What is an +++ascending pass+++ for an amateur satellite?

A. A pass from west to east

B. A pass from east to west

C. A pass from south to north

D. A pass from north to south

4BB-1A.2 What is a +++descending pass+++ for an amateur satellite?

A. A pass from north to south

B. A pass from west to east

C. A pass from east to west

D. A pass from south to north

4BB-1A.3 What is the +++period+++ of an amateur satellite?

A. An orbital arc that extends from 60 degrees west longitude to 145 degrees west longitude

B. The point on an orbit where satellite height is minimum

C. The amount of time it takes for a satellite to complete one orbit

D. The time it takes a satellite to travel from perigee to apogee

4BB-1B.1 What is +++Mode A+++ in an amateur satellite?

- A. Operation through a 10-meter receiver on a satellite that retransmits on 2 meters
- B. The lowest frequency used in Phase 3 transponders
- C. The highest frequency used in Phase 3 translators
- D. Operation through a 2-meter receiver on a satellite that retransmits on 10 meters

4BB-1B.2 What is ++++Mode B++++ in an amateur satellite?

- A. Operation through a 10-meter receiver on a satellite that retransmits on 2 meters
- B. Operation through a 70-centimeter receiver on a satellite that retransmits on 2 meters
- C. The beacon output
- D. A codestore device used to record messages

4BB-1B.3 What is ++++Mode J++++ in an amateur satellite?

- A. Operation through a 70-centimeter receiver on a satellite that retransmits on 2 meters
- B. Operation through a 2-meter receiver on a satellite that retransmits on 70 centimeters
- C. Operation through a 2-meter receiver on a satellite that retransmits on 10 meters
- D. Operation through a 70-centimeter receiver on a satellite that retransmits on 10 meters

4BB-1B.4 What is ++++Mode L++++ in an amateur satellite?

- A. Operation through a 70-centimeter receiver on a satellite that retransmits on 10 meters
- B. Operation through a 23-centimeter receiver on a satellite that retransmits on 70 centimeters
- C. Operation through a 70-centimeter receiver on a satellite that retransmits on 23 centimeters
- D. Operation through a 10-meter receiver on a satellite that retransmits on 70 centimeters

4BB-1C.1 What is a ++++linear transponder++++?

- A. A repeater that passes only linear or CW signals
- B. A device that receives and retransmits signals of any mode in a certain passband
- C. An amplifier for SSB transmissions
- D. A device used to change FM to SSB

4BB-1C.2 What are the two basic types of ++++linear transponders++++ used in amateur satellites?

- A. Inverting and noninverting
- B. Geostationary and elliptical
- C. Phase 2 and Phase 3
- D. Amplitude modulated and frequency modulated

4BB-1D.1 Why does the downlink frequency appear to vary by several kHz during a low-earth-orbit amateur satellite pass?

- A. The distance between the satellite and ground station is changing, causing the Kepler effect
- B. The distance between the satellite and ground station is changing, causing the Bernoulli effect
- C. The distance between the satellite and ground station is changing, causing the Boyles' law effect

D. The distance between the satellite and ground station is changing, causing the Doppler effect

4BB-1D.2 Why does the received signal from a Phase III amateur satellite exhibit a fairly rapid pulsed fading effect?

- A. Because the satellite is rotating
- B. Because of ionospheric absorption
- C. Because of the satellite's low orbital altitude
- D. Because of the Doppler effect

4BB-1D.3 What type of antenna can be used to minimize the effects of +++spin modulation+++ and +++Faraday rotation+++?

- A. A nonpolarized antenna
- B. A circularly polarized antenna
- C. An isotropic antenna
- D. A log-periodic dipole array

4BB-2A.1 How often is a new frame transmitted in a fast-scan television system?

- A. 30 times per second
- B. 60 times per second
- C. 90 times per second
- D. 120 times per second

4BB-2A.2 How many horizontal lines make up a fast-scan television frame?

- A. 30
- B. 60
- C. 525
- D. 1050

4BB-2A.3 How is the interlace scanning pattern generated in a fast-scan television system?

- A. By scanning the field from top to bottom
- B. By scanning the field from bottom to top
- C. By scanning even numbered lines in one field and odd numbered ones in the next
- D. By scanning from left to right in one field and right to left in the next

4BB-2A.4 What is +++blanking+++ in a video signal?

- A. Synchronization of the horizontal and vertical sync-pulses
- B. Turning off the scanning beam while it is traveling from right to left and from bottom to top
- C. Turning off the scanning beam at the conclusion of a transmission
- D. Transmitting a black and white test pattern

4BB-2A.5 What is the standard video voltage level between the sync tip and the whitest white at TV camera outputs and modulator inputs?

- A. 1 volt peak-to-peak
- B. 120 IEEE units
- C. 12 volts DC
- D. 5 volts RMS

4BB-2A.6 What is the bandwidth of a fast-scan television

transmission?

- A. 3 kHz
- B. 10 kHz
- C. 25 kHz
- D. 6 MHz

4BB-2A.7 What is the standard video level, in percent PEV, for black?

- A. 0%
- B. 12.5%
- C. 70%
- D. 100%

4BB-2A.8 What is the standard video level, in percent PEV, for white?

- A. 0%
- B. 12.5%
- C. 70%
- D. 100%

4BB-2A.9 What is the standard video level, in percent PEV, for blanking?

- A. 0%
- B. 12.5%
- C. 75%
- D. 100%

4BC-1.1 What is the maximum separation between two stations communicating by +++moonbounce+++?

- A. 500 miles maximum, if the moon is at perigee
- B. 2,000 miles maximum, if the moon is at apogee
- C. 5,000 miles maximum, if the moon is at perigee
- D. Any distance as long as the stations have a mutual lunar window

4BC-1.2 What characterizes +++libration fading+++ of an EME signal?

- A. A slow change in the pitch of the CW signal
- B. A fluttery, rapid irregular fading
- C. A gradual loss of signal as the sun rises
- D. The returning echo is several hertz lower in frequency than the transmitted signal

4BC-1.3 What are the best days to schedule EME contacts?

- A. When the moon is at perigee
- B. When the moon is full
- C. When the moon is at apogee
- D. When the weather at both stations is clear

4BC-1.4 What type of receiving system is required for EME communications?

- A. Equipment capable of reception on 14 MHz
- B. Equipment with very low dynamic range
- C. Equipment with very low gain
- D. Equipment with very low noise figures

4BC-1.5 What type of transmitting system is required for EME communications?

- A. A transmitting system capable of operation on the 21 MHz band
- B. A transmitting system capable of producing a very high EIRP
- C. A transmitting system using an unmodulated carrier
- D. A transmitting system with a high second harmonic output

4BC-2.1 When the earth's atmosphere is struck by a meteor, a cylindrical region of free electrons is formed at what layer of the ionosphere?

- A. The F1 layer
- B. The E layer
- C. The F2 layer
- D. The D layer

4BC-2.2 Which range of frequencies is well suited for ++++meteor-scatter++++ communications?

- A. 1.8 - 1.9 MHz
- B. 10 - 14 MHz
- C. 28 - 148 MHz
- D. 220 - 450 MHz

4BC-3.1 What is ++++transequatorial propagation++++?

- A. Propagation between two points at approximately the same distance north and south of the magnetic equator
- B. Propagation between two points on the magnetic equator
- C. Propagation between two continents by way of ducts along the magnetic equator
- D. Propagation between any two stations at the same latitude

4BC-3.2 What is the maximum range for signals using ++++transequatorial propagation++++?

- A. About 1,000 miles
- B. About 2,500 miles
- C. About 5,000 miles
- D. About 7,500 miles

4BC-3.3 What is the best time of day for ++++transequatorial propagation++++?

- A. Morning
- B. Noon
- C. Afternoon or early evening
- D. Transequatorial propagation only works at night

4BC-4.1 If a beam antenna must be pointed in a direction 180 degrees away from a station to receive the strongest signals, what type of propagation is probably occurring?

- A. Transequatorial propagation
- B. Sporadic-E propagation
- C. Long-path propagation
- D. Auroral propagation

4BC-5.1 What is the name for a type of propagation in which radio signals travel along the ++++terminator++++, which separates daylight from darkness?

- A. Transequatorial propagation
- B. Sporadic-E propagation
- C. Long-path propagation

D. Gray-line propagation

4BD-1A.1 How does a ++++spectrum analyzer++++ differ from a conventional time-domain oscilloscope?

A. The oscilloscope is used to display electrical signals while the spectrum analyzer is used to measure ionospheric reflection

B. The oscilloscope is used to display electrical signals in the frequency domain while the spectrum analyzer is used to display electrical signals in the time domain

C. The oscilloscope is used to display electrical signals in the time domain while the spectrum analyzer is used to display electrical signals in the frequency domain

D. The oscilloscope is used for displaying audio frequencies and the spectrum analyzer is used for displaying radio frequencies

4BD-1A.2 What does the horizontal axis of a ++++spectrum analyzer++++ display?

A. Amplitude

B. Voltage

C. Resonance

D. Frequency

4BD-1A.3 What does the vertical axis of a ++++spectrum analyzer++++ display?

A. Amplitude

B. Duration

C. Frequency

D. Time

4BD-1B.1 What test instrument can be used to display spurious signals in the output of a radio transmitter?

A. A spectrum analyzer

B. A wattmeter

C. A logic analyzer

D. A time-domain reflectometer

4BD-1B.2 What test instrument is used to display intermodulation distortion products from an SSB transmitter?

A. A wattmeter

B. A spectrum analyzer

C. A logic analyzer

D. A time-domain reflectometer

4BD-2A.1 What advantage does a ++++logic probe++++ have over a voltmeter for monitoring logic states in a circuit?

A. A logic probe has fewer leads to connect to a circuit than a voltmeter

B. A logic probe can be used to test analog and digital circuits

C. A logic probe can be powered by commercial AC lines

D. A logic probe is smaller and shows a simplified readout

4BD-2A.2 What piece of test equipment can be used to directly indicate high and low logic states?

A. A galvanometer



- B. An electroscopescope
- C. A logic probe
- D. A Wheatstone bridge

4BD-2A.3 What is a logic probe used to indicate?

- A. A short-circuit fault in a digital-logic circuit
- B. An open-circuit failure in a digital-logic circuit
- C. A high-impedance ground loop
- D. High and low logic states in a digital-logic circuit

4BD-2B.1 What piece of test equipment besides an oscilloscope can be used to indicate pulse conditions in a digital-logic circuit?

- A. A logic probe
- B. A galvanometer
- C. An electroscopescope
- D. A Wheatstone bridge

4BD-3A.1 What is one of the most significant problems you might encounter when you try to receive signals with a mobile station?

- A. Ignition noise
- B. Doppler shift
- C. Radar interference
- D. Mechanical vibrations

4BD-3A.2 What is the proper procedure for suppressing electrical noise in a mobile station?

- A. Apply shielding and filtering where necessary
- B. Insulate all plane sheet metal surfaces from each other
- C. Apply antistatic spray liberally to all non-metallic surfaces
- D. Install filter capacitors in series with all DC wiring

4BD-3A.3 How can ferrite beads be used to suppress ignition noise?

- A. Install them in the resistive high voltage cable every 2 years
- B. Install them between the starter solenoid and the starter motor
- C. Install them in the primary and secondary ignition leads
- D. Install them in the antenna lead to the radio

4BD-3A.4 How can ensuring good electrical contact between connecting metal surfaces in a vehicle reduce spark plug noise?

- A. It reduces the spark gap distance, causing a lower frequency spark
- B. It helps radiate the spark plug noise away from the vehicle
- C. It reduces static buildup on the vehicle body
- D. It encourages lower frequency electrical resonances in the vehicle

4BD-3B.1 How can +++++alternator whine+++++ be minimized?

- A. By connecting the radio's power leads to the battery by the longest possible path
- B. By connecting the radio's power leads to the battery by the shortest possible path
- C. By installing a high pass filter in series with the radio's DC power lead to the vehicle's electrical system

D. By installing filter capacitors in series with the DC power lead

4BD-3B.2 How can conducted and radiated noise caused by an automobile alternator be suppressed?

A. By installing filter capacitors in series with the DC power lead and by installing a blocking capacitor in the field lead

B. By connecting the radio's power leads to the battery by the longest possible path and by installing a blocking capacitor in series with the positive lead

C. By installing a high pass filter in series with the radio's power lead to the vehicle's electrical system and by installing a low-pass filter in parallel with the field lead

D. By connecting the radio's power leads directly to the battery and by installing coaxial capacitors in the alternator leads

4BD-3C.1 What is a major cause of atmospheric static?

A. Sunspots

B. Thunderstorms

C. Airplanes

D. Meteor showers

4BD-3D.1 How can you determine if a line-noise interference problem is being generated within your home?

A. Check the power-line voltage with a time-domain reflectometer

B. Observe the AC waveform on an oscilloscope

C. Turn off the main circuit breaker and listen on a battery-operated radio

D. Observe the power-line voltage on a spectrum analyzer

4BD-4.1 What is the main drawback of a wire-loop antenna for direction finding?

A. It has a bidirectional pattern broadside to the loop

B. It is non-rotatable

C. It receives equally well in all directions

D. It is practical for use only on VHF bands

4BD-4.2 What directional pattern is desirable for a direction-finding antenna?

A. A non-cardioid pattern

B. Good front-to-back and front-to-side ratios

C. Good top-to-bottom and front-to-side ratios

D. Shallow nulls

4BD-4.3 What is the ++++triangulation method++++ of direction finding?

A. Using the geometric angle of ground waves and sky waves emanating from the same source to locate the signal source

B. A fixed receiving station uses three beam headings to plot the signal source on a map

C. Beam headings from several receiving locations are used to plot the signal source on a map

D. The use of three vertical antennas to indicate the location of the signal source

4BD-4.4 Why is an RF attenuator desirable in a receiver used for

direction finding?

- A. It narrows the bandwidth of the received signal
- B. It eliminates the effects of isotropic radiation
- C. It reduces loss of received signals caused by antenna pattern nulls
- D. It prevents receiver overload from extremely strong signals

4BD-4.5 What is a +sense antenna+?

- A. A vertical antenna added to a loop antenna to produce a cardioid reception pattern
- B. A horizontal antenna added to a loop antenna to produce a cardioid reception pattern
- C. A vertical antenna added to an Adcock antenna to produce an omnidirectional reception pattern
- D. A horizontal antenna added to an Adcock antenna to produce a cardioid reception pattern

4BD-4.6 What type of antenna is most useful for sky-wave reception in radio direction finding?

- A. A log-periodic dipole array
- B. An isotropic antenna
- C. A circularly polarized antenna
- D. An Adcock antenna

4BD-4.7 What is a +loop antenna+?

- A. A circularly polarized antenna
- B. A coil of wire used as an antenna in FM broadcast receivers
- C. A wire loop used in radio direction finding
- D. An antenna coupled to the feed line through an inductive loop of wire

4BD-4.8 How can the output voltage of a loop antenna be increased?

- A. By reducing the permeability of the loop shield
- B. By increasing the number of wire turns in the loop while reducing the area of the loop structure
- C. By reducing either the number of wire turns in the loop, or the area of the loop structure
- D. By increasing either the number of wire turns in the loop, or the area of the loop structure

4BD-4.9 Why is an antenna system with a cardioid pattern desirable for a direction-finding system?

- A. The broad side responses of the cardioid pattern can be aimed at the desired station
- B. The deep null of the cardioid pattern can pinpoint the direction of the desired station
- C. The sharp peak response of the cardioid pattern can pinpoint the direction of the desired station
- D. The high radiation angle of the cardioid pattern is useful for short-distance direction finding

4BD-4.10 What type of terrain can cause errors in direction finding?

- A. Homogeneous terrain
- B. Smooth grassy terrain
- C. Varied terrain

D. Terrain with no buildings or mountains

4BE-1.1 What is the ++++photoconductive effect++++?

- A. The conversion of photon energy to electromotive energy
- B. The increased conductivity of an illuminated semiconductor junction
- C. The conversion of electromotive energy to photon energy
- D. The decreased conductivity of an illuminated semiconductor junction

4BE-1.2 What happens to photoconductive material when light shines on it?

- A. The conductivity of the material increases
- B. The conductivity of the material decreases
- C. The conductivity of the material stays the same
- D. The conductivity of the material becomes temperature dependent

4BE-1.3 What happens to the resistance of a photoconductive material when light shines on it?

- A. It increases
- B. It becomes temperature dependent
- C. It stays the same
- D. It decreases

4BE-1.4 What happens to the conductivity of a semiconductor junction when it is illuminated?

- A. It stays the same
- B. It becomes temperature dependent
- C. It increases
- D. It decreases

4BE-1.5 What is an ++++optocoupler++++?

- A. A resistor and a capacitor
- B. A frequency modulated helium-neon laser
- C. An amplitude modulated helium-neon laser
- D. An LED and a phototransistor

4BE-1.6 What is an ++++optoisolator++++?

- A. An LED and a phototransistor
- B. A P-N junction that develops an excess positive charge when exposed to light
- C. An LED and a capacitor
- D. An LED and a solar cell

4BE-1.7 What is an ++++optical shaft encoder++++?

- A. An array of optocouplers chopped by a stationary wheel
- B. An array of optocouplers whose light transmission path is controlled by a rotating wheel
- C. An array of optocouplers whose propagation velocity is controlled by a stationary wheel
- D. An array of optocouplers whose propagation velocity is controlled by a rotating wheel

4BE-1.8 What does the ++++photoconductive effect++++ in crystalline solids produce a noticeable change in?

- A. The capacitance of the solid

- B. The inductance of the solid
- C. The specific gravity of the solid
- D. The resistance of the solid

4BE-2A.1 What is the meaning of the term ++++time constant++++ of an RC circuit?

- A. The time required to charge the capacitor in the circuit to 36.8% of the supply voltage
- B. The time required to charge the capacitor in the circuit to 36.8% of the supply current
- C. The time required to charge the capacitor in the circuit to 63.2% of the supply current
- D. The time required to charge the capacitor in the circuit to 63.2% of the supply voltage

4BE-2A.2 What is the meaning of the term ++++time constant++++ of an RL circuit?

- A. The time required for the current in the circuit to build up to 36.8% of the maximum value
- B. The time required for the voltage in the circuit to build up to 63.2% of the maximum value
- C. The time required for the current in the circuit to build up to 63.2% of the maximum value
- D. The time required for the voltage in the circuit to build up to 36.8% of the maximum value

4BE-2A.3 What is the term for the time required for the capacitor in an RC circuit to be charged to 63.2% of the supply voltage?

- A. An exponential rate of one
- B. One time constant
- C. One exponential period
- D. A time factor of one

4BE-2A.4 What is the term for the time required for the current in an RL circuit to build up to 63.2% of the maximum value?

- A. One time constant
- B. An exponential period of one
- C. A time factor of one
- D. One exponential rate

4BE-2A.5 What is the term for the time it takes for a charged capacitor in an RC circuit to discharge to 36.8% of its initial value of stored charge?

- A. One discharge period
- B. An exponential discharge rate of one
- C. A discharge factor of one
- D. One time constant

4BE-2A.6 What is meant by ++++back EMF++++?

- A. A current equal to the applied EMF
- B. An opposing EMF equal to  $R$  times  $C$  ( $RC$ ) percent of the applied EMF
- C. A current that opposes the applied EMF
- D. A voltage that opposes the applied EMF

4BE-2B.1 After two time constants, the capacitor in an RC circuit is charged to what percentage of the supply voltage?

- A. 36.8%
- B. 63.2%
- C. 86.5%
- D. 95%

4BE-2B.2 After two time constants, the capacitor in an RC circuit is discharged to what percentage of the starting voltage?

- A. 86.5%
- B. 63.2%
- C. 36.8%
- D. 13.5%

4BE-2B.3 What is the time constant of a circuit having a 100-microfarad capacitor in series with a 470-kilohm resistor?

- A. 4700 seconds
- B. 470 seconds
- C. 47 seconds
- D. 0.47 seconds

4BE-2B.4 What is the time constant of a circuit having a 220-microfarad capacitor in parallel with a 1-megohm resistor?

- A. 220 seconds
- B. 22 seconds
- C. 2.2 seconds
- D. 0.22 seconds

4BE-2B.5 What is the time constant of a circuit having two 100-microfarad capacitors and two 470-kilohm resistors all in series?

- A. 470 seconds
- B. 47 seconds
- C. 4.7 seconds
- D. 0.47 seconds

4BE-2B.6 What is the time constant of a circuit having two 100-microfarad capacitors and two 470-kilohm resistors all in parallel?

- A. 470 seconds
- B. 47 seconds
- C. 4.7 seconds
- D. 0.47 seconds

4BE-2B.7 What is the time constant of a circuit having two 220-microfarad capacitors and two 1-megohm resistors all in series?

- A. 55 seconds
- B. 110 seconds
- C. 220 seconds
- D. 440 seconds

4BE-2B.8 What is the time constant of a circuit having two 220-microfarad capacitors and two 1-megohm resistors all in parallel?

- A. 22 seconds
- B. 44 seconds
- C. 220 seconds
- D. 440 seconds

4BE-2B.9 What is the time constant of a circuit having one 100-microfarad capacitor, one 220-microfarad capacitor, one 470-

kilohm resistor and one 1-megohm resistor all in series?

- A. 68.8 seconds
- B. 101.1 seconds
- C. 220.0 seconds
- D. 470.0 seconds

4BE-2B.10 What is the time constant of a circuit having a 470-microfarad capacitor and a 1-megohm resistor in parallel?

- A. 0.47 seconds
- B. 47 seconds
- C. 220 seconds
- D. 470 seconds

4BE-2B.11 What is the time constant of a circuit having a 470-microfarad capacitor in series with a 470-kilohm resistor?

- A. 221 seconds
- B. 221000 seconds
- C. 470 seconds
- D. 470000 seconds

4BE-2B.12 What is the time constant of a circuit having a 220-microfarad capacitor in series with a 470-kilohm resistor?

- A. 103 seconds
- B. 220 seconds
- C. 470 seconds
- D. 470000 seconds

4BE-2B.13 How long does it take for an initial charge of 20 V DC to decrease to 7.36 V DC in a 0.01-microfarad capacitor when a 2-megohm resistor is connected across it?

- A. 12.64 seconds
- B. 0.02 seconds
- C. 1 second
- D. 7.98 seconds

4BE-2B.14 How long does it take for an initial charge of 20 V DC to decrease to 2.71 V DC in a 0.01-microfarad capacitor when a 2-megohm resistor is connected across it?

- A. 0.04 seconds
- B. 0.02 seconds
- C. 7.36 seconds
- D. 12.64 seconds

4BE-2B.15 How long does it take for an initial charge of 20 V DC to decrease to 1 V DC in a 0.01-microfarad capacitor when a 2-megohm resistor is connected across it?

- A. 0.01 seconds
- B. 0.02 seconds
- C. 0.04 seconds
- D. 0.06 seconds

4BE-2B.16 How long does it take for an initial charge of 20 V DC to decrease to 0.37 V DC in a 0.01-microfarad capacitor when a 2-megohm resistor is connected across it?

- A. 0.08 seconds
- B. 0.6 seconds
- C. 0.4 seconds

D. 0.2 seconds

4BE-2B.17 How long does it take for an initial charge of 20 V DC to decrease to 0.13 V DC in a 0.01-microfarad capacitor when a 2-megohm resistor is connected across it?

- A. 0.06 seconds
- B. 0.08 seconds
- C. 0.1 seconds
- D. 1.2 seconds

4BE-2B.18 How long does it take for an initial charge of 800 V DC to decrease to 294 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

- A. 80 seconds
- B. 294 seconds
- C. 368 seconds
- D. 450 seconds

4BE-2B.19 How long does it take for an initial charge of 800 V DC to decrease to 108 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

- A. 225 seconds
- B. 294 seconds
- C. 450 seconds
- D. 900 seconds

4BE-2B.20 How long does it take for an initial charge of 800 V DC to decrease to 39.9 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

- A. 1350 seconds
- B. 900 seconds
- C. 450 seconds
- D. 225 seconds

4BE-2B.21 How long does it take for an initial charge of 800 V DC to decrease to 40.2 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

- A. Approximately 225 seconds
- B. Approximately 450 seconds
- C. Approximately 900 seconds
- D. Approximately 1350 seconds

4BE-2B.22 How long does it take for an initial charge of 800 V DC to decrease to 14.8 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

- A. Approximately 900 seconds
- B. Approximately 1350 seconds
- C. Approximately 1804 seconds
- D. Approximately 2000 seconds

4BE-3.1 What is a ++++Smith Chart++++?

- A. A graph for calculating impedance along transmission lines
- B. A graph for calculating great circle bearings
- C. A graph for calculating antenna height
- D. A graph for calculating radiation patterns

4BE-3.2 What type of coordinate system is used in a ++++Smith Chart++++?



- A. Voltage and current circles
- B. Resistance and reactance circles
- C. Voltage and current lines
- D. Resistance and reactance lines

4BE-3.3 What type of calculations can be performed using a Smith Chart?

- A. Beam headings and radiation patterns
- B. Satellite azimuth and elevation bearings
- C. Impedance and SWR values in transmission lines
- D. Circuit gain calculations

4BE-3.4 What are the two families of circles that make up a Smith Chart?

- A. Resistance and voltage
- B. Reactance and voltage
- C. Resistance and reactance
- D. Voltage and impedance

4BE-3.5 What is the only straight line on a blank Smith Chart?

- A. The reactance axis
- B. The resistance axis
- C. The voltage axis
- D. The current axis

4BE-3.6 What is the process of normalizing with regard to a Smith Chart?

- A. Reassigning resistance values with regard to the reactance axis
- B. Reassigning reactance values with regard to the resistance axis
- C. Reassigning resistance values with regard to the prime center
- D. Reassigning prime center with regard to the reactance axis

4BE-3.7 What are the curved lines on a Smith Chart?

- A. Portions of current circles
- B. Portions of voltage circles
- C. Portions of resistance circles
- D. Portions of reactance circles

4BE-3.8 What is the third family of circles, which are added to a Smith Chart during the process of solving problems?

- A. Coaxial length circles
- B. Antenna length circles
- C. Standing wave ratio circles
- D. Radiation pattern circles

4BE-3.9 How are the wavelength scales on a Smith Chart calibrated?

- A. In portions of transmission line electrical frequency
- B. In portions of transmission line electrical wavelength
- C. In portions of antenna electrical wavelength
- D. In portions of antenna electrical frequency

4BE-4.1 What is the impedance of a network comprised of a 0.1-microhenry inductor in series with a 20-ohm resistor, at 30 MHz?

(Specify your answer in rectangular coordinates.)

- A.  $20 + j19$
- B.  $20 - j19$
- C.  $19 + j20$
- D.  $19 - j20$

4BE-4.2 What is the impedance of a network comprised of a 0.1-microhenry inductor in series with a 30-ohm resistor, at 5 MHz? (Specify your answer in rectangular coordinates.)

- A.  $30 - j3$
- B.  $30 + j3$
- C.  $3 + j30$
- D.  $3 - j30$

4BE-4.3 What is the impedance of a network comprised of a 10-microhenry inductor in series with a 40-ohm resistor, at 500 MHz? (Specify your answer in rectangular coordinates.)

- A.  $40 + j31400$
- B.  $40 - j31400$
- C.  $31400 + j40$
- D.  $31400 - j40$

4BE-4.4 What is the impedance of a network comprised of a 100-picofarad capacitor in parallel with a 4000-ohm resistor, at 500 kHz? (Specify your answer in polar coordinates.)

- A. 2490 ohms,  $51.5^\circ$
- B. 4000 ohms,  $38.5^\circ$
- C. 5112 ohms,  $-38.5^\circ$
- D. 2490 ohms,  $-51.5^\circ$

4BE-4.5 What is the impedance of a network comprised of a 0.001-microfarad capacitor in series with a 400-ohm resistor, at 500 kHz? (Specify your answer in rectangular coordinates.)

- A.  $400 - j318$
- B.  $318 - j400$
- C.  $400 + j318$
- D.  $318 + j400$

4BE-5.1 What is the impedance of a network comprised of a 100-ohm-reactance inductor in series with a 100-ohm resistor? (Specify your answer in polar coordinates.)

- A. 121 ohms,  $35^\circ$
- B. 141 ohms,  $45^\circ$
- C. 161 ohms,  $55^\circ$
- D. 181 ohms,  $65^\circ$

4BE-5.2 What is the impedance of a network comprised of a 100-ohm-reactance inductor, a 100-ohm-reactance capacitor, and a 100-ohm resistor all connected in series? (Specify your answer in polar coordinates.)

- A. 100 ohms,  $90^\circ$
- B. 10 ohms,  $0^\circ$
- C. 100 ohms,  $0^\circ$
- D. 10 ohms,  $100^\circ$

4BE-5.3 What is the impedance of a network comprised of a 400-ohm-reactance capacitor in series with a 300-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 240 ohms,  $240 \angle 36.9^\circ$
- B. 240 ohms,  $240 \angle -36.9^\circ$
- C. 500 ohms,  $500 \angle 53.1^\circ$
- D. 500 ohms,  $500 \angle -53.1^\circ$

4BE-5.4 What is the impedance of a network comprised of a 300-ohm-reactance capacitor, a 600-ohm-reactance inductor, and a 400-ohm resistor, all connected in series? (Specify your answer in polar coordinates.)

- A. 500 ohms,  $500 \angle 37^\circ$
- B. 400 ohms,  $400 \angle 27^\circ$
- C. 300 ohms,  $300 \angle 17^\circ$
- D. 200 ohms,  $200 \angle 10^\circ$

4BE-5.5 What is the impedance of a network comprised of a 400-ohm-reactance inductor in parallel with a 300-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 240 ohms,  $240 \angle 36.9^\circ$
- B. 240 ohms,  $240 \angle -36.9^\circ$
- C. 500 ohms,  $500 \angle 53.1^\circ$
- D. 500 ohms,  $500 \angle -53.1^\circ$

4BE-6A.1 What is the impedance of a network comprised of a 1.0-millihenry inductor in series with a 200-ohm resistor, at 30 kHz?

(Specify your answer in rectangular coordinates.)

- A.  $200 - j188$
- B.  $200 + j188$
- C.  $188 + j200$
- D.  $188 - j200$

4BE-6A.2 What is the impedance of a network comprised of a 10-millihenry inductor in series with a 600-ohm resistor, at 10 kHz?

(Specify your answer in rectangular coordinates.)

- A.  $628 + j600$
- B.  $628 - j600$
- C.  $600 + j628$
- D.  $600 - j628$

4BE-6A.3 What is the impedance of a network comprised of a 0.01-microfarad capacitor in parallel with a 300-ohm resistor, at 50 kHz?

(Specify your answer in rectangular coordinates.)

- A.  $150 - j159$
- B.  $150 + j159$
- C.  $159 + j150$
- D.  $159 - j150$

4BE-6A.4 What is the impedance of a network comprised of a 0.1-microfarad capacitor in series with a 40-ohm resistor, at 50 kHz?

(Specify your answer in rectangular coordinates.)

- A.  $40 + j32$
- B.  $40 - j32$
- C.  $32 - j40$
- D.  $32 + j40$

4BE-6A.5 What is the impedance of a network comprised of a 1.0-microfarad capacitor in parallel with a 30-ohm resistor, at 5

MHz? (Specify your answer in rectangular coordinates.)

- A.  $0.000034 + j0.032$
- B.  $0.032 + j0.000034$
- C.  $0.000034 - j0.032$
- D.  $0.032 - j0.000034$

4BE-6B.1 What is the impedance of a network comprised of a 100-ohm-reactance capacitor in series with a 100-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 121 ohms,  $25^\circ$
- B. 141 ohms,  $45^\circ$
- C. 161 ohms,  $65^\circ$
- D. 191 ohms,  $85^\circ$

4BE-6B.2 What is the impedance of a network comprised of a 100-ohm-reactance capacitor in parallel with a 100-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 31 ohms,  $15^\circ$
- B. 51 ohms,  $25^\circ$
- C. 71 ohms,  $45^\circ$
- D. 91 ohms,  $65^\circ$

4BE-6B.3 What is the impedance of a network comprised of a 300-ohm-reactance inductor in series with a 400-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 400 ohms,  $27^\circ$
- B. 500 ohms,  $37^\circ$
- C. 600 ohms,  $47^\circ$
- D. 700 ohms,  $57^\circ$

4BE-6B.4 What is the impedance of a network comprised of a 100-ohm-reactance inductor in parallel with a 100-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 71 ohms,  $45^\circ$
- B. 81 ohms,  $55^\circ$
- C. 91 ohms,  $65^\circ$
- D. 100 ohms,  $75^\circ$

4BE-6B.5 What is the impedance of a network comprised of a 300-ohm-reactance capacitor in series with a 400-ohm resistor?

(Specify your answer in polar coordinates.)

- A. 200 ohms,  $10^\circ$
- B. 300 ohms,  $17^\circ$
- C. 400 ohms,  $27^\circ$
- D. 500 ohms,  $37^\circ$

4BF-1A.1 What is an enhancement-mode FET?

- A. An FET with a channel that blocks voltage through the gate
- B. An FET with a channel that allows a current when the gate voltage is zero
- C. An FET without a channel to hinder current through the gate
- D. An FET without a channel; no current occurs with zero gate voltage

4BF-1B.1 What is a depletion-mode FET?

- A. An FET that has a channel with no gate voltage applied; a current flows with zero gate voltage

- B. An FET that has a channel that blocks current when the gate voltage is zero
- C. An FET without a channel; no current flows with zero gate voltage
- D. An FET without a channel to hinder current through the gate

4BF-1C.1 What is the schematic symbol for an N-channel MOSFET [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-1C.2 What is the schematic symbol for a P-channel MOSFET [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-1C.3 What is the schematic symbol for an N-channel dual-gate MOSFET [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-1C.4 What is the schematic symbol for a P-channel dual-gate MOSFET [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-1C.5 Why do many MOSFET devices have built-in gate-protective Zener diodes?

- A. The gate-protective Zener diode provides a voltage reference to provide the correct amount of reverse-bias gate voltage
- B. The gate-protective Zener diode protects the substrate from excessive voltages
- C. The gate-protective Zener diode keeps the gate voltage within specifications to prevent the device from overheating
- D. The gate-protective Zener diode prevents the gate insulation from being punctured by small static charges or excessive voltages

4BF-1D.1 What do the initials ++++CMOS++++ stand for?

- A. Common mode oscillating system
- B. Complementary mica-oxide silicon
- C. Complementary metal-oxide semiconductor
- D. Complementary metal-oxide substrate

4BF-1D.2 Why are special precautions necessary in handling FET and CMOS devices?

- A. They are susceptible to damage from static charges
- B. They have fragile leads that may break off

- C. They have micro-welded semiconductor junctions that are susceptible to breakage
- D. They are light sensitive

4BF-1E.1 What is the schematic symbol for an N-channel junction FET [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-1E.2 How does the input impedance of a +++++field-effect transistor++++ compare with that of a bipolar transistor?

- A. One cannot compare input impedance without first knowing the supply voltage
- B. An FET has low input impedance; a bipolar transistor has high input impedance
- C. The input impedance of FETs and bipolar transistors is the same
- D. An FET has high input impedance; a bipolar transistor has low input impedance

4BF-1E.3 What are the three terminals of a +++++field-effect transistor++++?

- A. Gate 1, gate 2, drain
- B. Emitter, base, collector
- C. Emitter, base 1, base 2
- D. Gate, drain, source

4BF-1F.1 What is the schematic symbol for a P-channel junction FET [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-1F.2 What are the two basic types of junction +++++field-effect transistors++++?

- A. N-channel and P-channel
- B. High power and low power
- C. MOSFET and GaAsFET
- D. Silicon FET and germanium FET

4BF-2.1 What is an +++++operational amplifier++++?

- A. A high-gain, direct-coupled differential amplifier whose characteristics are determined by components external to the amplifier unit
- B. A high-gain, direct-coupled audio amplifier whose characteristics are determined by components external to the amplifier unit
- C. An amplifier used to increase the average output of frequency modulated amateur signals to the legal limit
- D. A program subroutine that calculates the gain of an RF amplifier

4BF-2.2 What is the schematic symbol for an +++++operational amplifier++++ [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BF-2.3 What would be the characteristics of the ideal op-amp?

- A. Zero input impedance, infinite output impedance, infinite gain, flat frequency response
- B. Infinite input impedance, zero output impedance, infinite gain, flat frequency response
- C. Zero input impedance, zero output impedance, infinite gain, flat frequency response
- D. Infinite input impedance, infinite output impedance, infinite gain, flat frequency response

4BF-2.4 What determines the gain of a closed-loop op-amp circuit?

- A. The external feedback network
- B. The collector-to-base capacitance of the PNP stage
- C. The power supply voltage
- D. The PNP collector load

4BF-2.5 What is meant by the term ++++op-amp offset voltage++++?

- A. The output voltage of the op-amp minus its input voltage
- B. The difference between the output voltage of the op-amp and the input voltage required in the following stage
- C. The potential between the amplifier-input terminals of the op-amp in a closed-loop condition
- D. The potential between the amplifier-input terminals of the op-amp in an open-loop condition

4BF-2.6 What is the input impedance of a theoretically ideal op-amp?

- A. 100 ohms
- B. 1000 ohms
- C. Very low
- D. Very high

4BF-2.7 What is the output impedance of a theoretically ideal op-amp?

- A. Very low
- B. Very high
- C. 100 ohms
- D. 1000 ohms

4BF-3.1 What is a ++++phase-locked loop++++ circuit?

- A. An electronic servo loop consisting of a ratio detector, reactance modulator, and voltage-controlled oscillator
- B. An electronic circuit also known as a monostable multivibrator
- C. An electronic circuit consisting of a precision push-pull amplifier with a differential input
- D. An electronic servo loop consisting of a phase detector, a low-pass filter and voltage-controlled oscillator

4BF-3.2 What functions are performed by a ++++phase-locked loop++++?

- A. Wideband AF and RF power amplification
- B. Comparison of two digital input signals, digital pulse

counter

- C. Photovoltaic conversion, optical coupling
- D. Frequency synthesis, FM demodulation

4BF-3.3 A circuit compares the output from a voltage-controlled oscillator and a frequency standard. The difference between the two frequencies produces an error voltage that changes the voltage-controlled oscillator frequency. What is the name of the circuit?

- A. A doubly balanced mixer
- B. A phase-locked loop
- C. A differential voltage amplifier
- D. A variable frequency oscillator

4BF-4.1 What do the initials +++TTL+++ stand for?

- A. Resistor-transistor logic
- B. Transistor-transistor logic
- C. Diode-transistor logic
- D. Emitter-coupled logic

4BF-4.2 What is the recommended power supply voltage for +++TTL+++ series integrated circuits?

- A. 12.00 volts
- B. 50.00 volts
- C. 5.00 volts
- D. 13.60 volts

4BF-4.3 What logic state do the inputs of a +++TTL+++ device assume if they are left open?

- A. A high logic state
- B. A low logic state
- C. The device becomes randomized and will not provide consistent high or low logic states
- D. Open inputs on a TTL device are ignored

4BF-4.4 What level of input voltage is +++high+++ in a +++TTL+++ device operating with a 5-volt power supply?

- A. 2.0 to 5.5 volts
- B. 1.5 to 3.0 volts
- C. 1.0 to 1.5 volts
- D. -5.0 to -2.0 volts

4BF-4.5 What level of input voltage is +++low+++ in a +++TTL+++ device operating with a 5-volt power supply?

- A. -2.0 to -5.5 volts
- B. 2.0 to 5.5 volts
- C. -0.6 to 0.8 volts
- D. -0.8 to 0.4 volts

4BF-4.6 Why do circuits containing +++TTL+++ devices have several bypass capacitors per printed circuit board?

- A. To prevent RFI to receivers
- B. To keep the switching noise within the circuit, thus eliminating RFI
- C. To filter out switching harmonics
- D. To prevent switching transients from appearing on the supply line



4BF-5.1 What is a ++++CMOS IC++++?

- A. A chip with only P-channel transistors
- B. A chip with P-channel and N-channel transistors
- C. A chip with only N-channel transistors
- D. A chip with only bipolar transistors

4BF-5.2 What is one major advantage of ++++CMOS++++ over other devices?

- A. Small size
- B. Low current consumption
- C. Low cost
- D. Ease of circuit design

4BF-5.3 Why do ++++CMOS++++ digital integrated circuits have high immunity to noise on the input signal or power supply?

- A. Larger bypass capacitors are used in CMOS circuit design
- B. The input switching threshold is about two times the power supply voltage
- C. The input switching threshold is about one-half the power supply voltage
- D. Input signals are stronger

4BF-6.1 What is the name for a vacuum tube that is commonly found in television cameras used for amateur television?

- A. A traveling-wave tube
- B. A klystron tube
- C. A vidicon tube
- D. A cathode-ray tube

4BF-6.2 How is the electron beam deflected in a ++++vidicon++++?

- A. By varying the beam voltage
- B. By varying the bias voltage on the beam forming grids inside the tube
- C. By varying the beam current
- D. By varying electromagnetic fields

4BF-6.3 What type of CRT deflection is better when high-frequency waves are to be displayed on the screen?

- A. Electromagnetic
- B. Tubular
- C. Radar
- D. Electrostatic

4BG-1A.1 What is a ++++flip-flop++++ circuit?

- A. A binary sequential logic element with one stable state
- B. A binary sequential logic element with eight stable states
- C. A binary sequential logic element with four stable states
- D. A binary sequential logic element with two stable states

4BG-1A.2 How many bits of information can be stored in a single ++++flip-flop++++ circuit?

- A. 1
- B. 2
- C. 3
- D. 4

4BG-1A.3 What is a ++++bistable multivibrator++++ circuit?

- A. An "AND" gate
- B. An "OR" gate
- C. A flip-flop
- D. A clock

4BG-1A.4 How many output changes are obtained for every two trigger pulses applied to the input of a +++bistable T flip-flop+++ circuit?

- A. No output level changes
- B. One output level change
- C. Two output level changes
- D. Four output level changes

4BG-1A.5 The frequency of an AC signal can be divided electronically by what type of digital circuit?

- A. A free-running multivibrator
- B. An OR gate
- C. A bistable multivibrator
- D. An astable multivibrator

4BG-1A.6 What type of digital IC is also known as a +++latch+++?

- A. A decade counter
- B. An OR gate
- C. A flip-flop
- D. An op-amp

4BG-1A.7 How many +++flip-flops+++ are required to divide a signal frequency by 4?

- A. 1
- B. 2
- C. 4
- D. 8

4BG-1B.1 What is an +++astable multivibrator+++?

- A. A circuit that alternates between two stable states
- B. A circuit that alternates between a stable state and an unstable state
- C. A circuit set to block either a 0 pulse or a 1 pulse and pass the other
- D. A circuit that alternates between two unstable states

4BG-1B.2 What is a +++monostable multivibrator+++?

- A. A circuit that can be switched momentarily to the opposite binary state and then returns after a set time to its original state
- B. A "clock" circuit that produces a continuous square wave oscillating between 1 and 0
- C. A circuit designed to store one bit of data in either the 0 or the 1 configuration
- D. A circuit that maintains a constant output voltage, regardless of variations in the input voltage

4BG-1C.1 What is an +++AND gate+++?

- A. A circuit that produces a logic "1" at its output only if all inputs are logic "1"
- B. A circuit that produces a logic "0" at its output only if all inputs are logic "1"

- C. A circuit that produces a logic "1" at its output if only one input is a logic "1"
- D. A circuit that produces a logic "1" at its output if all inputs are logic "0"

4BG-1C.2 What is the schematic symbol for an +++AND gate+++ [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BG-1C.3 What is a +++NAND gate+++?

- A. A circuit that produces a logic "0" at its output only when all inputs are logic "0"
- B. A circuit that produces a logic "1" at its output only when all inputs are logic "1"
- C. A circuit that produces a logic "0" at its output if some but not all of its inputs are logic "1"
- D. A circuit that produces a logic "0" at its output only when all inputs are logic "1"

4BG-1C.4 What is the schematic symbol for a +++NAND gate+++ [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BG-1C.5 What is an +++OR gate+++?

- A. A circuit that produces a logic "1" at its output if any input is logic "1"
- B. A circuit that produces a logic "0" at its output if any input is logic "1"
- C. A circuit that produces a logic "0" at its output if all inputs are logic "1"
- D. A circuit that produces a logic "1" at its output if all inputs are logic "0"

4BG-1C.6 What is the schematic symbol for an +++OR gate+++ [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BG-1C.7 What is a +++NOR gate+++?

- A. A circuit that produces a logic "0" at its output only if all inputs are logic "0"
- B. A circuit that produces a logic "1" at its output only if all inputs are logic "1"
- C. A circuit that produces a logic "0" at its output if any or all inputs are logic "1"
- D. A circuit that produces a logic "1" at its output if some but not all of its inputs are logic "1"

4BG-1C.8 What is the schematic symbol for a +++NOR gate+++ [see graphics

addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BG-1C.9 What is a +++NOT gate+++?

- A. A circuit that produces a logic "0" at its output when the input is logic "1" and vice versa
- B. A circuit that does not allow data transmission when its input is high
- C. A circuit that allows data transmission only when its input is high
- D. A circuit that produces a logic "1" at its output when the input is logic "1" and vice versa

4BG-1C.10 What is the schematic symbol for a +++NOT gate+++ [see graphics addendum]?

- A. 1
- B. 2
- C. 3
- D. 4

4BG-1D.1 What is a +++truth table+++?

- A. A table of logic symbols that indicate the high logic states of an op-amp
- B. A diagram showing logic states when the digital device's output is true
- C. A list of input combinations and their corresponding outputs that characterizes a digital device's function
- D. A table of logic symbols that indicates the low logic states of an op-amp

4BG-1D.2 In a positive-logic circuit, what level is used to represent a logic 1?

- A. A low level
- B. A positive-transition level
- C. A negative-transition level
- D. A high level

4BG-1D.3 In a positive-logic circuit, what level is used to represent a logic 0?

- A. A low level
- B. A positive-transition level
- C. A negative-transition level
- D. A high level

4BG-1D.4 In a negative-logic circuit, what level is used to represent a logic 1?

- A. A low level
- B. A positive-transition level
- C. A negative-transition level
- D. A high level

4BG-1D.5 In a negative-logic circuit, what level is used to represent a logic 0?

- A. A low level

- B. A positive-transition level
- C. A negative-transition level
- D. A high level

4BG-2A.1 What is a +++crystal-controlled marker generator+++?

- A. A low-stability oscillator that "sweeps" through a band of frequencies
- B. An oscillator often used in aircraft to determine the craft's location relative to the inner and outer markers at airports
- C. A high-stability oscillator whose output frequency and amplitude can be varied over a wide range
- D. A high-stability oscillator that generates a series of reference signals at known frequency intervals

4BG-2A.2 What additional circuitry is required in a 100-kHz +++crystal-controlled marker generator+++ to provide markers at 50 and 25 kHz?

- A. An emitter-follower
- B. Two frequency multipliers
- C. Two flip-flops
- D. A voltage divider

4BG-2B.1 What is the purpose of a +++prescaler circuit+++?

- A. It converts the output of a JK flip-flop to that of an RS flip-flop
- B. It multiplies an HF signal so a low-frequency counter can display the operating frequency
- C. It prevents oscillation in a low frequency counter circuit
- D. It divides an HF signal so a low-frequency counter can display the operating frequency

4BG-2B.2 What does the accuracy of a +++frequency counter+++ depend on?

- A. The internal crystal reference
- B. A voltage-regulated power supply with an unvarying output
- C. Accuracy of the AC input frequency to the power supply
- D. Proper balancing of the power-supply diodes

4BG-2B.3 How many states does a decade counter digital IC have?

- A. 6
- B. 10
- C. 15
- D. 20

4BG-2B.4 What is the function of a decade counter digital IC?

- A. Decode a decimal number for display on a seven-segment LED display
- B. Produce one output pulse for every ten input pulses
- C. Produce ten output pulses for every input pulse
- D. Add two decimal numbers

4BG-3A.1 What are the advantages of using an op-amp instead of LC elements in an audio filter?

- A. Op-amps are more rugged and can withstand more abuse than can LC elements
- B. Op-amps are fixed at one frequency
- C. Op-amps are available in more styles and types than are LC

elements

- D. Op-amps exhibit gain rather than insertion loss

4BG-3A.2 What determines the gain and frequency characteristics of an op-amp RC active filter?

- A. Values of capacitances and resistances built into the op-amp
- B. Values of capacitances and resistances external to the op-amp
- C. Voltage and frequency of DC input to the op-amp power supply
- D. Regulated DC voltage output from the op-amp power supply

4BG-3A.3 What are the principle uses of an op-amp RC active filter in amateur circuitry?

- A. Op-amp circuits are used as high-pass filters to block RFI at the input to receivers
- B. Op-amp circuits are used as low-pass filters between transmitters and transmission lines
- C. Op-amp circuits are used as filters for smoothing power-supply output
- D. Op-amp circuits are used as audio filters for receivers

4BG-3B.1 What type of capacitors should be used in an op-amp RC active filter circuit?

- A. Electrolytic
- B. Disc ceramic
- C. Polystyrene
- D. Paper dielectric

4BG-3B.2 How can unwanted ringing and audio instability be prevented in a multisection op-amp RC audio filter circuit?

- A. Restrict both gain and  $Q$
- B. Restrict gain, but increase  $Q$
- C. Restrict  $Q$ , but increase gain
- D. Increase both gain and  $Q$

4BG-3B.3 Where should an op-amp RC active audio filter be placed in an amateur receiver?

- A. In the IF strip, immediately before the detector
- B. In the audio circuitry immediately before the speaker or phone jack
- C. Between the balanced modulator and frequency multiplier
- D. In the low-level audio stages

4BG-3B.4 What parameter must be selected when designing an audio filter using an op-amp?

- A. Bandpass characteristics
- B. Desired current gain
- C. Temperature coefficient
- D. Output-offset overshoot

4BG-4A.1 What two factors determine the ++++sensitivity++++ of a receiver?

- A. Dynamic range and third-order intercept
- B. Cost and availability

- C. Intermodulation distortion and dynamic range
- D. Bandwidth and noise figure

4BG-4A.2 What is the limiting condition for +++sensitivity+++ in a communications receiver?

- A. The noise floor of the receiver
- B. The power-supply output ripple
- C. The two-tone intermodulation distortion
- D. The input impedance to the detector

4BG-4A.3 What is the theoretical minimum +++noise floor+++ of a receiver with a 400-hertz bandwidth?

- A. -141 dBm
- B. -148 dBm
- C. -174 dBm
- D. -180 dBm

4BG-4B.1 How can +++selectivity+++ be achieved in the front-end circuitry of a communications receiver?

- A. By using an audio filter
- B. By using a preselector
- C. By using an additional RF amplifier stage
- D. By using an additional IF amplifier stage

4BG-4B.2 A receiver selectivity of 2.4 kHz in the IF circuitry is optimum for what type of amateur signals?

- A. CW
- B. SSB voice
- C. Double-sideband AM voice
- D. FSK RTTY

4BG-4B.3 What occurs during CW reception if too narrow a filter bandwidth is used in the IF stage of a receiver?

- A. Undesired signals will reach the audio stage
- B. Output-offset overshoot
- C. Cross-modulation distortion
- D. Filter ringing

4BG-4B.4 What degree of selectivity is desirable in the IF circuitry of an amateur RTTY receiver?

- A. 100 Hz
- B. 300 Hz
- C. 6000 Hz
- D. 2400 Hz

4BG-4B.5 A receiver selectivity of 10 kHz in the IF circuitry is optimum for what type of amateur signals?

- A. SSB voice
- B. Double-sideband AM
- C. CW
- D. FSK RTTY

4BG-4B.6 What degree of selectivity is desirable in the IF circuitry of a single-sideband phone receiver?

- A. 1 kHz
- B. 2.4 kHz
- C. 4.2 kHz

D. 4.8 kHz

4BG-4B.7 What is an undesirable effect of using too wide a filter bandwidth in the IF section of a receiver?

- A. Output-offset overshoot
- B. Undesired signals will reach the audio stage
- C. Thermal-noise distortion
- D. Filter ringing

4BG-4B.8 How should the filter bandwidth of a receiver IF section compare with the bandwidth of a received signal?

- A. Filter bandwidth should be slightly greater than the received-signal bandwidth
- B. Filter bandwidth should be approximately half the received-signal bandwidth
- C. Filter bandwidth should be approximately two times the received-signal bandwidth
- D. Filter bandwidth should be approximately four times the received-signal bandwidth

4BG-4B.9 What degree of selectivity is desirable in the IF circuitry of an FM-phone receiver?

- A. 1 kHz
- B. 2.4 kHz
- C. 4.2 kHz
- D. 15 kHz

4BG-4B.10 How can selectivity be achieved in the IF circuitry of a communications receiver?

- A. Incorporate a means of varying the supply voltage to the local oscillator circuitry
- B. Replace the standard JFET mixer with a bipolar transistor followed by a capacitor of the proper value
- C. Remove AGC action from the IF stage and confine it to the audio stage only
- D. Incorporate a high-Q filter

4BG-4C.1 What is meant by the ++++dynamic range++++ of a communications receiver?

- A. The number of kHz between the lowest and the highest frequency to which the receiver can be tuned
- B. The maximum possible undistorted audio output of the receiver, referenced to one milliwatt
- C. The ratio between the minimum discernible signal and the largest tolerable signal without causing audible distortion products
- D. The difference between the lowest-frequency signal and the highest-frequency signal detectable without moving the tuning knob

4BG-4C.2 What is the term for the ratio between the largest tolerable receiver input signal and the minimum discernible signal?

- A. Intermodulation distortion
- B. Noise floor
- C. Noise figure
- D. Dynamic range



4BG-4C.3 What type of problems are caused by poor +++dynamic range+++ in a communications receiver?

- A. Cross-modulation of the desired signal and desensitization from strong adjacent signals
- B. Oscillator instability requiring frequent retuning, and loss of ability to recover the opposite sideband, should it be transmitted
- C. Cross-modulation of the desired signal and insufficient audio power to operate the speaker
- D. Oscillator instability and severe audio distortion of all but the strongest received signals

4BG-4C.4 The ability of a communications receiver to perform well in the presence of strong signals outside the amateur band of interest is indicated by what parameter?

- A. Noise figure
- B. Blocking dynamic range
- C. Signal-to-noise ratio
- D. Audio output

4BG-4D.1 What is meant by the term +++noise figure+++ of a communications receiver?

- A. The level of noise entering the receiver from the antenna
- B. The relative strength of a received signal 3 kHz removed from the carrier frequency
- C. The level of noise generated in the front end and succeeding stages of a receiver
- D. The ability of a receiver to reject unwanted signals at frequencies close to the desired one

4BG-4D.2 Which stage of a receiver primarily establishes its +++noise figure+++?

- A. The audio stage
- B. The IF strip
- C. The RF stage
- D. The local oscillator

4BG-5A.1 What is an +++inverting op-amp circuit+++?

- A. An operational amplifier circuit connected such that the input and output signals are 180 degrees out of phase
- B. An operational amplifier circuit connected such that the input and output signals are in phase
- C. An operational amplifier circuit connected such that the input and output signals are 90 degrees out of phase
- D. An operational amplifier circuit connected such that the input impedance is held at zero, while the output impedance is high

4BG-5B.1 What is a +++noninverting op-amp circuit+++?

- A. An operational amplifier circuit connected such that the input and output signals are 180 degrees out of phase
- B. An operational amplifier circuit connected such that the input and output signals are in phase
- C. An operational amplifier circuit connected such that the input and output signals are 90 degrees out of phase
- D. An operational amplifier circuit connected such that the

input impedance is held at zero while the output impedance is high

4BG-5C.1 What voltage gain can be expected from the circuit in Figure 4BG-5 when  $R_1$  is 1000 ohms and  $R_f$  is 100 kilohms [see graphics addendum]?

- A. 0.01
- B. 1
- C. 10
- D. 100

4BG-5C.2 What voltage gain can be expected from the circuit in Figure 4BG-5 when  $R_1$  is 1800 ohms and  $R_f$  is 68 kilohms [see graphics addendum]?

- A. 1
- B. 0.03
- C. 38
- D. 76

4BG-5C.3 What voltage gain can be expected from the circuit in Figure 4BG-5 when  $R_1$  is 3300 ohms and  $R_f$  is 47 kilohms [see graphics addendum]?

- A. 28
- B. 14
- C. 7
- D. 0.07

4BG-5C.4 What voltage gain can be expected from the circuit in Figure 4BG-5 when  $R_1$  is 10 ohms and  $R_f$  is 47 kilohms [see graphics addendum]?

- A. 0.00021
- B. 9400
- C. 4700
- D. 2350

4BG-5D.1 How does the gain of a theoretically ideal operational amplifier vary with frequency?

- A. The gain increases linearly with increasing frequency
- B. The gain decreases linearly with increasing frequency
- C. The gain decreases logarithmically with increasing frequency
- D. The gain does not vary with frequency

4BG-6.1 What determines the input impedance in a FET common-source amplifier?

- A. The input impedance is essentially determined by the resistance between the drain and substrate
- B. The input impedance is essentially determined by the resistance between the source and drain
- C. The input impedance is essentially determined by the gate biasing network
- D. The input impedance is essentially determined by the resistance between the source and substrate

4BG-6.2 What determines the output impedance in a FET common-source amplifier?

- A. The output impedance is essentially determined by the drain resistor

- B. The output impedance is essentially determined by the input impedance of the FET
- C. The output impedance is essentially determined by the drain supply voltage
- D. The output impedance is essentially determined by the gate supply voltage

4BG-7.1 What frequency range will be tuned by the circuit in Figure 4BG-7 when L is 10 microhenrys, Cf is 156 picofarads, and Cv is 50 picofarads maximum and 2 picofarads minimum?

- A. 3508 through 4004 kHz
- B. 6998 through 7360 kHz
- C. 13.396 through 14.402 MHz
- D. 49.998 through 54.101 MHz

4BG-7.2 What frequency range will be tuned by the circuit in Figure 4BG-7 when L is 30 microhenrys, Cf is 200 picofarads, and Cv is 80 picofarads maximum and 10 picofarads minimum?

- A. 1737 through 2005 kHz
- B. 3507 through 4004 kHz
- C. 7002 through 7354 kHz
- D. 14.990 through 15.020 MHz

4BG-8.1 What is the purpose of a bypass capacitor?

- A. It increases the resonant frequency of the circuit
- B. It removes direct current from the circuit by shunting DC to ground
- C. It removes alternating current by providing a low impedance path to ground
- D. It acts as a voltage divider

4BG-8.2 What is the purpose of a coupling capacitor?

- A. It blocks direct current and passes alternating current
- B. It blocks alternating current and passes direct current
- C. It increases the resonant frequency of the circuit
- D. It decreases the resonant frequency of the circuit

4BH-1A.1 In a pulse-width modulation system, what parameter does the modulating signal vary?

- A. Pulse duration
- B. Pulse frequency
- C. Pulse amplitude
- D. Pulse intensity

4BH-1A.2 What is the type of modulation in which the modulating signal varies the duration of the transmitted pulse?

- A. Amplitude modulation
- B. Frequency modulation
- C. Pulse-width modulation
- D. Pulse-height modulation

4BH-1B.1 In a pulse-position modulation system, what parameter does the modulating signal vary?

- A. The number of pulses per second
- B. Both the frequency and amplitude of the pulses
- C. The duration of the pulses
- D. The time at which each pulse occurs

4BH-1B.2 Why is the transmitter peak power in a pulse modulation system much greater than its average power?

- A. The signal duty cycle is less than 100%
- B. The signal reaches peak amplitude only when voice modulated
- C. The signal reaches peak amplitude only when voltage spikes are generated within the modulator
- D. The signal reaches peak amplitude only when the pulses are also amplitude modulated

4BH-1B.3 What is one way that voice is transmitted in a pulse-width modulation system?

- A. A standard pulse is varied in amplitude by an amount depending on the voice waveform at that instant
- B. The position of a standard pulse is varied by an amount depending on the voice waveform at that instant
- C. A standard pulse is varied in duration by an amount depending on the voice waveform at that instant
- D. The number of standard pulses per second varies depending on the voice waveform at that instant

4BH-2A.1 What digital code consists of elements having unequal length?

- A. ASCII
- B. AX.25
- C. Baudot
- D. Morse code

4BH-2B.1 What digital communications system is well suited for meteor-scatter communications?

- A. ACSSB
- B. AMTOR
- C. Packet radio
- D. Spread spectrum

4BH-2B.2 The International Organization for Standardization has developed a seven-level reference model for a packet-radio communications structure. What level is responsible for the actual transmission of data and handshaking signals?

- A. The physical layer
- B. The transport layer
- C. The communications layer
- D. The synchronization layer

4BH-2B.3 The International Organization for Standardization has developed a seven-level reference model for a packet-radio communications structure. What level arranges the bits into frames and controls data flow?

- A. The transport layer
- B. The link layer
- C. The communications layer
- D. The synchronization layer

4BH-2C.1 What is one advantage of using the ASCII code, with its larger character set, instead of the Baudot code?

- A. ASCII includes built-in error-correction features
- B. ASCII characters contain fewer information bits than Baudot

characters

- C. It is possible to transmit upper and lower case text
- D. The larger character set allows store-and-forward control characters to be added to a message

4BH-2D.1 What type of error control system does ++++Mode A AMTOR++++ use?

- A. Each character is sent twice
- B. The receiving station checks the calculated frame check sequence (FCS) against the transmitted FCS
- C. Mode A AMTOR does not include an error control system
- D. The receiving station automatically requests repeats when needed

4BH-2D.2 What type of error control system does ++++Mode B AMTOR++++ use?

- A. Each character is sent twice
- B. The receiving station checks the calculated frame check sequence (FCS) against the transmitted FCS
- C. Mode B AMTOR does not include an error control system
- D. The receiving station automatically requests repeats when needed

4BH-2E.1 What is the duration of a 45-baud Baudot RTTY data pulse?

- A. 11 milliseconds
- B. 40 milliseconds
- C. 31 milliseconds
- D. 22 milliseconds

4BH-2E.2 What is the duration of a 45-baud Baudot RTTY start pulse?

- A. 11 milliseconds
- B. 22 milliseconds
- C. 31 milliseconds
- D. 40 milliseconds

4BH-2E.3 What is the duration of a 45-baud Baudot RTTY stop pulse?

- A. 11 milliseconds
- B. 18 milliseconds
- C. 31 milliseconds
- D. 40 milliseconds

4BH-2E.4 What is the primary advantage of AMTOR over Baudot RTTY?

- A. AMTOR characters contain fewer information bits than Baudot characters
- B. AMTOR includes an error detection system
- C. Surplus radioteletype machines that use the AMTOR code are readily available
- D. Photographs can be transmitted using AMTOR

4BH-2F.1 What is the necessary bandwidth of a 170-hertz shift, 45-baud Baudot emission F1B transmission?

- A. 45 Hz
- B. 249 Hz
- C. 442 Hz
- D. 600 Hz

4BH-2F.2 What is the necessary bandwidth of a 170-hertz shift, 45-baud Baudot emission J2B transmission?

- A. 45 Hz
- B. 249 Hz
- C. 442 Hz
- D. 600 Hz

4BH-2F.3 What is the necessary bandwidth of a 170-hertz shift, 74-baud Baudot emission F1B transmission?

- A. 250 Hz
- B. 278 Hz
- C. 442 Hz
- D. 600 Hz

4BH-2F.4 What is the necessary bandwidth of a 170-hertz shift, 74-baud Baudot emission J2B transmission?

- A. 250 Hz
- B. 278 Hz
- C. 442 Hz
- D. 600 Hz

4BH-2F.5 What is the necessary bandwidth of a 13-WPM international Morse code emission A1A transmission?

- A. Approximately 13 Hz
- B. Approximately 26 Hz
- C. Approximately 52 Hz
- D. Approximately 104 Hz

4BH-2F.6 What is the necessary bandwidth of a 13-WPM international Morse code emission J2A transmission?

- A. Approximately 13 Hz
- B. Approximately 26 Hz
- C. Approximately 52 Hz
- D. Approximately 104 Hz

4BH-2F.7 What is the necessary bandwidth of a 1000-hertz shift, 1200-baud ASCII emission F1D transmission?

- A. 1000 Hz
- B. 1200 Hz
- C. 440 Hz
- D. 2400 Hz

4BH-2F.8 What is the necessary bandwidth of a 4800-hertz frequency shift, 9600-baud ASCII emission F1D transmission?

- A. 15.36 kHz
- B. 9.6 kHz
- C. 4.8 kHz
- D. 5.76 kHz

4BH-2F.9 What is the necessary bandwidth of a 4800-hertz frequency shift, 9600-baud ASCII emission J2D transmission?

- A. 15.36 kHz
- B. 9.6 kHz
- C. 4.8 kHz
- D. 5.76 kHz

4BH-2F.10 What is the necessary bandwidth of a 5-WPM

international Morse code emission A1A transmission?

- A. Approximately 5 Hz
- B. Approximately 10 Hz
- C. Approximately 20 Hz
- D. Approximately 40 Hz

4BH-2F.11 What is the necessary bandwidth of a 5-WPM international Morse code emission J2A transmission?

- A. Approximately 5 Hz
- B. Approximately 10 Hz
- C. Approximately 20 Hz
- D. Approximately 40 Hz

4BH-2F.12 What is the necessary bandwidth of a 170-hertz shift, 110-baud ASCII emission F1B transmission?

- A. 304 Hz
- B. 314 Hz
- C. 608 Hz
- D. 628 Hz

4BH-2F.13 What is the necessary bandwidth of a 170-hertz shift, 110-baud ASCII emission J2B transmission?

- A. 304 Hz
- B. 314 Hz
- C. 608 Hz
- D. 628 Hz

4BH-2F.14 What is the necessary bandwidth of a 170-hertz shift, 300-baud ASCII emission F1D transmission?

- A. 0 Hz
- B. 0.3 kHz
- C. 0.5 kHz
- D. 1.0 kHz

4BH-2F.15 What is the necessary bandwidth for a 170-hertz shift, 300-baud ASCII emission J2D transmission?

- A. 0 Hz
- B. 0.3 kHz
- C. 0.5 kHz
- D. 1.0 kHz

4BH-3.1 What is ++++amplitude compandored single sideband++++?

- A. Reception of single sideband with a conventional CW receiver
- B. Reception of single sideband with a conventional FM receiver
- C. Single sideband incorporating speech compression at the transmitter and speech expansion at the receiver
- D. Single sideband incorporating speech expansion at the transmitter and speech compression at the receiver

4BH-3.2 What is meant by ++++compandoring++++?

- A. Compressing speech at the transmitter and expanding it at the receiver
- B. Using an audio-frequency signal to produce pulse-length modulation
- C. Combining amplitude and frequency modulation to produce a

single-sideband signal

D. Detecting and demodulating a single-sideband signal by converting it to a pulse-modulated signal

4BH-3.3 What is the purpose of a +++pilot tone+++ in an amplitude compandored single sideband system?

A. It permits rapid tuning of a mobile receiver

B. It replaces the suppressed carrier at the receiver

C. It permits rapid change of frequency to escape high-powered interference

D. It acts as a beacon to indicate the present propagation characteristic of the band

4BH-3.4 What is the approximate frequency of the +++pilot tone+++ in an amplitude compandored single sideband system?

A. 1 kHz

B. 5 MHz

C. 455 kHz

D. 3 kHz

4BH-3.5 How many more voice transmissions can be packed into a given frequency band for amplitude-compandored single-sideband systems over conventional FM-phone systems?

A. 2

B. 4

C. 8

D. 16

4BH-4.1 What term describes a wide-bandwidth communications system in which the RF carrier varies according to some predetermined sequence?

A. Amplitude compandored single sideband

B. AMTOR

C. Time-domain frequency modulation

D. Spread spectrum communication

4BH-4.2 What is the term used to describe a +++spread spectrum communications system+++ where the center frequency of a conventional carrier is altered many times per second in accordance with a pseudo-random list of channels?

A. Frequency hopping

B. Direct sequence

C. Time-domain frequency modulation

D. Frequency compandored spread spectrum

4BH-4.3 What term is used to describe a +++spread spectrum communications system+++ in which a very fast binary bit stream is used to shift the phase of an RF carrier?

A. Frequency hopping

B. Direct sequence

C. Binary phase-shift keying

D. Phase compandored spread spectrum

4BH-5.1 What is the term for the amplitude of the maximum positive excursion of a signal as viewed on an oscilloscope?

A. Peak-to-peak voltage

B. Inverse peak negative voltage



- C. RMS voltage
- D. Peak positive voltage

4BH-5.2 What is the term for the amplitude of the maximum negative excursion of a signal as viewed on an oscilloscope?

- A. Peak-to-peak voltage
- B. Inverse peak positive voltage
- C. RMS voltage
- D. Peak negative voltage

4BH-6A.1 What is the easiest voltage amplitude dimension to measure by viewing a pure sine wave signal on an oscilloscope?

- A. Peak-to-peak voltage
- B. RMS voltage
- C. Average voltage
- D. DC voltage

4BH-6A.2 What is the relationship between the peak-to-peak voltage and the peak voltage amplitude in a symmetrical wave form?

- A. 1:1
- B. 2:1
- C. 3:1
- D. 4:1

4BH-6A.3 What input-amplitude parameter is valuable in evaluating the signal-handling capability of a Class A amplifier?

- A. Peak voltage
- B. Average voltage
- C. RMS voltage
- D. Resting voltage

4BI-1A.1 What is an ++++isotropic radiator++++?

- A. A hypothetical, omnidirectional antenna
- B. In the northern hemisphere, an antenna whose directive pattern is constant in southern directions
- C. An antenna high enough in the air that its directive pattern is substantially unaffected by the ground beneath it
- D. An antenna whose directive pattern is substantially unaffected by the spacing of the elements

4BI-1B.1 When is it useful to refer to an ++++isotropic radiator++++?

- A. When comparing the gains of directional antennas
- B. When testing a transmission line for standing wave ratio
- C. When (in the northern hemisphere) directing the transmission in a southerly direction
- D. When using a dummy load to tune a transmitter

4BI-1B.2 What theoretical reference antenna provides a comparison for antenna measurements?

- A. Quarter-wave vertical
- B. Yagi
- C. Bobtail curtain
- D. Isotropic radiator

4BI-1B.3 What purpose does an ++++isotropic radiator++++ serve?

- A. It is used to compare signal strengths (at a distant point)

of different transmitters

- B. It is used as a reference for antenna gain measurements
- C. It is used as a dummy load for tuning transmitters
- D. It is used to measure the standing-wave-ratio on a

transmission line

4BI-1B.4 How much gain does a 1/2-wavelength dipole have over an ++++isotropic radiator++++?

- A. About 1.5 dB
- B. About 2.1 dB
- C. About 3.0 dB
- D. About 6.0 dB

4BI-1B.5 How much gain does an antenna have over a 1/2-wavelength dipole when it has 6 dB gain over an ++++isotropic radiator++++?

- A. About 3.9 dB
- B. About 6.0 dB
- C. About 8.1 dB
- D. About 10.0 dB

4BI-1B.6 How much gain does an antenna have over a 1/2-wavelength dipole when it has 12 dB gain over an ++++isotropic radiator++++?

- A. About 6.1 dB
- B. About 9.9 dB
- C. About 12.0 dB
- D. About 14.1 dB

4BI-1C.1 What is the antenna pattern for an ++++isotropic radiator++++?

- A. A figure-8
- B. A unidirectional cardioid
- C. A parabola
- D. A sphere

4BI-1C.2 What type of directivity pattern does an ++++isotropic radiator++++ have?

- A. A figure-8
- B. A unidirectional cardioid
- C. A parabola
- D. A sphere

4BI-2A.1 What is the radiation pattern of two 1/4-wavelength vertical antennas spaced 1/2 wavelength apart and fed 180 degrees out of phase?

- A. Unidirectional cardioid
- B. Omnidirectional
- C. Figure-8 broadside to the antennas
- D. Figure-8 end-fire in line with the antennas

4BI-2A.2 What is the radiation pattern of two 1/4-wavelength vertical antennas spaced 1/4 wavelength apart and fed 90 degrees out of phase?

- A. Unidirectional cardioid
- B. Figure-8 end-fire
- C. Figure-8 broadside
- D. Omnidirectional

4BI-2A.3 What is the radiation pattern of two 1/4-wavelength

vertical antennas spaced  $1/2$  wavelength apart and fed in phase?

- A. Omnidirectional
- B. Cardioid unidirectional
- C. Figure-8 broadside to the antennas
- D. Figure-8 end-fire in line with the antennas

4BI-2A.4 How far apart should two  $1/4$ -wavelength vertical antennas be spaced in order to produce a figure-8 pattern that is broadside to the plane of the verticals when fed in phase?

- A.  $1/8$  wavelength
- B.  $1/4$  wavelength
- C.  $1/2$  wavelength
- D. 1 wavelength

4BI-2A.5 How many  $1/2$  wavelengths apart should two  $1/4$ -wavelength vertical antennas be spaced to produce a figure-8 pattern that is in line with the vertical antennas when they are fed 180 degrees out of phase?

- A. One half wavelength apart
- B. Two half wavelengths apart
- C. Three half wavelengths apart
- D. Four half wavelengths apart

4BI-2A.6 What is the radiation pattern of two  $1/4$ -wavelength vertical antennas spaced  $1/4$  wavelength apart and fed 180 degrees out of phase?

- A. Omnidirectional
- B. Cardioid unidirectional
- C. Figure-8 broadside to the antennas
- D. Figure-8 end-fire in line with the antennas

4BI-2A.7 What is the radiation pattern for two  $1/4$ -wavelength vertical antennas spaced  $1/8$  wavelength apart and fed 180 degrees out of phase?

- A. Omnidirectional
- B. Cardioid unidirectional
- C. Figure-8 broadside to the antennas
- D. Figure-8 end-fire in line with the antennas

4BI-2A.8 What is the radiation pattern for two  $1/4$ -wavelength vertical antennas spaced  $1/8$  wavelength apart and fed in phase?

- A. Omnidirectional
- B. Cardioid unidirectional
- C. Figure-8 broadside to the antennas
- D. Figure-8 end-fire in line with the antennas

4BI-2A.9 What is the radiation pattern for two  $1/4$ -wavelength vertical antennas spaced  $1/4$  wavelength apart and fed in phase?

- A. Substantially unidirectional
- B. Elliptical
- C. Cardioid unidirectional
- D. Figure-8 end-fire in line with the antennas

4BI-3A.1 What is a ++++resonant rhombic antenna++++?

- A. A unidirectional antenna, each of whose sides is equal to half a wavelength and which is terminated in a resistance equal to its characteristic impedance

B. A bidirectional antenna open at the end opposite that to which the transmission line is connected and with each side approximately equal to one wavelength

C. An antenna with an LC network at each vertex (other than that to which the transmission line is connected) tuned to resonate at the operating frequency

D. A high-frequency antenna, each of whose sides contains traps for changing the resonance to match the band in use

4BI-3B.1 What is a +++nonresonant rhombic antenna+++?

A. A unidirectional antenna terminated in a resistance equal to its characteristic impedance

B. An open-ended bidirectional antenna

C. An antenna resonant at approximately double the frequency of the intended band of operation

D. A horizontal triangular antenna consisting of two adjacent sides and the long diagonal of a resonant rhombic antenna

4BI-3B.2 What are the advantages of a +++nonresonant rhombic antenna+++?

A. Wide frequency range, high gain and high front-to-back ratio

B. High front-to-back ratio, compact size and high gain

C. Unidirectional radiation pattern, high gain and compact size

D. Bidirectional radiation pattern, high gain and wide frequency range

4BI-3B.3 What are the disadvantages of a +++nonresonant rhombic antenna+++?

A. It requires a large area for proper installation and has a narrow bandwidth

B. It requires a large area for proper installation and has a low front-to-back ratio

C. It requires a large amount of aluminum tubing and has a low front-to-back ratio

D. It requires a large area and four sturdy supports for proper installation

4BI-3B.4 What is the characteristic impedance at the input of a +++nonresonant rhombic antenna+++?

A. 50 to 55 ohms

B. 70 to 75 ohms

C. 300 to 350 ohms

D. 700 to 800 ohms

4BI-3C.1 What is the effect of a +++terminating resistor+++ on a rhombic antenna?

A. It reflects the standing waves on the antenna elements back to the transmitter

B. It changes the radiation pattern from essentially bidirectional to essentially unidirectional

C. It changes the radiation pattern from horizontal to vertical polarization

D. It decreases the ground loss

4BI-3C.2 What should be the value of the +++terminating resistor+++ on

a rhombic antenna?

- A. About 50 ohms
- B. About 75 ohms
- C. About 800 ohms
- D. About 1800 ohms

4BI-4A.1 What factors determine the receiving antenna gain required at an amateur station in earth operation?

- A. Height, transmitter power and antennas of satellite
- B. Length of transmission line and impedance match between receiver and transmission line
- C. Preamplifier location on transmission line and presence or absence of RF amplifier stages
- D. Height of earth antenna and satellite orbit

4BI-4A.2 What factors determine the EIRP required by an amateur station in earth operation?

- A. Satellite antennas and height, satellite receiver sensitivity
- B. Path loss, earth antenna gain, signal-to-noise ratio
- C. Satellite transmitter power and orientation of ground receiving antenna
- D. Elevation of satellite above horizon, signal-to-noise ratio, satellite transmitter power

4BI-4A.3 What factors determine the EIRP required by an amateur station in telecommand operation?

- A. Path loss, earth antenna gain, signal-to-noise ratio
- B. Satellite antennas and height, satellite receiver sensitivity
- C. Satellite transmitter power and orientation of ground receiving antenna
- D. Elevation of satellite above horizon, signal-to-noise ratio, satellite transmitter power

4BI-4A.4 How does the gain of a parabolic dish type antenna change when the operating frequency is doubled?

- A. Gain does not change
- B. Gain is multiplied by 0.707
- C. Gain increases 6 dB
- D. Gain increases 3 dB

4BI-4B.1 What happens to the beamwidth of an antenna as the gain is increased?

- A. The beamwidth increases geometrically as the gain is increased
- B. The beamwidth increases arithmetically as the gain is increased
- C. The beamwidth is essentially unaffected by the gain of the antenna
- D. The beamwidth decreases as the gain is increased

4BI-4B.2 What is the beamwidth of a symmetrical pattern antenna with a gain of 20 dB as compared to an isotropic radiator?

- A. 10.1 degrees
- B. 20.3 degrees
- C. 45.0 degrees

D. 60.9 degrees

4BI-4B.3 What is the beamwidth of a symmetrical pattern antenna with a gain of 30 dB as compared to an isotropic radiator?

- A. 3.2 degrees
- B. 6.4 degrees
- C. 37 degrees
- D. 60.4 degrees

4BI-4B.4 What is the beamwidth of a symmetrical pattern antenna with a gain of 15 dB as compared to an isotropic radiator?

- A. 72 degrees
- B. 52 degrees
- C. 36.1 degrees
- D. 3.61 degrees

4BI-4B.5 What is the beamwidth of a symmetrical pattern antenna with a gain of 12 dB as compared to an isotropic radiator?

- A. 34.8 degrees
- B. 45.0 degrees
- C. 58.0 degrees
- D. 51.0 degrees

4BI-4C.1 How is circular polarization produced using linearly-polarized antennas?

- A. Stack two Yagis, fed 90 degrees out of phase, to form an array with the respective elements in parallel planes
- B. Stack two Yagis, fed in phase, to form an array with the respective elements in parallel planes
- C. Arrange two Yagis perpendicular to each other, with the driven elements in the same plane, fed 90 degrees out of phase
- D. Arrange two Yagis perpendicular to each other, with the driven elements in the same plane, fed in phase

4BI-4C.2 Why does an antenna system for ++++earth operation++++ (for communications through a satellite) need to have rotators for both azimuth and elevation control?

- A. In order to point the antenna above the horizon to avoid terrestrial interference
- B. Satellite antennas require two rotators because they are so large and heavy
- C. In order to track the satellite as it orbits the earth
- D. The elevation rotator points the antenna at the satellite and the azimuth rotator changes the antenna polarization

4BI-5.1 What term describes a method used to match a high-impedance transmission line to a lower impedance antenna by connecting the line to the driven element in two places, spaced a fraction of a wavelength on each side of the driven element center?

- A. The gamma matching system
- B. The delta matching system
- C. The omega matching system
- D. The stub matching system

4BI-5.2 What term describes an unbalanced feed system in which the driven element is fed both at the center of that element and

a fraction of a wavelength to one side of center?

- A. The gamma matching system
- B. The delta matching system
- C. The omega matching system
- D. The stub matching system

4BI-5.3 What term describes a method of antenna impedance matching that uses a short section of transmission line connected to the antenna feed line near the antenna and perpendicular to the feed line?

- A. The gamma matching system
- B. The delta matching system
- C. The omega matching system
- D. The stub matching system

4BI-5.4 What should be the approximate capacitance of the resonating capacitor in a gamma matching circuit on a 1/2-wavelength dipole antenna for the 20-meter wavelength band?

- A. 70 pF
- B. 140 pF
- C. 200 pF
- D. 0.2 pF

4BI-5.5 What should be the approximate capacitance of the resonating capacitor in a gamma matching circuit on a 1/2-wavelength dipole antenna for the 10-meter wavelength band?

- A. 70 pF
- B. 140 pF
- C. 200 pF
- D. 0.2 pF

4BI-6A.1 What kind of impedance does a 1/8-wavelength transmission line present to a generator when the line is shorted at the far end?

- A. A capacitive reactance
- B. The same as the characteristic impedance of the line
- C. An inductive reactance
- D. The same as the input impedance to the final generator

stage

4BI-6A.2 What kind of impedance does a 1/8-wavelength transmission line present to a generator when the line is open at the far end?

- A. The same as the characteristic impedance of the line
- B. An inductive reactance
- C. A capacitive reactance
- D. The same as the input impedance of the final generator

stage

4BI-6B.1 What kind of impedance does a 1/4-wavelength transmission line present to a generator when the line is shorted at the far end?

- A. A very high impedance
- B. A very low impedance
- C. The same as the characteristic impedance of the transmission line
- D. The same as the generator output impedance

4BI-6B.2 What kind of impedance does a  $1/4$ -wavelength transmission line present to a generator when the line is open at the far end?

- A. A very high impedance
- B. A very low impedance
- C. The same as the characteristic impedance of the line
- D. The same as the input impedance to the final generator

stage

4BI-6C.1 What kind of impedance does a  $3/8$ -wavelength transmission line present to a generator when the line is shorted at the far end?

- A. The same as the characteristic impedance of the line
- B. An inductive reactance
- C. A capacitive reactance
- D. The same as the input impedance to the final generator

stage

4BI-6C.2 What kind of impedance does a  $3/8$ -wavelength transmission line present to a generator when the line is open at the far end?

- A. A capacitive reactance
- B. The same as the characteristic impedance of the line
- C. An inductive reactance
- D. The same as the input impedance to the final generator

stage

4BI-6D.1 What kind of impedance does a  $1/2$ -wavelength transmission line present to a generator when the line is shorted at the far end?

- A. A very high impedance
- B. A very low impedance
- C. The same as the characteristic impedance of the line
- D. The same as the output impedance of the generator

4BI-6D.2 What kind of impedance does a  $1/2$ -wavelength transmission line present to a generator when the line is open at the far end?

- A. A very high impedance
- B. A very low impedance
- C. The same as the characteristic impedance of the line
- D. The same as the output impedance of the generator

#### Answers

- |          |   |
|----------|---|
| 4BA-1A.1 | B |
| 4BA-1A.2 | A |
| 4BA-1A.3 | A |
| 4BA-1A.4 | D |
| 4BA-1A.5 | C |
| 4BA-1B.1 | A |
| 4BA-1B.2 | B |
| 4BA-1B.3 | D |



4BA-1B.4	D
4BA-1C.1	B
4BA-1C.2	B
4BA-1C.3	A
4BA-1D.1	B
4BA-1E.1	A
4BA-1E.2	B
4BA-2A.1	A
4BA-2B.1	B
4BA-2B.2	A
4BA-2C.1	C
4BA-2D.1	C
4BA-3A.1	B
4BA-3B.1	A
4BA-3C.1	C
4BA-3D.1	D
4BA-3E.1	A
4BA-3F.1	D
4BA-3G.1	A
4BA-3H.1	C
4BA-3H.2	A
4BA-3I.1	C
4BA-4A.1	C
4BA-4B.1	A
4BA-4C-1.1	B
4BA-4C-2.1	D
4BA-4D-1.1	C
4BA-4E-1.1	D
4BA-4E-2.1	D
4BA-4E-4.1	D
4BA-4E-4.2	C
4BA-4E-4.3	D
4BA-4F-1.1	A
4BA-4F-2.1	A
4BA-5A.1	C
4BA-5B.1	B
4BA-5C.1	A
4BA-5C.2	A
4BA-5C.3	A
4BA-5C.4	A
4BA-5C.5	A
4BA-5C.6	A
4BA-5D.1	B
4BA-5E.1	A
4BA-5E.2	A
4BA-5F.1	D
4BA-5F.2	B
4BA-5F.3	A
4BA-5F.4	D
4BA-5G.1	A
4BA-5G.2	B
4BA-5G.3	A
4BA-5G.4	C
4BA-5G.5	B
4BA-5G.6	A
4BA-6A.1	B
4BA-6A.2	B

4BA-6B.1	B
4BA-6B.2	B
4BA-6B.3	B
4BA-6B.4	B
4BA-6B.5	A
4BA-6C.1	D
4BA-6C.2	A
4BA-6C.3	C
4BA-6D.1	D
4BA-6D.2	A
4BA-7A-1.1	A
4BA-7A-1.2	D
4BA-7A-1.3	A
4BA-7A-1.4	C
4BA-7A-1.5	C
4BA-7A-1.6	D
4BA-7A-1.7	C
4BA-7A-1.8	D
4BA-7A-2.1	A
4BA-7A-2.2	D
4BA-7A-2.3	A
4BA-7A-2.4	A
4BA-7A-2.5	D
4BA-7A-2.6	D
4BA-7B.1	D
4BA-7B.2	D
4BA-7B.3	A
4BA-7B.4	C
4BA-7C.1	A
4BA-7C.2	B
4BA-7C.3	B
4BA-7C.4	D
4BA-7C.5	C
4BA-7C.6	B
4BA-7C.7	A
4BA-7C.8	C
4BA-7C.9	C
4BA-7D.1	D
4BA-7D.2	A
4BA-7D.3	C
4BA-7D.4	B
4BA-7D.5	B
4BA-7E.1	C
4BA-7E.2	B
4BA-7E.3	A
4BA-7E.4	D
4BA-7E.5	A
4BA-7E.6	B
4BA-7F.1	A
4BA-7F.2	B
4BA-7F.3	D
4BA-7F.4	B
4BB-1A.1	C
4BB-1A.2	A
4BB-1A.3	C
4BB-1B.1	D
4BB-1B.2	B

4BB-1B.3	B
4BB-1B.4	B
4BB-1C.1	B
4BB-1C.2	A
4BB-1D.1	D
4BB-1D.2	A
4BB-1D.3	B
4BB-2A.1	A
4BB-2A.2	C
4BB-2A.3	C
4BB-2A.4	B
4BB-2A.5	A
4BB-2A.6	D
4BB-2A.7	C
4BB-2A.8	B
4BB-2A.9	C
4BC-1.1	D
4BC-1.2	B
4BC-1.3	A
4BC-1.4	D
4BC-1.5	B
4BC-2.1	B
4BC-2.2	C
4BC-3.1	A
4BC-3.2	C
4BC-3.3	C
4BC-4.1	C
4BC-5.1	D
4BD-1A.1	C
4BD-1A.2	D
4BD-1A.3	A
4BD-1B.1	A
4BD-1B.2	B
4BD-2A.1	D
4BD-2A.2	C
4BD-2A.3	D
4BD-2B.1	A
4BD-3A.1	A
4BD-3A.2	A
4BD-3A.3	C
4BD-3A.4	D
4BD-3B.1	B
4BD-3B.2	D
4BD-3C.1	B
4BD-3D.1	C
4BD-4.1	A
4BD-4.2	B
4BD-4.3	C
4BD-4.4	D
4BD-4.5	A
4BD-4.6	D
4BD-4.7	C
4BD-4.8	D
4BD-4.9	B
4BD-4.10	C
4BE-1.1	B
4BE-1.2	A

4BE-1.3	D
4BE-1.4	C
4BE-1.5	D
4BE-1.6	A
4BE-1.7	B
4BE-1.8	D
4BE-2A.1	D
4BE-2A.2	C
4BE-2A.3	B
4BE-2A.4	A
4BE-2A.5	D
4BE-2A.6	D
4BE-2B.1	C
4BE-2B.2	D
4BE-2B.3	C
4BE-2B.4	A
4BE-2B.5	B
4BE-2B.6	B
4BE-2B.7	C
4BE-2B.8	C
4BE-2B.9	B
4BE-2B.10	D
4BE-2B.11	A
4BE-2B.12	A
4BE-2B.13	B
4BE-2B.14	A
4BE-2B.15	D
4BE-2B.16	A
4BE-2B.17	C
4BE-2B.18	D
4BE-2B.19	D
4BE-2B.20	A
4BE-2B.21	D
4BE-2B.22	C
4BE-3.1	A
4BE-3.2	B
4BE-3.3	C
4BE-3.4	C
4BE-3.5	B
4BE-3.6	C
4BE-3.7	D
4BE-3.8	C
4BE-3.9	B
4BE-4.1	A
4BE-4.2	B
4BE-4.3	A
4BE-4.4	D
4BE-4.5	A
4BE-5.1	B
4BE-5.2	C
4BE-5.3	D
4BE-5.4	A
4BE-5.5	A
4BE-6A.1	B
4BE-6A.2	C
4BE-6A.3	D
4BE-6A.4	B

4BE-6A.5	C
4BE-6B.1	B
4BE-6B.2	C
4BE-6B.3	B
4BE-6B.4	A
4BE-6B.5	D
4BF-1A.1	D
4BF-1B.1	A
4BF-1C.1	A
4BF-1C.2	B
4BF-1C.3	C
4BF-1C.4	D
4BF-1C.5	D
4BF-1D.1	C
4BF-1D.2	A
4BF-1E.1	A
4BF-1E.2	D
4BF-1E.3	D
4BF-1F.1	B
4BF-1F.2	A
4BF-2.1	A
4BF-2.2	A
4BF-2.3	B
4BF-2.4	A
4BF-2.5	C
4BF-2.6	D
4BF-2.7	A
4BF-3.1	D
4BF-3.2	D
4BF-3.3	B
4BF-4.1	B
4BF-4.2	C
4BF-4.3	A
4BF-4.4	A
4BF-4.5	C
4BF-4.6	D
4BF-5.1	B
4BF-5.2	B
4BF-5.3	C
4BF-6.1	C
4BF-6.2	D
4BF-6.3	D
4BG-1A.1	D
4BG-1A.2	A
4BG-1A.3	C
4BG-1A.4	C
4BG-1A.5	C
4BG-1A.6	C
4BG-1A.7	B
4BG-1B.1	D
4BG-1B.2	A
4BG-1C.1	A
4BG-1C.2	A
4BG-1C.3	D
4BG-1C.4	B
4BG-1C.5	A
4BG-1C.6	D

4BG-1C.7	C
4BG-1C.8	D
4BG-1C.9	A
4BG-1C.10	A
4BG-1D.1	C
4BG-1D.2	D
4BG-1D.3	A
4BG-1D.4	A
4BG-1D.5	D
4BG-2A.1	D
4BG-2A.2	C
4BG-2B.1	D
4BG-2B.2	A
4BG-2B.3	B
4BG-2B.4	B
4BG-3A.1	D
4BG-3A.2	B
4BG-3A.3	D
4BG-3B.1	C
4BG-3B.2	A
4BG-3B.3	D
4BG-3B.4	A
4BG-4A.1	D
4BG-4A.2	A
4BG-4A.3	B
4BG-4B.1	B
4BG-4B.2	B
4BG-4B.3	D
4BG-4B.4	B
4BG-4B.5	B
4BG-4B.6	B
4BG-4B.7	B
4BG-4B.8	A
4BG-4B.9	D
4BG-4B.10	D
4BG-4C.1	C
4BG-4C.2	D
4BG-4C.3	A
4BG-4C.4	B
4BG-4D.1	C
4BG-4D.2	C
4BG-5A.1	A
4BG-5B.1	B
4BG-5C.1	D
4BG-5C.2	C
4BG-5C.3	B
4BG-5C.4	C
4BG-5D.1	D
4BG-6.1	C
4BG-6.2	A
4BG-7.1	A
4BG-7.2	A
4BG-8.1	C
4BG-8.2	A
4BH-1A.1	A
4BH-1A.2	C
4BH-1B.1	D

4BH-1B.2	A
4BH-1B.3	C
4BH-2A.1	D
4BH-2B.1	C
4BH-2B.2	A
4BH-2B.3	B
4BH-2C.1	C
4BH-2D.1	D
4BH-2D.2	A
4BH-2E.1	D
4BH-2E.2	B
4BH-2E.3	C
4BH-2E.4	B
4BH-2F.1	B
4BH-2F.2	B
4BH-2F.3	B
4BH-2F.4	B
4BH-2F.5	C
4BH-2F.6	C
4BH-2F.7	D
4BH-2F.8	A
4BH-2F.9	A
4BH-2F.10	C
4BH-2F.11	C
4BH-2F.12	B
4BH-2F.13	B
4BH-2F.14	C
4BH-2F.15	C
4BH-3.1	C
4BH-3.2	A
4BH-3.3	A
4BH-3.4	D
4BH-3.5	B
4BH-4.1	D
4BH-4.2	A
4BH-4.3	B
4BH-5.1	D
4BH-5.2	D
4BH-6A.1	A
4BH-6A.2	B
4BH-6A.3	A
4BI-1A.1	A
4BI-1B.1	A
4BI-1B.2	D
4BI-1B.3	B
4BI-1B.4	B
4BI-1B.5	A
4BI-1B.6	B
4BI-1C.1	D
4BI-1C.2	D
4BI-2A.1	D
4BI-2A.2	A
4BI-2A.3	C
4BI-2A.4	C
4BI-2A.5	A
4BI-2A.6	D
4BI-2A.7	D

4BI-2A.8	A
4BI-2A.9	B
4BI-3A.1	B
4BI-3B.1	A
4BI-3B.2	A
4BI-3B.3	D
4BI-3B.4	D
4BI-3C.1	B
4BI-3C.2	C
4BI-4A.1	A
4BI-4A.2	A
4BI-4A.3	B
4BI-4A.4	C
4BI-4B.1	D
4BI-4B.2	B
4BI-4B.3	B
4BI-4B.4	C
4BI-4B.5	D
4BI-4C.1	C
4BI-4C.2	C
4BI-5.1	B
4BI-5.2	A
4BI-5.3	D
4BI-5.4	B
4BI-5.5	A
4BI-6A.1	C
4BI-6A.2	C
4BI-6B.1	A
4BI-6B.2	B
4BI-6C.1	C
4BI-6C.2	C
4BI-6D.1	B
4BI-6D.2	A





Subject: General License Exam Questions

3A-3.2 What is the maximum transmitting power permitted an amateur station on 10.14-MHz?

- A. 200 watts PEP output
- B. 1000 watts DC input
- C. 1500 watts PEP output
- D. 2000 watts DC input

3A-3.3 What is the maximum transmitting power permitted an amateur station on 3725-kHz?

- A. 200 watts PEP output
- B. 1000 watts DC input
- C. 1500 watts PEP output
- D. 2000 watts DC input

3A-3.4 What is the maximum transmitting power permitted an amateur station on 7080-kHz?

- A. 200 watts PEP output
- B. 1000 watts DC input
- C. 1500 watts PEP output
- D. 2000 watts DC input

3A-3.5 What is the maximum transmitting power permitted an amateur station on 24.95-MHz?

- A. 200 watts PEP output
- B. 1000 watts DC input
- C. 1500 watts PEP output
- D. 2000 watts DC input

3A-3.7 What is the maximum transmitting power permitted an amateur station transmitting on 21.150-MHz?

- A. 200 watts PEP output
- B. 1000 watts DC input
- C. 1500 watts DC input
- D. 1500 watts PEP output

3A-4.1 How must a General control operator at a Novice station make the station identification when transmitting on 7250 kHz in ITU Region 2?

- A. The control operator should identify the station with his or her call, followed by the word "controlling" and the Novice call
- B. The control operator should identify the station with his or her call, followed by the slant bar "/" (or any suitable word) and the Novice call
- C. The control operator should identify the station with the Novice call, followed by the slant bar "/" (or any suitable word) and his or her own call
- D. A Novice station should not be operated on 7250 kHz, even with a General class control operator

3A-4.3 How must a control operator who has a Technician class license and a "Certificate of Successful Completion of Examination" for General class privileges identify the station when transmitting on 14.325 MHz? (Assume telephony)

- A. General-class privileges do not include 14.325 MHz
- B. No special form of identification is needed
- C. The operator shall give his/her call sign, followed by "slant mark" or any suitable word that denotes the slant mark and the identifier "AG"
- D. The operator shall give his/her call sign, followed by the date and location of the VEC examination where he/she obtained the upgraded license

3A-6.1 Under what circumstances, if any, may third-party communications be transmitted to a foreign country by an amateur station where the third party is not eligible to be a control operator of the station?

- A. Under no circumstances
- B. Only if the country has a third-party communications agreement with the United States
- C. Only if the control operator is an Amateur Extra class licensee
- D. Only if the country has formal diplomatic relations with the United States

3A-6.2 What types of messages may be transmitted by an amateur station to a foreign country for a third-party?

- A. Third-party communications involving material compensation, either tangible or intangible, direct or indirect, to a third party, a station licensee, a control operator, or other person
- B. Third-party communications facilitating the business affairs of any party
- C. Third-party communications limited to messages of a technical nature or remarks of a personal character
- D. No messages may be transmitted to foreign countries for third parties

3A-6.6 Which of the following limitations apply to third-party messages transmitted to foreign countries where the third party is not eligible to be a control operator of the station?

- A. Third-party messages may only be transmitted to amateurs in countries with which the US has a third-party communications agreement
- B. Third-party messages may only be sent to amateurs in ITU Region 1
- C. Third-party messages may only be sent to amateurs in ITU Region 3
- D. Third-party messages must always be transmitted in English

3A-8.6 Under what circumstances, if any, may an amateur station transmitting on 29.64-MHz repeat the 146.34-MHz signals of an amateur station with a Technician control operator?

- A. Under no circumstances
- B. Only if the station on 29.64 MHz is operating under a Special Temporary Authorization allowing such retransmission
- C. Only during an FCC-declared general state of communications emergency
- D. Only if the control operator of the repeater transmitter is authorized to operate on 29.64 MHz

3A-9.1 What frequency privileges are authorized to General operators in the 160-meter wavelength band?

- A. 1800 to 1900 kHz only
- B. 1900 to 2000 kHz only
- C. 1800 to 2000 kHz only
- D. 1825 to 2000 kHz only

3A-9.2 What frequency privileges are authorized to General operators in the 75/80-meter wavelength band?

- A. 3525 to 3750 and 3850 to 4000 kHz only
- B. 3525 to 3775 and 3875 to 4000 kHz only
- C. 3525 to 3750 and 3875 to 4000 kHz only
- D. 3525 to 3775 and 3850 to 4000 kHz only

3A-9.3 What frequency privileges are authorized to General operators in the 40-meter wavelength band?

- A. 7025 to 7175 and 7200 to 7300 kHz only
- B. 7025 to 7175 and 7225 to 7300 kHz only
- C. 7025 to 7150 and 7200 to 7300 kHz only
- D. 7025 to 7150 and 7225 to 7300 kHz only

3A-9.4 What frequency privileges are authorized to General operators in the 30-meter wavelength band?

- A. 10,100 to 10,150 kHz only
- B. 10,105 to 10,150 kHz only
- C. 10,125 to 10,150 kHz only
- D. 10,100 to 10,125 kHz only

3A-9.5 What frequency privileges are authorized to General operators in the 20-meter wavelength band?

- A. 14,025 to 14,100 and 14,175 to 14,350 kHz only
- B. 14,025 to 14,150 and 14,225 to 14,350 kHz only
- C. 14,025 to 14,125 and 14,200 to 14,350 kHz only
- D. 14,025 to 14,175 and 14,250 to 14,350 kHz only

3A-9.6 What frequency privileges are authorized to General operators in the 15-meter wavelength band?

- A. 21,025 to 21,200 and 21,275 to 21,450 kHz only
- B. 21,025 to 21,150 and 21,300 to 21,450 kHz only
- C. 21,025 to 21,200 and 21,300 to 21,450 kHz only
- D. 21,000 to 21,150 and 21,275 to 21,450 kHz only

3A-9.7 What frequency privileges are authorized to General operators in the 12-meter wavelength band?

- A. 24,890 to 24,990 kHz only
- B. 24,890 to 24,975 kHz only
- C. 24,900 to 24,990 kHz only
- D. 24,790 to 24,990 kHz only

3A-9.8 What frequency privileges are authorized to General operators in the 10-meter wavelength band?

- A. 28,000 to 29,700 kHz only
- B. 28,025 to 29,700 kHz only
- C. 28,100 to 29,700 kHz only
- D. 28,025 to 29,600 kHz only

- 3A-9.9 Which operator licenses authorize privileges on 1820-kHz?
- A. Extra only
  - B. Extra, Advanced only
  - C. Extra, Advanced, General only
  - D. Extra, Advanced, General, Technician only
- 3A-9.10 Which operator licenses authorize privileges on 3950-kHz?
- A. Extra, Advanced only
  - B. Extra, Advanced, General only
  - C. Extra, Advanced, General, Technician only
  - D. Extra, Advanced, General, Technician, Novice only
- 3A-9.11 Which operator licenses authorize privileges on 7230-kHz?
- A. Extra only
  - B. Extra, Advanced only
  - C. Extra, Advanced, General only
  - D. Extra, Advanced, General, Technician only
- 3A-9.12 Which operator licenses authorize privileges on 10.125-MHz?
- A. Extra, Advanced, General only
  - B. Extra, Advanced only
  - C. Extra only
  - D. Technician only
- 3A-9.13 Which operator licenses authorize privileges on 14.325-MHz?
- A. Extra, Advanced, General, Technician only
  - B. Extra, Advanced, General only
  - C. Extra, Advanced only
  - D. Extra only
- 3A-9.14 Which operator licenses authorize privileges on 21.425-MHz?
- A. Extra, Advanced, General, Novice only
  - B. Extra, Advanced, General, Technician only
  - C. Extra, Advanced, General only
  - D. Extra, Advanced only
- 3A-9.15 Which operator licenses authorize privileges on 24.895-MHz?
- A. Extra only
  - B. Extra, Advanced only
  - C. Extra, Advanced, General only
  - D. None
- 3A-9.16 Which operator licenses authorize privileges on 29.616-MHz?
- A. Novice, Technician, General, Advanced, Extra only
  - B. Technician, General, Advanced, Extra only
  - C. General, Advanced, Extra only
  - D. Advanced, Extra only
- 3A-10.1 On what frequencies within the 160-meter wavelength band may phone emissions be transmitted?
- A. 1800-2000 kHz only
  - B. 1800-1900 kHz only

- C. 1900-2000 kHz only
- D. 1825-1950 kHz only

3A-10.2 On what frequencies within the 80-meter wavelength band may CW emissions be transmitted?

- A. 3500-3750 kHz only
- B. 3700-3750 kHz only
- C. 3500-4000 kHz only
- D. 3890-4000 kHz only

3A-10.3 On what frequencies within the 40-meter wavelength band may image emissions be transmitted?

- A. 7225-7300 kHz only
- B. 7000-7300 kHz only
- C. 7100-7150 kHz only
- D. 7150-7300 kHz only

3A-10.4 On what frequencies within the 30-meter wavelength band may RTTY emissions be transmitted?

- A. 10.140-10.150 MHz only
- B. 10.125-10.150 MHz only
- C. 10.100-10.150 MHz only
- D. 10.100-10.125 MHz only

3A-10.5 On what frequencies within the 20-meter wavelength band may image emissions be transmitted?

- A. 14,200-14,300 kHz only
- B. 14,150-14,350 kHz only
- C. 14,025-14,150 kHz only
- D. 14,150-14,300 kHz only

3A-10.6 On what frequencies within the 15-meter wavelength band may image emissions be transmitted?

- A. 21,200-21,300 kHz only
- B. 21,350-21,450 kHz only
- C. 21,200-21,450 kHz only
- D. 21,100-21,200 kHz only

3A-10.7 On what frequencies within the 12-meter wavelength band may phone emissions be transmitted?

- A. 24,890-24,990 kHz only
- B. 24,890-24,930 kHz only
- C. 24,930-24,990 kHz only
- D. Phone emissions are not permitted in this band

3A-10.8 On what frequencies within the 10-meter wavelength band may phone emissions be transmitted?

- A. 28,000-28,300 kHz only
- B. 29,000-29,700 kHz only
- C. 28,300-29,700 kHz only
- D. 28,000-29,000 kHz only

3A-13.1 What is the maximum sending speed permitted for data emissions below 28 MHz?

- A. 56 kilobauds
- B. 19.6 kilobauds
- C. 300 bauds

D. 1200 bauds

3A-13.2 What is the maximum sending speed permitted for RTTY emissions below 28 MHz?

- A. 56 kilobauds
- B. 19.6 kilobauds
- C. 1200 bauds
- D. 300 bauds

3A-14.3 Under what circumstances, if any, may an amateur station engage in some form of broadcasting?

- A. During severe storms, amateurs may broadcast weather information for people with scanners
- B. Under no circumstances
- C. If power levels under one watt are used, amateur stations may broadcast information bulletins, but not music
- D. Amateur broadcasting is permissible above 10 GHz

3A-14.6 Which of the following is +++++not+++++ a condition that allows an amateur station to engage in news gathering for broadcast purposes?

- A. The information is more quickly transmitted by Amateur Radio
- B. The information involves the immediate safety of life of individuals or the immediate protection of property
- C. The information is directly related to the event
- D. The information cannot be transmitted by other means

3A-15.1 Under what circumstances, if any, may the playing of a violin be transmitted by an amateur station?

- A. When the music played produces no dissonances or spurious emissions
- B. When it is used to jam an illegal transmission
- C. Only above 1215 MHz
- D. Transmitting music is not permitted in the Amateur Service

3A-15.3 Under what circumstances, if any, may the playing of a piano be transmitted by an amateur station?

- A. When it is used to jam an illegal transmission
- B. Only above 1215 MHz
- C. Transmitting music is not permitted in the Amateur Service
- D. When the music played produces no dissonances or spurious emissions

3A-15.4 Under what circumstances, if any, may the playing of a harmonica be transmitted by an amateur station?

- A. When the music played produces no dissonances or spurious emissions
- B. Transmitting music is not permitted in the Amateur Service
- C. When it is used to jam an illegal transmission
- D. Only above 1215 MHz

3A-16.1 Under what circumstances, if any, may an amateur station in two-way communication transmit a message in a secret code in

order to obscure the meaning of the communication?

- A. Only above 450 MHz
- B. Only on Field Day
- C. Never
- D. Only during a declared communications emergency

3A-16.2 In an amateur communication, what types of abbreviations or procedural signals are not considered codes or ciphers?

- A. Abbreviations and procedural signals certified by the ARRL
- B. Abbreviations and procedural signals established by regulation or custom and usage and whose intent is to facilitate communication and not to obscure meaning
- C. No abbreviations are permitted, as they tend to obscure the meaning of the message to FCC monitoring stations
- D. Only "10-codes" are permitted

3A-16.3 When, if ever, are codes or ciphers permitted in two-way domestic Amateur Radio communications?

- A. Codes or ciphers are prohibited under all circumstances
- B. Codes or ciphers are permitted during ARRL-sponsored contests
- C. Codes or ciphers are permitted during nationally declared emergencies
- D. Codes or ciphers are permitted above 2.3 GHz

3A-16.4 When, if ever, are codes or ciphers permitted in two-way international Amateur Radio communications?

- A. Codes or ciphers are prohibited under all circumstances
- B. Codes or ciphers are permitted during ITU-sponsored DX contests
- C. Codes or ciphers are permitted during internationally declared emergencies
- D. Codes or ciphers are permitted only on frequencies above 2.3 GHz

3B-1.4 What is meant by the term +++flattopping+++ in a single-sideband phone transmission?

- A. Signal distortion caused by insufficient collector current
- B. The transmitter's automatic level control is properly adjusted
- C. Signal distortion caused by excessive drive
- D. The transmitter's carrier is properly suppressed

3B-1.5 How should the microphone gain control be adjusted on a single-sideband phone transmitter?

- A. For full deflection of the ALC meter on modulation peaks
- B. For slight movement of the ALC meter on modulation peaks
- C. For 100% frequency deviation on modulation peaks
- D. For a dip in plate current

3B-2.1 In what segment of the 20-meter wavelength band do most RTTY transmissions take place?

- A. Between 14.000 and 14.050 MHz
- B. Between 14.075 and 14.100 MHz
- C. Between 14.150 and 14.225 MHz



D. Between 14.275 and 14.350 MHz

3B-2.2 In what segment of the 80-meter wavelength band do most RTTY transmissions take place?

- A. 3.610 to 3.630 MHz
- B. 3500 to 3525 kHz
- C. 3700 to 3750 kHz
- D. 3.775 to 3.825 MHz

3B-2.3 What is meant by the term ++++Baudot++++?

- A. Baudot is a 7-bit code, with start, stop and parity bits
- B. Baudot is a 7-bit code in which each character has four mark and three space bits
- C. Baudot is a 5-bit code, with additional start and stop bits
- D. Baudot is a 6-bit code, with additional start, stop and parity bits

3B-2.4 What is meant by the term ++++ASCII++++?

- A. ASCII is a 7-bit code, with additional start, stop and parity bits
- B. ASCII is a 7-bit code in which each character has four mark and three space bits
- C. ASCII is a 5-bit code, with additional start and stop bits
- D. ASCII is a 5-bit code in which each character has three mark and two space bits

3B-2.6 What is the most common frequency shift for RTTY emissions in the amateur HF bands?

- A. 85 Hz
- B. 170 Hz
- C. 425 Hz
- D. 850 Hz

3B-2.10 What are the two subset modes of AMTOR?

- A. A mark of 2125 Hz and a space of 2295 Hz
- B. Baudot and ASCII
- C. ARQ and FEC
- D. USB and LSB

3B-2.11 What is the meaning of the term ++++ARQ++++?

- A. Automatic Repeater Queue
- B. Automatic Receiver Quieting
- C. Automatically Resend Quickly
- D. Automatic Repeat Request

3B-2.12 What is the meaning of the term ++++FEC++++?

- A. Frame Error Check
- B. Forward Error Correction
- C. Frequency Envelope Control
- D. Frequency Encoded Connection

3B-3.8 What is a ++++band plan++++?

- A. An outline adopted by Amateur Radio operators for operating within a specific portion of radio spectrum
- B. An arrangement for deviating from FCC Rules and

Regulations

C. A schedule for operating devised by the Federal Communications Commission

D. A plan devised for a club on how best to use a band during a contest

3B-3.12 What is the usual input/output frequency separation for a 10 meter station in repeater operation?

- A. 100 kHz
- B. 600 kHz
- C. 1.6 MHz
- D. 170 Hz

3B-4.1 What is meant by the term ++++VOX transmitter control++++?

- A. Circuitry that causes the transmitter to transmit automatically when the operator speaks into the microphone
- B. Circuitry that shifts the frequency of the transmitter when the operator switches from radiotelegraphy to radiotelephony
- C. Circuitry that activates the receiver incremental tuning in a transceiver
- D. Circuitry that isolates the microphone from the ambient noise level

3B-4.2 What is the common name for the circuit that causes a transmitter to automatically transmit when a person speaks into the microphone?

- A. VXO
- B. VOX
- C. VCO
- D. VFO

3B-5.1 What is meant by the term ++++full break-in telegraphy++++?

- A. A system of radiotelegraph communication in which the breaking station sends the Morse Code symbols BK
- B. A system of radiotelegraph communication in which only automatic keyers can be used
- C. A system of radiotelegraph communication in which the operator must activate the send-receive switch after completing a transmission
- D. A system of radiotelegraph communication in which the receiver is sensitive to incoming signals between transmitted key pulses

3B-5.2 What Q signal is used to indicate full break-in telegraphy capability?

- A. QSB
- B. QSF
- C. QSK
- D. QSV

3B-6.1 When selecting a CW transmitting frequency, what is the minimum frequency separation from a QSO in progress that should be allowed in order to minimize interference?

- A. 5 to 50 Hz
- B. 150 to 500 Hz
- C. Approximately 3 kHz
- D. Approximately 6 kHz

3B-6.2 When selecting a single-sideband phone transmitting frequency, what is the minimum frequency separation from a QSO in progress that should be allowed in order to minimize interference?

- A. 150 to 500 Hz between suppressed carriers
- B. Approximately 3 kHz between suppressed carriers
- C. Approximately 6 kHz between suppressed carriers
- D. Approximately 10 kHz between suppressed carriers

3B-6.3 When selecting a RTTY transmitting frequency, what is the minimum frequency separation from a QSO in progress that should be allowed in order to minimize interference?

- A. Approximately 45 Hz center to center
- B. Approximately 250 to 500 Hz center to center
- C. Approximately 3 kHz center to center
- D. Approximately 6 kHz center to center

3B-7.1 What is an azimuthal map?

- A. A map projection that is always centered on the North Pole
- B. A map projection, centered on a particular location, that determines the shortest path between two points on the surface of the earth
- C. A map that shows the angle at which an amateur satellite crosses the equator
- D. A map that shows the number of degrees longitude that an amateur satellite appears to move westward at the equator with each orbit

3B-7.2 How can an azimuthal map be helpful in conducting international HF radio communications?

- A. It is used to determine the proper beam heading for the shortest path to a DX station
- B. It is used to determine the most efficient transmitting antenna height to conduct the desired communication
- C. It is used to determine the angle at which an amateur satellite crosses the equator
- D. It is used to determine the maximum usable frequency (MUF)

3B-7.3 What is the most useful type of map when orienting a directional antenna toward a station 5,000 miles distant?

- A. Azimuthal
- B. Mercator
- C. Polar projection
- D. Topographical

3B-7.4 A directional antenna pointed in the long-path direction to another station is generally oriented how many degrees from the short-path heading?

- A. 45 degrees
- B. 90 degrees
- C. 180 degrees
- D. 270 degrees

3B-7.5 What is the short-path heading to Antarctica?

- A. Approximately 0 degrees
- B. Approximately 90 degrees
- C. Approximately 180 degrees
- D. Approximately 270 degrees

3B-8.1 When permitted, transmissions to amateur stations in another country must be limited to only what type of messages?

- A. Messages of any type are permitted
- B. Messages that compete with public telecommunications services
- C. Messages of a technical nature or remarks of a personal character of relative unimportance
- D. Such transmissions are never permitted

3B-8.2 In which International Telecommunication Union Region is the continental United States?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-8.3 In which International Telecommunication Union Region is Alaska?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-8.4 In which International Telecommunication Union Region is American Samoa?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-8.5 For uniformity in international radio communication, what time measurement standard should Amateur Radio operators worldwide use?

- A. Eastern Standard Time
- B. Uniform Calibrated Time
- C. Coordinated Universal Time
- D. Universal Time Control

3B-8.6 In which International Telecommunication Union Region is Hawaii?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-8.7 In which International Telecommunication Union Region are the Northern Mariana Islands?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-8.8 In which International Telecommunication Union Region is Guam?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-8.9 In which International Telecommunication Union Region is Wake Island?

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4

3B-10.1 What is the +++++Amateur Auxiliary+++++ to the FCC's Field Operations Bureau?

- A. Amateur Volunteers formally enlisted to monitor the airwaves for rules violations
- B. Amateur Volunteers who conduct Amateur Radio licensing examinations
- C. Amateur Volunteers who conduct frequency coordination for amateur VHF repeaters
- D. Amateur Volunteers who determine height above average terrain measurements for repeater installations

3B-10.2 What are the objectives of the Amateur Auxiliary to the FCC's Field Operations Bureau?

- A. To enforce amateur self-regulation and compliance with the rules
- B. To foster amateur self-regulation and compliance with the rules
- C. To promote efficient and orderly spectrum usage in the repeater subbands
- D. To provide emergency and public safety communications

3C-1.6 What is the maximum distance along the earth's surface that can normally be covered in one hop using the F2 layer?

- A. Approximately 180 miles
- B. Approximately 1200 miles
- C. Approximately 2500 miles
- D. No distance. This layer does not support radio communication

3C-1.7 What is the maximum distance along the earth's surface that can be covered in one hop using the E layer?

- A. Approximately 180 miles
- B. Approximately 1200 miles
- C. Approximately 2500 miles
- D. No distance. This layer does not support radio communication

3C-1.9 What is the average height of maximum ionization of the E layer?

- A. 45 miles
- B. 70 miles
- C. 200 miles
- D. 1200 miles

3C-1.10 During what part of the day, and in what season of the year can the F2 layer be expected to reach its maximum height?

- A. At noon during the summer
- B. At midnight during the summer
- C. At dusk in the spring and fall
- D. At noon during the winter

3C-1.13 What is the +++critical angle+++, as used in radio wave propagation?

- A. The lowest take off angle that will return a radio wave to earth under specific ionospheric conditions
- B. The compass direction of the desired DX station from your location
- C. The 180-degree-inverted compass direction of the desired DX station from your location
- D. The highest take off angle that will return a radio wave to earth during specific ionospheric conditions

3C-2.3 What is the main reason that the 160-, 80-, and 40-meter wavelength amateur bands tend to be useful for only short-distance communications during daylight hours?

- A. Because of a lack of activity
- B. Because of auroral propagation
- C. Because of D-layer absorption
- D. Because of magnetic flux

3C-2.4 What is the principal reason the 160-meter through 40-meter wavelength bands are useful for only short-distance radio communications during daylight hours?

- A. F-layer bending
- B. Gamma radiation
- C. D-layer absorption
- D. Tropospheric ducting

3C-3.3 If the maximum usable frequency on the path from Minnesota to Africa is 22-MHz, which band should offer the best chance for a successful QSO?

- A. 10 meters
- B. 15 meters
- C. 20 meters
- D. 40 meters

3C-3.4 If the maximum usable frequency on the path from Ohio to West Germany is 17-MHz, which band should offer the best chance for a successful QSO?

- A. 80 meters
- B. 40 meters
- C. 20 meters
- D. 2 meters

3C-5.1 Over what periods of time do sudden ionospheric disturbances normally last?

- A. The entire day
- B. A few minutes to a few hours
- C. A few hours to a few days
- D. Approximately one week

3C-5.2 What can be done at an amateur station to continue radio communications during a sudden ionospheric disturbance?

- A. Try a higher frequency
- B. Try the other sideband
- C. Try a different antenna polarization
- D. Try a different frequency shift

3C-5.3 What effect does a sudden ionospheric disturbance have on the daylight ionospheric propagation of HF radio waves?

- A. Disrupts higher-latitude paths more than lower-latitude paths
- B. Disrupts transmissions on lower frequencies more than those on higher frequencies
- C. Disrupts communications via satellite more than direct communications
- D. None. Only dark (as in nighttime) areas of the globe are affected

3C-5.4 How long does it take a solar disturbance that increases the sun's ultraviolet radiation to cause ionospheric disturbances on earth?

- A. Instantaneously
- B. 1.5 seconds
- C. 8 minutes
- D. 20 to 40 hours

3C-5.5 Sudden ionospheric disturbances cause increased radio wave absorption in which layer of the ionosphere?

- A. D layer
- B. E layer
- C. F1 layer
- D. F2 layer

3C-6.2 What is a characteristic of +++backscatter+++ signals?

- A. High intelligibility
- B. A wavering sound
- C. Reversed modulation
- D. Reversed sidebands

3C-6.4 What makes backscatter signals often sound distorted?

- A. Auroral activity and changes in the earth's magnetic field
- B. The propagation through ground waves that absorb much of the signal's clarity
- C. The earth's E-layer at the point of radio wave refraction
- D. The small part of the signal's energy scattered back to the transmitter skip zone through several radio-wave paths

3C-6.5 What is the radio wave propagation phenomenon that allows a signal to be detected at a distance too far for ground wave propagation but too near for normal sky wave propagation?

- A. Ground wave
- B. Scatter
- C. Sporadic-E skip
- D. Short path skip

3C-6.6 When does ionospheric scatter propagation on the HF bands most often occur?

- A. When the sunspot cycle is at a minimum
- B. At night
- C. When the F1 and F2 layers are combined
- D. At frequencies above the maximum usable frequency

3C-7.1 What is +++solar flux+++?

- A. The density of the sun's magnetic field
- B. The radio energy emitted by the sun
- C. The number of sunspots on the side of the sun facing the earth
- D. A measure of the tilt of the earth's ionosphere on the side toward the sun

3C-7.2 What is the +++solar-flux index+++?

- A. A measure of past measurements of solar activity
- B. A measurement of solar activity that compares daily readings with results from the last six months
- C. Another name for the American sunspot number
- D. A measure of solar activity that is taken daily

3C-7.3 What is a timely indicator of solar activity?

- A. The 2800-MHz solar flux index
- B. The mean Canadian sunspot number
- C. A clock set to Coordinated Universal Time
- D. Van Allen radiation measurements taken at Boulder, Colorado

3C-7.4 What type of propagation conditions on the 15-meter wavelength band are indicated by a solar-flux index value of 60 to 70?

- A. Unpredictable ionospheric propagation
- B. No ionospheric propagation is possible
- C. Excellent ionospheric propagation
- D. Poor ionospheric propagation

3C-7.5 A solar flux index in the range of 90 to 110 indicates what type of propagation conditions on the 15-meter wavelength band?

- A. Poor ionospheric propagation
- B. No ionospheric propagation is possible
- C. Unpredictable ionospheric propagation
- D. Good ionospheric propagation

3C-7.6 A solar flux index of greater than 120 would indicate what type of propagation conditions on the 10-meter wavelength band?

- A. Good ionospheric propagation
- B. Poor ionospheric propagation
- C. No ionospheric propagation is possible
- D. Unpredictable ionospheric propagation

3C-7.7 For widespread long distance openings on the 6-meter wavelength band, what solar-flux index values would be required?

- A. Less than 50
- B. Approximately 75
- C. Greater than 100



D. Greater than 250

3C-7.8 If the MUF is high and HF radio communications are generally good for several days, a similar condition can usually be expected how many days later?

- A. 7 days
- B. 14 days
- C. 28 days
- D. 90 days

3C-10.1 What is a +++geomagnetic disturbance+++?

- A. A sudden drop in the solar-flux index
- B. A shifting of the earth's magnetic pole
- C. Ripples in the ionosphere
- D. A dramatic change in the earth's magnetic field over a short period of time

3C-10.2 Which latitude paths are more susceptible to geomagnetic disturbances?

- A. Those greater than 45 degrees latitude
- B. Those less than 45 degrees latitude
- C. Equatorial paths
- D. All paths are affected equally

3C-10.3 What can be the effect of a major geomagnetic storm on radio communications?

- A. Improved high-latitude HF communications
- B. Degraded high-latitude HF communications
- C. Improved ground-wave propagation
- D. Improved chances of ducting at UHF

3C-10.4 How long does it take a solar disturbance that increases the sun's radiation of charged particles to affect radio wave propagation on earth?

- A. The effect is instantaneous
- B. 1.5 seconds
- C. 8 minutes
- D. 20 to 40 hours

3D-1.5 Which wires in a four conductor line cord should be attached to fuses in a 234-VAC primary (single phase) power supply?

- A. Only the "hot" (black and red) wires
- B. Only the "neutral" (white) wire
- C. Only the ground (bare) wire
- D. All wires

3D-1.6 What size wire is normally used on a 15-ampere, 117-VAC household lighting circuit?

- A. AWG number 14
- B. AWG number 16
- C. AWG number 18
- D. AWG number 22

3D-1.7 What size wire is normally used on a 20-ampere, 117-VAC household appliance circuit?

- A. AWG number 20

- B. AWG number 16
- C. AWG number 14
- D. AWG number 12

3D-1.8 What could be a cause of the room lights dimming when the transmitter is keyed?

- A. RF in the AC pole transformer
- B. High resistance in the key contacts
- C. A drop in AC line voltage
- D. The line cord is wired incorrectly

3D-1.9 What size fuse should be used on a #12 wire household appliance circuit?

- A. Maximum of 100 amperes
- B. Maximum of 60 amperes
- C. Maximum of 30 amperes
- D. Maximum of 20 amperes

3D-2.4 What safety feature is provided by a bleeder resistor in a power supply?

- A. It improves voltage regulation
- B. It discharges the filter capacitors
- C. It removes shock hazards from the induction coils
- D. It eliminates ground-loop current

3D-3.1 What kind of input signal is used to test the amplitude linearity of a single-sideband phone transmitter while viewing the output on an oscilloscope?

- A. Normal speech
- B. An audio-frequency sine wave
- C. Two audio-frequency sine waves
- D. An audio-frequency square wave

3D-3.2 To test the amplitude linearity of a single-sideband phone transmitter with an oscilloscope, what should the audio input to the transmitter be?

- A. Normal speech
- B. An audio-frequency sine wave
- C. Two audio-frequency sine waves
- D. An audio-frequency square wave

3D-3.3 How are two tones used to test the amplitude linearity of a single-sideband phone transmitter?

- A. Two harmonically related audio tones are fed into the microphone input of the transmitter, and the output is observed on an oscilloscope
- B. Two harmonically related audio tones are fed into the microphone input of the transmitter, and the output is observed on a distortion analyzer
- C. Two non-harmonically related audio tones are fed into the microphone input of the transmitter, and the output is observed on an oscilloscope
- D. Two non-harmonically related audio tones are fed into the microphone input of the transmitter, and the output is observed on a wattmeter

3D-3.4 What audio frequencies are used in a +++two-tone test+++ of the

linearity of a single-sideband phone transmitter?

- A. 20 Hz and 20,000 Hz tones must be used
- B. 1200 Hz and 2400 Hz tones must be used
- C. Any two audio tones may be used, but they must be within the transmitter audio passband, and must be harmonically related
- D. Any two audio tones may be used, but they must be within the transmitter audio passband, and should not be harmonically related

3D-3.5 What can be determined by making a +++two-tone test+++ using an oscilloscope?

- A. The percent of frequency modulation
- B. The percent of carrier phase shift
- C. The frequency deviation
- D. The amplifier linearity

3D-4.1 How can the grid-current meter in a power amplifier be used as a neutralizing indicator?

- A. Tune for minimum change in grid current as the output circuit is changed
- B. Tune for maximum change in grid current as the output circuit is changed
- C. Tune for minimum grid current
- D. Tune for maximum grid current

3D-4.2 Why is neutralization in some vacuum tube amplifiers necessary?

- A. To reduce the limits of loaded Q in practical tuned circuits
- B. To reduce grid to cathode leakage
- C. To cancel acid build-up caused by thorium oxide gas
- D. To cancel oscillation caused by the effects of interelectrode capacitance

3D-4.3 How is neutralization of an RF amplifier accomplished?

- A. By supplying energy from the amplifier output to the input on alternate half cycles
- B. By supplying energy from the amplifier output to the input shifted 360 degrees out of phase
- C. By supplying energy from the amplifier output to the input shifted 180 degrees out of phase
- D. By supplying energy from the amplifier output to the input with a proper DC bias

3D-4.4 What purpose does a neutralizing circuit serve in an RF amplifier?

- A. It controls differential gain
- B. It cancels the effects of positive feedback
- C. It eliminates circulating currents
- D. It reduces incidental grid modulation

3D-4.5 What is the reason for neutralizing the final amplifier stage of a transmitter?

- A. To limit the modulation index
- B. To eliminate parasitic oscillations
- C. To cut off the final amplifier during standby periods
- D. To keep the carrier on frequency

3D-5.1 How can the output PEP of a transmitter be determined with an oscilloscope?

A. Measure peak load voltage across a resistive load with an oscilloscope, and calculate, using  $PEP = [(V_p)(V_p)]/(RL)$

B. Measure peak load voltage across a resistive load with an oscilloscope, and calculate, using  $PEP = [(0.707 PEP)(0.707 PEP)]/RL$

C. Measure peak load voltage across a resistive load with an oscilloscope, and calculate, using  $PEP = (V_p)(V_p)(RL)$

D. Measure peak load voltage across a resistive load with an oscilloscope, and calculate, using  $PEP = [(1.414 PEP)(1.414 PEP)]/RL$

3D-5.5 What is the output PEP from a transmitter when an oscilloscope shows 200-volts peak-to-peak across a 50 ohm resistor connected to the transmitter output terminals?

- A. 100 watts
- B. 200 watts
- C. 400 watts
- D. 1000 watts

3D-5.6 What is the output PEP from a transmitter when an oscilloscope shows 500-volts peak-to-peak across a 50 ohm resistor connected to the transmitter output terminals?

- A. 500 watts
- B. 625 watts
- C. 1250 watts
- D. 2500 watts

3D-5.7 What is the output PEP of an unmodulated carrier transmitter when an average-reading wattmeter connected to the transmitter output terminals indicates 1060 watts?

- A. 530 watts
- B. 1060 watts
- C. 1500 watts
- D. 2120 watts

3D-6.1 What item of test equipment contains horizontal and vertical channel amplifiers?

- A. The ohmmeter
- B. The signal generator
- C. The ammeter
- D. The oscilloscope

3D-6.2 What types of signals can an oscilloscope measure?

- A. Any time-dependent signal within the bandwidth capability of the instrument
- B. Blinker-light signals from ocean-going vessels
- C. International nautical flag signals
- D. Signals created by aeronautical flares

3D-6.3 What is an +++++oscilloscope++++?

- A. An instrument that displays the radiation resistance of an antenna
- B. An instrument that displays the SWR on a feed line
- C. An instrument that displays the resistance in a circuit

D. An instrument that displays signal waveforms

3D-6.4 What can cause phosphor damage to an oscilloscope cathode ray tube?

A. Directly connecting deflection electrodes to the cathode ray tube

B. Too high an intensity setting

C. Overdriving the vertical amplifier

D. Improperly adjusted focus

3D-9.1 What is a ++++signal tracer++++?

A. A direction-finding antenna

B. An aid for following schematic diagrams

C. A device for detecting signals in a circuit

D. A device for drawing signal waveforms

3D-9.2 How is a signal tracer used?

A. To detect the presence of a signal in the various stages of a receiver

B. To locate a source of interference

C. To trace the path of a radio signal through the ionosphere

D. To draw a waveform on paper

3D-9.3 What is a signal tracer normally used for?

A. To identify the source of radio transmissions

B. To make exact replicas of signals

C. To give a visual indication of standing waves on open-wire feed lines

D. To identify an inoperative stage in a radio receiver

3D-10.1 What is the most effective way to reduce or eliminate audio frequency interference to home entertainment systems?

A. Install bypass inductors

B. Install bypass capacitors

C. Install metal oxide varistors

D. Install bypass resistors

3D-10.2 What should be done when a properly operating amateur station is the source of interference to a nearby telephone?

A. Make internal adjustments to the telephone equipment

B. Contact a phone service representative about installing RFI filters

C. Nothing can be done to cure the interference

D. Ground and shield the local telephone distribution amplifier

3D-10.3 What sound is heard from a public address system when audio rectification occurs in response to a nearby single-sideband phone transmission?

A. A steady hum that persists while the transmitter's carrier is on the air

B. On-and-off humming or clicking

C. Distorted speech from the transmitter's signals

D. Clearly audible speech from the transmitter's signals

3D-10.4 How can the possibility of audio rectification occurring

be minimized?

- A. By using a solid state transmitter
- B. By using CW emission only
- C. By ensuring all station equipment is properly grounded
- D. By using AM emission only

3D-10.5 What sound is heard from a public address system when audio rectification occurs in response to a nearby double-sideband phone transmission?

- A. Audible, possibly distorted speech from the transmitter signals
- B. On-and-off humming or clicking
- C. Muffled, distorted speech from the transmitter's signals
- D. Extremely loud, severely distorted speech from the transmitter's signals

3D-12.2 What is the reason for using a speech processor with a single-sideband phone transmitter?

- A. A properly adjusted speech processor reduces average transmitter power requirements
- B. A properly adjusted speech processor reduces unwanted noise pickup from the microphone
- C. A properly adjusted speech processor improves voice frequency fidelity
- D. A properly adjusted speech processor improves signal intelligibility at the receiver

3D-12.3 When a transmitter is 100% modulated, will a speech processor increase the output PEP?

- A. Yes
- B. No
- C. It will decrease the transmitter's peak power output
- D. It will decrease the transmitter's average power output

3D-12.4 Under which band conditions should a speech processor not be used?

- A. When there is high atmospheric noise on the band
- B. When the band is crowded
- C. When the frequency in use is clear
- D. When the sunspot count is relatively high

3D-12.5 What effect can result from using a speech processor with a single-sideband phone transmitter?

- A. A properly adjusted speech processor reduces average transmitter power requirements
- B. A properly adjusted speech processor reduces unwanted noise pickup from the microphone
- C. A properly adjusted speech processor improves voice frequency fidelity
- D. A properly adjusted speech processor improves signal intelligibility at the receiver

3D-13.1 At what point in a coaxial line should an electronic T-R switch be installed?

- A. Between the transmitter and low-pass filter
- B. Between the low-pass filter and antenna
- C. At the antenna feed point

D. Right after the low-pass filter

3D-13.2 Why is an electronic T-R switch preferable to a mechanical one?

- A. Greater receiver sensitivity
- B. Circuit simplicity
- C. Higher operating speed
- D. Cleaner output signals

3D-13.3 What station accessory facilitates QSK operation?

- A. Oscilloscope
- B. Audio CW filter
- C. Antenna relay
- D. Electronic TR switch

3D-14.6 What is an antenna +++noise bridge+++?

- A. An instrument for measuring the noise figure of an antenna or other electrical circuit
- B. An instrument for measuring the impedance of an antenna or other electrical circuit
- C. An instrument for measuring solar flux
- D. An instrument for tuning out noise in a receiver

3D-14.7 How is an antenna noise bridge used?

- A. It is connected at the antenna feed point, and the noise is read directly
- B. It is connected between a transmitter and an antenna and tuned for minimum SWR
- C. It is connected between a receiver and an unknown impedance and tuned for minimum noise
- D. It is connected between an antenna and a Transmatch and adjusted for minimum SWR

3D-15.1 How does the emitted waveform from a properly adjusted single-sideband phone transmitter appear on a monitoring oscilloscope?

- A. A vertical line
- B. A waveform that mirrors the input waveform
- C. A square wave
- D. Two loops at right angles

3D-15.2 What is the best instrument for checking the transmitted signal quality from a CW or single-sideband phone transmitter?

- A. A monitor oscilloscope
- B. A field strength meter
- C. A sidetone monitor
- D. A diode probe and an audio amplifier

3D-15.3 What is a +++monitoring oscilloscope+++?

- A. A device used by the FCC to detect out-of-band signals
- B. A device used to observe the waveform of a transmitted signal
- C. A device used to display SSTV signals
- D. A device used to display signals in a receiver IF stage

3D-15.4 How is a monitoring oscilloscope connected in a station in order to check the quality of the transmitted signal?

- A. Connect the receiver IF output to the vertical-deflection plates of the oscilloscope
- B. Connect the transmitter audio input to the oscilloscope vertical input
- C. Connect a receiving antenna directly to the oscilloscope vertical input
- D. Connect the transmitter output to the vertical-deflection plates of the oscilloscope

3D-17.2 What is the most appropriate instrument to use when determining antenna horizontal radiation patterns?

- A. A field strength meter
- B. A grid-dip meter
- C. A wave meter
- D. A vacuum-tube voltmeter

3D-17.3 What is a +++++field-strength++++ meter?

- A. A device for determining the standing-wave ratio on a transmission line
- B. A device for checking modulation on the output of a transmitter
- C. A device for monitoring relative RF output
- D. A device for increasing the average transmitter output

3D-17.4 What is a simple instrument that can be useful for monitoring relative RF output during antenna and transmitter adjustments?

- A. A field-strength meter
- B. An antenna noise bridge
- C. A multimeter
- D. A Transmatch

3D-17.5 When the power output from a transmitter is increased by four times, how should the S-meter reading on a nearby receiver change?

- A. Decrease by approximately one S-unit
- B. Increase by approximately one S-unit
- C. Increase by approximately four S-units
- D. Decrease by approximately four S-units

3D-17.6 By how many times must the power output from a transmitter be increased to raise the S-meter reading on a nearby receiver from S-8 to S-9?

- A. Approximately 2 times
- B. Approximately 3 times
- C. Approximately 4 times
- D. Approximately 5 times

3E-1.1 What is meant by the term +++++impedance++++?

- A. The electric charge stored by a capacitor
- B. The opposition to the flow of AC in a circuit containing only capacitance
- C. The opposition to the flow of AC in a circuit
- D. The force of repulsion presented to an electric field by another field with the same charge

3E-1.2 What is the opposition to the flow of AC in a circuit



containing both resistance and reactance called?

- A. Ohm
- B. Joule
- C. Impedance
- D. Watt

3E-3.1 What is meant by the term +++reactance+++?

- A. Opposition to DC caused by resistors
- B. Opposition to AC caused by inductors and capacitors
- C. A property of ideal resistors in AC circuits
- D. A large spark produced at switch contacts when an inductor is de-energized

3E-3.2 What is the opposition to the flow of AC caused by an inductor called?

- A. Resistance
- B. Reluctance
- C. Admittance
- D. Reactance

3E-3.3 What is the opposition to the flow of AC caused by a capacitor called?

- A. Resistance
- B. Reluctance
- C. Admittance
- D. Reactance

3E-3.4 How does a coil react to AC?

- A. As the frequency of the applied AC increases, the reactance decreases
- B. As the amplitude of the applied AC increases, the reactance also increases
- C. As the amplitude of the applied AC increases, the reactance decreases
- D. As the frequency of the applied AC increases, the reactance also increases

3E-3.5 How does a capacitor react to AC?

- A. As the frequency of the applied AC increases, the reactance decreases
- B. As the frequency of the applied AC increases, the reactance increases
- C. As the amplitude of the applied AC increases, the reactance also increases
- D. As the amplitude of the applied AC increases, the reactance decreases

3E-6.1 When will a power source deliver maximum output?

- A. When the impedance of the load is equal to the impedance of the source
- B. When the SWR has reached a maximum value
- C. When the power supply fuse rating equals the primary winding current
- D. When air wound transformers are used instead of iron core transformers

3E-6.2 What is meant by +++impedance matching+++?

- A. To make the load impedance much greater than the source impedance
- B. To make the load impedance much less than the source impedance
- C. To use a balun at the antenna feed point
- D. To make the load impedance equal the source impedance

3E-6.3 What occurs when the impedance of an electrical load is equal to the internal impedance of the power source?

- A. The source delivers minimum power to the load
- B. There will be a high SWR condition
- C. No current can flow through the circuit
- D. The source delivers maximum power to the load

3E-6.4 Why is impedance matching important in radio work?

- A. So the source can deliver maximum power to the load
- B. So the load will draw minimum power from the source
- C. To ensure that there is less resistance than reactance in the circuit
- D. To ensure that the resistance and reactance in the circuit are equal

3E-7.2 What is the unit measurement of reactance?

- A. Mho
- B. Ohm
- C. Ampere
- D. Siemens

3E-7.4 What is the unit measurement of impedance?

- A. Ohm
- B. Volt
- C. Ampere
- D. Watt

3E-10.1 What is a bel?

- A. The basic unit used to describe a change in power levels
- B. The basic unit used to describe a change in inductances
- C. The basic unit used to describe a change in capacitances
- D. The basic unit used to describe a change in resistances

3E-10.2 What is a decibel?

- A. A unit used to describe a change in power levels, equal to 0.1 bel
- B. A unit used to describe a change in power levels, equal to 0.01 bel
- C. A unit used to describe a change in power levels, equal to 10 bels
- D. A unit used to describe a change in power levels, equal to 100 bels

3E-10.3 Under ideal conditions, a barely detectable change in loudness is approximately how many dB?

- A. 12 dB
- B. 6 dB
- C. 3 dB
- D. 1 dB

3E-10.4 A two-times increase in power results in a change of how many dB?

- A. Multiplying the original power by 2 gives a new power that is 1 dB higher
- B. Multiplying the original power by 2 gives a new power that is 3 dB higher
- C. Multiplying the original power by 2 gives a new power that is 6 dB higher
- D. Multiplying the original power by 2 gives a new power that is 12 dB higher

3E-10.5 An increase of 6 dB results from raising the power by how many times?

- A. Multiply the original power by 1.5 to get the new power
- B. Multiply the original power by 2 to get the new power
- C. Multiply the original power by 3 to get the new power
- D. Multiply the original power by 4 to get the new power

3E-10.6 A decrease of 3 dB results from lowering the power by how many times?

- A. Divide the original power by 1.5 to get the new power
- B. Divide the original power by 2 to get the new power
- C. Divide the original power by 3 to get the new power
- D. Divide the original power by 4 to get the new power

3E-10.7 A signal strength report is "10 dB over S9." If the transmitter power is reduced from 1500 watts to 150 watts, what should be the new signal strength report?

- A. S5
- B. S7
- C. S9
- D. S9 plus 5 dB

3E-10.8 A signal strength report is "20 dB over S9." If the transmitter power is reduced from 1500 watts to 150 watts, what should be the new signal strength report?

- A. S5
- B. S7
- C. S9
- D. S9 plus 10 dB

3E-10.9 A signal strength report is "20 dB over S9." If the transmitter power is reduced from 1500 watts to 15 watts, what should be the new signal strength report?

- A. S5
- B. S7
- C. S9
- D. S9 plus 10 dB

3E-12.1 If a 1.0-ampere current source is connected to two parallel-connected 10 ohm resistors, how much current passes through each resistor?

- A. 10 amperes
- B. 2 amperes
- C. 1 ampere
- D. 0.5 ampere

3E-12.3 In a parallel circuit with a voltage source and several branch resistors, what relationship does the total current have to the current in the branch circuits?

- A. The total current equals the average of the branch current through each resistor
- B. The total current equals the sum of the branch current through each resistor
- C. The total current decreases as more parallel resistors are added to the circuit
- D. The total current is calculated by adding the voltage drops across each resistor and multiplying the sum by the total number of all circuit resistors

3E-13.1 How many watts of electrical power are being used when a 400-VDC power source supplies an 800 ohm load?

- A. 0.5 watt
- B. 200 watts
- C. 400 watts
- D. 320,000 watts

3E-13.2 How many watts of electrical power are being consumed by a 12-VDC pilot light which draws 0.2-amperes?

- A. 60 watts
- B. 24 watts
- C. 6 watts
- D. 2.4 watts

3E-13.3 How many watts are being dissipated when 7.0-milliamperes flows through 1.25 kilohms?

- A. Approximately 61 milliwatts
- B. Approximately 39 milliwatts
- C. Approximately 11 milliwatts
- D. Approximately 9 milliwatts

3E-14.1 How is the total resistance calculated for several resistors in series?

- A. The total resistance must be divided by the number of resistors to ensure accurate measurement of resistance
- B. The total resistance is always the lowest-rated resistance
- C. The total resistance is found by adding the individual resistances together
- D. The tolerance of each resistor must be raised proportionally to the number of resistors

3E-14.2 What is the total resistance of two equal, parallel-connected resistors?

- A. Twice the resistance of either resistance
- B. The sum of the two resistances
- C. The total resistance cannot be determined without knowing the exact resistances
- D. Half the resistance of either resistor

3E-14.3 What is the total inductance of two equal, parallel-connected inductors?

- A. Half the inductance of either inductor, assuming no mutual coupling

- B. Twice the inductance of either inductor, assuming no mutual coupling
- C. The sum of the two inductances, assuming no mutual coupling
- D. The total inductance cannot be determined without knowing the exact inductances

3E-14.4 What is the total capacitance of two equal, parallel-connected capacitors?

- A. Half the capacitance of either capacitor
- B. Twice the capacitance of either capacitor
- C. The value of either capacitor
- D. The total capacitance cannot be determined without knowing the exact capacitances

3E-14.5 What is the total resistance of two equal, series-connected resistors?

- A. Half the resistance of either resistor
- B. Twice the resistance of either resistor
- C. The value of either resistor
- D. The total resistance cannot be determined without knowing the exact resistances

3E-14.6 What is the total inductance of two equal, series-connected inductors?

- A. Half the inductance of either inductor, assuming no mutual coupling
- B. Twice the inductance of either inductor, assuming no mutual coupling
- C. The value of either inductor, assuming no mutual coupling
- D. The total inductance cannot be determined without knowing the exact inductances

3E-14.7 What is the total capacitance of two equal, series-connected capacitors?

- A. Half the capacitance of either capacitor
- B. Twice the capacitance of either capacitor
- C. The value of either capacitor
- D. The total capacitance cannot be determined without knowing the exact capacitances

3E-15.1 What is the voltage across a 500 turn secondary winding in a transformer when the 2250 turn primary is connected to 117-VAC?

- A. 2369 volts
- B. 526.5 volts
- C. 26 volts
- D. 5.8 volts

3E-15.2 What is the turns ratio of a transformer to match an audio amplifier having an output impedance of 200 ohms to a speaker having an impedance of 10 ohms?

- A. 4.47 to 1
- B. 14.14 to 1
- C. 20 to 1
- D. 400 to 1

3E-15.3 What is the turns ratio of a transformer to match an audio amplifier having an output impedance of 600 ohms to a speaker having an impedance of 4 ohms?

- A. 12.2 to 1
- B. 24.4 to 1
- C. 150 to 1
- D. 300 to 1

3E-15.4 What is the impedance of a speaker which requires a transformer with a turns ratio of 24 to 1 to match an audio amplifier having an output impedance of 2000 ohms?

- A. 576 ohms
- B. 83.3 ohms
- C. 7.0 ohms
- D. 3.5 ohms

3E-16.1 What is the voltage that would produce the same amount of heat over time in a resistive element as would an applied sine wave AC voltage?

- A. A DC voltage equal to the peak-to-peak value of the AC voltage
- B. A DC voltage equal to the RMS value of the AC voltage
- C. A DC voltage equal to the average value of the AC voltage
- D. A DC voltage equal to the peak value of the AC voltage

3E-16.2 What is the peak-to-peak voltage of a sine wave which has an RMS voltage of 117-volts?

- A. 82.7 volts
- B. 165.5 volts
- C. 183.9 volts
- D. 330.9 volts

3E-16.3 A sine wave of 17-volts peak is equivalent to how many volts RMS?

- A. 8.5 volts
- B. 12 volts
- C. 24 volts
- D. 34 volts

3F-1.5 What is the effect of an increase in ambient temperature on the resistance of a carbon resistor?

- A. The resistance will increase by 20% for every 10 degrees centigrade that the temperature increases
- B. The resistance stays the same
- C. The resistance change depends on the resistor's temperature coefficient rating
- D. The resistance becomes time dependent

3F-2.6 What type of capacitor is often used in power supply circuits to filter the rectified AC?

- A. Disc ceramic
- B. Vacuum variable
- C. Mica
- D. Electrolytic

3F-2.7 What type of capacitor is used in power supply circuits to filter transient voltage spikes across the transformer secondary

winding?

- A. High-value
- B. Trimmer
- C. Vacuum variable
- D. Suppressor

3F-3.5 How do inductors become self-resonant?

- A. Through distributed electromagnetism
- B. Through eddy currents
- C. Through distributed capacitance
- D. Through parasitic hysteresis

3F-4.1 What circuit component can change 120-VAC to 400-VAC?

- A. A transformer
- B. A capacitor
- C. A diode
- D. An SCR

3F-4.2 What is the source of energy connected to in a transformer?

- A. To the secondary winding
- B. To the primary winding
- C. To the core
- D. To the plates

3F-4.3 When there is no load attached to the secondary winding of a transformer, what is current in the primary winding called?

- A. Magnetizing current
- B. Direct current
- C. Excitation current
- D. Stabilizing current

3F-4.4 In what terms are the primary and secondary windings ratings of a power transformer usually specified?

- A. Joules per second
- B. Peak inverse voltage
- C. Coulombs per second
- D. Volts or volt-amperes

3F-5.1 What is the peak-inverse-voltage rating of a power supply rectifier?

- A. The highest transient voltage the diode will handle
- B. 1.4 times the AC frequency
- C. The maximum voltage to be applied in the non-conducting direction
- D. 2.8 times the AC frequency

3F-5.2 Why must silicon rectifier diodes be thermally protected?

- A. Because of their proximity to the power transformer
- B. Because they will be destroyed if they become too hot
- C. Because of their susceptibility to transient voltages
- D. Because of their use in high-voltage applications

3F-5.4 What are the two major ratings for silicon diode rectifiers of the type used in power supply circuits which must not be exceeded?

- A. Peak load impedance; peak voltage

- B. Average power; average voltage
- C. Capacitive reactance; avalanche voltage
- D. Peak inverse voltage; average forward current

3G-1.1 Why should a resistor and capacitor be wired in parallel with power supply rectifier diodes?

- A. To equalize voltage drops and guard against transient voltage spikes
- B. To ensure that the current through each diode is about the same
- C. To smooth the output waveform
- D. To decrease the output voltage

3G-1.2 What function do capacitors serve when resistors and capacitors are connected in parallel with high voltage power supply rectifier diodes?

- A. They double or triple the output voltage
- B. They block the alternating current
- C. They protect those diodes that develop back resistance faster than other diodes
- D. They regulate the output voltage

3G-1.3 What is the output waveform of an unfiltered full-wave rectifier connected to a resistive load?

- A. A steady DC voltage
- B. A sine wave at half the frequency of the AC input
- C. A series of pulses at the same frequency as the AC input
- D. A series of pulses at twice the frequency of the AC input

3G-1.4 How many degrees of each cycle does a half-wave rectifier utilize?

- A. 90 degrees
- B. 180 degrees
- C. 270 degrees
- D. 360 degrees

3G-1.5 How many degrees of each cycle does a full-wave rectifier utilize?

- A. 90 degrees
- B. 180 degrees
- C. 270 degrees
- D. 360 degrees

3G-1.6 Where is a power supply bleeder resistor connected?

- A. Across the filter capacitor
- B. Across the power-supply input
- C. Between the transformer primary and secondary
- D. Across the inductor in the output filter

3G-1.7 What components comprise a power supply filter network?

- A. Diodes
- B. Transformers and transistors
- C. Quartz crystals
- D. Capacitors and inductors

3G-1.8 What should be the peak-inverse-voltage rating of the rectifier in a full-wave power supply?



- A. One-quarter the normal output voltage of the power supply
- B. Half the normal output voltage of the power supply
- C. Equal to the normal output voltage of the power supply
- D. Double the normal peak output voltage of the power supply

3G-1.9 What should be the peak-inverse-voltage rating of the rectifier in a half-wave power supply?

- A. One-quarter to one-half the normal peak output voltage of the power supply
- B. Half the normal output voltage of the power supply
- C. Equal to the normal output voltage of the power supply
- D. One to two times the normal peak output voltage of the power supply

3G-2.8 What should the impedance of a low-pass filter be as compared to the impedance of the transmission line into which it is inserted?

- A. Substantially higher
- B. About the same
- C. Substantially lower
- D. Twice the transmission line impedance

3H-2.1 What is the term for alteration of the amplitude of an RF wave for the purpose of conveying information?

- A. Frequency modulation
- B. Phase modulation
- C. Amplitude rectification
- D. Amplitude modulation

3H-2.3 What is the term for alteration of the phase of an RF wave for the purpose of conveying information?

- A. Pulse modulation
- B. Phase modulation
- C. Phase rectification
- D. Amplitude modulation

3H-2.4 What is the term for alteration of the frequency of an RF wave for the purpose of conveying information?

- A. Phase rectification
- B. Frequency rectification
- C. Amplitude modulation
- D. Frequency modulation

3H-3.1 In what emission type does the instantaneous amplitude (envelope) of the RF signal vary in accordance with the modulating AF?

- A. Frequency shift keying
- B. Pulse modulation
- C. Frequency modulation
- D. Amplitude modulation

3H-3.2 What determines the spectrum space occupied by each group of sidebands generated by a correctly operating double-sideband phone transmitter?

- A. The audio frequencies used to modulate the transmitter
- B. The phase angle between the audio and radio frequencies being mixed

- C. The radio frequencies used in the transmitter's VFO
- D. The CW keying speed

3H-4.1 How much is the carrier suppressed in a single-sideband phone transmission?

- A. No more than 20 dB below peak output power
- B. No more than 30 dB below peak output power
- C. At least 40 dB below peak output power
- D. At least 60 dB below peak output power

3H-4.2 What is one advantage of carrier suppression in a double-sideband phone transmission?

- A. Only half the bandwidth is required for the same information content
- B. Greater modulation percentage is obtainable with lower distortion
- C. More power can be put into the sidebands
- D. Simpler equipment can be used to receive a double-sideband suppressed-carrier signal

3H-5.1 Which one of the telephony emissions popular with amateurs occupies the narrowest band of frequencies?

- A. Single-sideband emission
- B. Double-sideband emission
- C. Phase-modulated emission
- D. Frequency-modulated emission

3H-5.2 Which emission type is produced by a telephony transmitter having a balanced modulator followed by a 2.5-kHz bandpass filter?

- A. PM
- B. AM
- C. SSB
- D. FM

3H-7.2 What emission is produced by a reactance modulator connected to an RF power amplifier?

- A. Multiplex modulation
- B. Phase modulation
- C. Amplitude modulation
- D. Pulse modulation

3H-8.1 What purpose does the carrier serve in a double-sideband phone transmission?

- A. The carrier separates the sidebands so they don't cancel in the receiver
- B. The carrier contains the modulation information
- C. The carrier maintains symmetry of the sidebands to prevent distortion
- D. The carrier serves as a reference signal for demodulation by an envelope detector

3H-8.2 What signal component appears in the center of the frequency band of a double-sideband phone transmission?

- A. The lower sidebands
- B. The subcarrier
- C. The carrier

D. The pilot tone

3H-9.1 What sidebands are generated by a double-sideband phone transmitter with a 7250-kHz carrier when it is modulated less than 100% by an 800-Hz pure sine wave?

- A. 7250.8 kHz and 7251.6 kHz
- B. 7250.0 kHz and 7250.8 kHz
- C. 7249.2 kHz and 7250.8 kHz
- D. 7248.4 kHz and 7249.2 kHz

3H-10.1 How many times over the maximum deviation is the bandwidth of an FM-phone transmission?

- A. 1.5
- B. At least 2.0
- C. At least 4.0
- D. The bandwidth cannot be determined without knowing the exact carrier and modulating frequencies involved

3H-10.2 What is the total bandwidth of an FM-phone transmission having a 5-kHz deviation and a 3-kHz modulating frequency?

- A. 3 kHz
- B. 5 kHz
- C. 8 kHz
- D. 16 kHz

3H-11.1 What happens to the shape of the RF envelope, as viewed on an oscilloscope, during double-sideband phone transmission?

- A. The amplitude of the envelope increases and decreases in proportion to the modulating signal
- B. The amplitude of the envelope remains constant
- C. The brightness of the envelope increases and decreases in proportion to the modulating signal
- D. The frequency of the envelope increases and decreases in proportion to the amplitude of the modulating signal

3H-13.1 What results when a single-sideband phone transmitter is overmodulated?

- A. The signal becomes louder with no other effects
- B. The signal occupies less bandwidth with poor high frequency response
- C. The signal has higher fidelity and improved signal-to-noise ratio
- D. The signal becomes distorted and occupies more bandwidth

3H-13.2 What results when a double-sideband phone transmitter is overmodulated?

- A. The signal becomes louder with no other effects
- B. The signal becomes distorted and occupies more bandwidth
- C. The signal occupies less bandwidth with poor high frequency response
- D. The transmitter's carrier frequency deviates

3H-15.1 What is the frequency deviation for a 12.21-MHz reactance-modulated oscillator in a 5-kHz deviation, 146.52-MHz FM-phone transmitter?

- A. 41.67 Hz
- B. 416.7 Hz

- C. 5 kHz
- D. 12 kHz

3H-15.2 What stage in a transmitter would translate a 5.3-MHz input signal to 14.3-MHz?

- A. A mixer
- B. A beat frequency oscillator
- C. A frequency multiplier
- D. A linear translator stage

3H-16.4 How many frequency components are in the signal from an AF shift keyer at any instant?

- A. One
- B. Two
- C. Three
- D. Four

3H-16.5 How is frequency shift related to keying speed in an FSK signal?

- A. The frequency shift in hertz must be at least four times the keying speed in WPM
- B. The frequency shift must not exceed 15 Hz per WPM of keying speed
- C. Greater keying speeds require greater frequency shifts
- D. Greater keying speeds require smaller frequency shifts

3I-1.3 Why is a Yagi antenna often used for radio communications on the 20-meter wavelength band?

- A. It provides excellent omnidirectional coverage in the horizontal plane
- B. It is smaller, less expensive and easier to erect than a dipole or vertical antenna
- C. It discriminates against interference from other stations off to the side or behind
- D. It provides the highest possible angle of radiation for the HF bands

3I-1.7 What method is best suited to match an unbalanced coaxial feed line to a Yagi antenna?

- A. "T" match
- B. Delta match
- C. Hairpin match
- D. Gamma match

3I-1.9 How can the bandwidth of a parasitic beam antenna be increased?

- A. Use larger diameter elements
- B. Use closer element spacing
- C. Use traps on the elements
- D. Use tapered-diameter elements

3I-2.1 How much gain over a half-wave dipole can a two-element cubical quad antenna provide?

- A. Approximately 0.6 dB
- B. Approximately 2 dB
- C. Approximately 6 dB
- D. Approximately 12 dB

3I-3.1 How long is each side of a cubical quad antenna driven element for 21.4-MHz?

- A. 1.17 feet
- B. 11.7 feet
- C. 47 feet
- D. 469 feet

3I-3.2 How long is each side of a cubical quad antenna driven element for 14.3-MHz?

- A. 1.75 feet
- B. 17.6 feet
- C. 23.4 feet
- D. 70.3 feet

3I-3.3 How long is each side of a cubical quad antenna reflector element for 29.6-MHz?

- A. 8.23 feet
- B. 8.7 feet
- C. 9.7 feet
- D. 34.8 feet

3I-3.4 How long is each leg of a symmetrical delta loop antenna driven element for 28.7-MHz?

- A. 8.75 feet
- B. 11.32 feet
- C. 11.7 feet
- D. 35 feet

3I-3.5 How long is each leg of a symmetrical delta loop antenna driven element for 24.9-MHz?

- A. 10.09 feet
- B. 13.05 feet
- C. 13.45 feet
- D. 40.36 feet

3I-3.6 How long is each leg of a symmetrical delta loop antenna reflector element for 14.1-MHz?

- A. 18.26 feet
- B. 23.76 feet
- C. 24.35 feet
- D. 73.05 feet

3I-3.7 How long is the driven element of a Yagi antenna for 14.0-MHz?

- A. Approximately 17 feet
- B. Approximately 33 feet
- C. Approximately 35 feet
- D. Approximately 66 feet

3I-3.8 How long is the director element of a Yagi antenna for 21.1-MHz?

- A. Approximately 42 feet
- B. Approximately 21 feet
- C. Approximately 17 feet
- D. Approximately 10.5 feet

3I-3.9 How long is the reflector element of a Yagi antenna for 28.1-MHz?

- A. Approximately 8.75 feet
- B. Approximately 16.6 feet
- C. Approximately 17.5 feet
- D. Approximately 35 feet

3I-5.1 What is the feed-point impedance for a half-wavelength dipole HF antenna suspended horizontally one-quarter wavelength or more above the ground?

- A. Approximately 50 ohms, resistive
- B. Approximately 73 ohms, resistive and inductive
- C. Approximately 50 ohms, resistive and capacitive
- D. Approximately 73 ohms, resistive

3I-5.2 What is the feed-point impedance of a quarter-wavelength vertical HF antenna with a horizontal ground plane?

- A. Approximately 18 ohms
- B. Approximately 36 ohms
- C. Approximately 52 ohms
- D. Approximately 72 ohms

3I-5.3 What is an advantage of downward sloping radials on a ground-plane antenna?

- A. Sloping the radials downward lowers the radiation angle
- B. Sloping the radials downward brings the feed-point impedance close to 300 ohms
- C. Sloping the radials downward allows rainwater to run off the antenna
- D. Sloping the radials downward brings the feed-point impedance closer to 50 ohms

3I-5.4 What happens to the feed-point impedance of a ground-plane antenna when the radials slope downward from the base of the antenna?

- A. The feed-point impedance decreases
- B. The feed-point impedance increases
- C. The feed-point impedance stays the same
- D. The feed-point impedance becomes purely capacitive

3I-6.1 Compared to a dipole antenna, what are the directional radiation characteristics of a cubical quad HF antenna?

- A. The quad has more directivity in the horizontal plane but less directivity in the vertical plane
- B. The quad has less directivity in the horizontal plane but more directivity in the vertical plane
- C. The quad has more directivity in both horizontal and vertical planes
- D. The quad has less directivity in both horizontal and vertical planes

3I-6.2 What is the radiation pattern of an ideal half-wavelength dipole HF antenna?

- A. If it is installed parallel to the earth, it radiates well in a figure-eight pattern at right angles to the antenna wire
- B. If it is installed parallel to the earth, it radiates

well in a figure-eight pattern off both ends of the antenna wire

C. If it is installed parallel to the earth, it radiates equally well in all directions

D. If it is installed parallel to the earth, the pattern will have two lobes on one side of the antenna wire, and one larger lobe on the other side

3I-6.3 How does proximity to the ground affect the radiation pattern of a horizontal dipole HF antenna?

A. If the antenna is too far from the ground, the pattern becomes unpredictable

B. If the antenna is less than one-half wavelength from the ground, reflected radio waves from the ground distort the radiation pattern of the antenna

C. A dipole antenna's radiation pattern is unaffected by its distance to the ground

D. If the antenna is less than one-half wavelength from the ground, radiation off the ends of the wire is reduced

3I-6.4 What does the term ++++antenna front-to-back ratio++++ mean?

A. The number of directors versus the number of reflectors

B. The relative position of the driven element with respect to the reflectors and directors

C. The power radiated in the major radiation lobe compared to the power radiated in exactly the opposite direction

D. The power radiated in the major radiation lobe compared to the power radiated 90 degrees away from that direction

3I-6.5 What effect upon the radiation pattern of an HF dipole antenna will a slightly smaller parasitic parallel element located a few feet away in the same horizontal plane have?

A. The radiation pattern will not change appreciably

B. A major lobe will develop in the horizontal plane, parallel to the two elements

C. A major lobe will develop in the vertical plane, away from the ground

D. If the spacing is greater than 0.1 wavelength, a major lobe will develop in the horizontal plane to the side of the driven element toward the parasitic element

3I-6.6 What is the meaning of the term ++++main lobe++++ as used in reference to a directional antenna?

A. The direction of least radiation from an antenna

B. The point of maximum current in a radiating antenna element

C. The direction of maximum radiated field strength from a radiating antenna

D. The maximum voltage standing wave point on a radiating element

3I-7.1 Upon what does the characteristic impedance of a parallel-conductor antenna feed line depend?

A. The distance between the centers of the conductors and the radius of the conductors

B. The distance between the centers of the conductors and the length of the line

C. The radius of the conductors and the frequency of the

signal

- D. The frequency of the signal and the length of the line

3I-7.2 What is the characteristic impedance of various coaxial cables commonly used for antenna feed lines at amateur stations?

- A. Around 25 and 30 ohms
- B. Around 50 and 75 ohms
- C. Around 80 and 100 ohms
- D. Around 500 and 750 ohms

3I-7.3 What effect, if any, does the length of a coaxial cable have upon its characteristic impedance?

- A. The length has no effect on the characteristic impedance
- B. The length affects the characteristic impedance primarily above 144 MHz
- C. The length affects the characteristic impedance primarily below 144 MHz
- D. The length affects the characteristic impedance at any frequency

3I-7.4 What is the characteristic impedance of flat-ribbon TV-type twinlead?

- A. 50 ohms
- B. 75 ohms
- C. 100 ohms
- D. 300 ohms

3I-8.4 What is the cause of power being reflected back down an antenna feed line?

- A. Operating an antenna at its resonant frequency
- B. Using more transmitter power than the antenna can handle
- C. A difference between feed line impedance and antenna feed-point impedance
- D. Feeding the antenna with unbalanced feed line

3I-9.3 What will be the standing wave ratio when a 50 ohm feed line is connected to a resonant antenna having a 200 ohm feed-point impedance?

- A. 4:1
- B. 1:4
- C. 2:1
- D. 1:2

3I-9.4 What will be the standing wave ratio when a 50 ohm feed line is connected to a resonant antenna having a 10 ohm feed-point impedance?

- A. 2:1
- B. 50:1
- C. 1:5
- D. 5:1

3I-9.5 What will be the standing wave ratio when a 50 ohm feed line is connected to a resonant antenna having a 50 ohm feed-point impedance?

- A. 2:1
- B. 50:50
- C. 1:1



D. 0:0

3I-11.1 How does the characteristic impedance of a coaxial cable affect the amount of attenuation to the RF signal passing through it?

A. The attenuation is affected more by the characteristic impedance at frequencies above 144 MHz than at frequencies below 144 MHz

B. The attenuation is affected less by the characteristic impedance at frequencies above 144 MHz than at frequencies below 144 MHz

C. The attenuation related to the characteristic impedance is about the same at all amateur frequencies below 1.5 GHz

D. The difference in attenuation depends on the emission type in use

3I-11.2 How does the amount of attenuation to a 2 meter signal passing through a coaxial cable differ from that to a 160 meter signal?

A. The attenuation is greater at 2 meters

B. The attenuation is less at 2 meters

C. The attenuation is the same at both frequencies

D. The difference in attenuation depends on the emission type in use

3I-11.4 What is the effect on its attenuation when flat-ribbon TV-type twinlead is wet?

A. Attenuation decreases slightly

B. Attenuation remains the same

C. Attenuation decreases sharply

D. Attenuation increases

3I-11.7 Why might silicone grease or automotive car wax be applied to flat-ribbon TV-type twinlead?

A. To reduce "skin effect" losses on the conductors

B. To reduce the buildup of dirt and moisture on the feed line

C. To increase the velocity factor of the feed line

D. To help dissipate heat during high-SWR operation

3I-11.8 In what values are RF feed line losses usually expressed?

A. Bels/1000 ft

B. dB/1000 ft

C. Bels/100 ft

D. dB/100 ft

3I-11.10 As the operating frequency increases, what happens to the dielectric losses in a feed line?

A. The losses decrease

B. The losses decrease to zero

C. The losses remain the same

D. The losses increase

3I-11.12 As the operating frequency decreases, what happens to the dielectric losses in a feed line?

A. The losses decrease

B. The losses increase

- C. The losses remain the same
- D. The losses become infinite

3I-12.1 What condition must be satisfied to prevent standing waves of voltage and current on an antenna feed line?

- A. The antenna feed point must be at DC ground potential
- B. The feed line must be an odd number of electrical quarter wavelengths long
- C. The feed line must be an even number of physical half wavelengths long
- D. The antenna feed-point impedance must be matched to the characteristic impedance of the feed line

3I-12.2 How is an inductively-coupled matching network used in an antenna system consisting of a center-fed resonant dipole and coaxial feed line?

- A. An inductively coupled matching network is not normally used in a resonant antenna system
- B. An inductively coupled matching network is used to increase the SWR to an acceptable level
- C. An inductively coupled matching network can be used to match the unbalanced condition at the transmitter output to the balanced condition required by the coaxial line
- D. An inductively coupled matching network can be used at the antenna feed point to tune out the radiation resistance

3I-12.5 What is an antenna-transmission line +++mismatch+++?

- A. A condition where the feed-point impedance of the antenna does not equal the output impedance of the transmitter
- B. A condition where the output impedance of the transmitter does not equal the characteristic impedance of the feed line
- C. A condition where a half-wavelength antenna is being fed with a transmission line of some length other than one-quarter wavelength at the operating frequency
- D. A condition where the characteristic impedance of the feed line does not equal the feed-point impedance of the antenna

#### Answers

- 3A-3.2 A
- 3A-3.3 A
- 3A-3.4 C
- 3A-3.5 C
- 3A-3.7 A
- 3A-4.1 C
- 3A-4.3 C
- 3A-6.1 B
- 3A-6.2 C
- 3A-6.6 A
- 3A-8.6 D
- 3A-9.1 C
- 3A-9.2 A
- 3A-9.3 D
- 3A-9.4 A

3A-9.5	B
3A-9.6	C
3A-9.7	A
3A-9.8	A
3A-9.9	C
3A-9.10	B
3A-9.11	C
3A-9.12	A
3A-9.13	B
3A-9.14	C
3A-9.15	C
3A-9.16	C
3A-10.1	A
3A-10.2	C
3A-10.3	D
3A-10.4	C
3A-10.5	B
3A-10.6	C
3A-10.7	C
3A-10.8	C
3A-13.1	C
3A-13.2	D
3A-14.3	B
3A-14.6	A
3A-15.1	D
3A-15.3	C
3A-15.4	B
3A-16.1	C
3A-16.2	B
3A-16.3	A
3A-16.4	A
3B-1.4	C
3B-1.5	B
3B-2.1	B
3B-2.2	A
3B-2.3	C
3B-2.4	A
3B-2.6	B
3B-2.10	C
3B-2.11	D
3B-2.12	B
3B-3.8	A
3B-3.12	A
3B-4.1	A
3B-4.2	B
3B-5.1	D
3B-5.2	C
3B-6.1	B
3B-6.2	B
3B-6.3	B
3B-7.1	B
3B-7.2	A
3B-7.3	A
3B-7.4	C
3B-7.5	C
3B-8.1	C
3B-8.2	B

3B-8.3	B
3B-8.4	C
3B-8.5	C
3B-8.6	B
3B-8.7	C
3B-8.8	C
3B-8.9	C
3B-10.1	A
3B-10.2	B
3C-1.6	C
3C-1.7	B
3C-1.9	B
3C-1.10	A
3C-1.13	D
3C-2.3	C
3C-2.4	C
3C-3.3	B
3C-3.4	C
3C-5.1	B
3C-5.2	A
3C-5.3	B
3C-5.4	C
3C-5.5	A
3C-6.2	B
3C-6.4	D
3C-6.5	B
3C-6.6	D
3C-7.1	B
3C-7.2	D
3C-7.3	A
3C-7.4	D
3C-7.5	D
3C-7.6	A
3C-7.7	D
3C-7.8	C
3C-10.1	D
3C-10.2	A
3C-10.3	B
3C-10.4	D
3D-1.5	A
3D-1.6	A
3D-1.7	D
3D-1.8	C
3D-1.9	D
3D-2.4	B
3D-3.1	C
3D-3.2	C
3D-3.3	C
3D-3.4	D
3D-3.5	D
3D-4.1	A
3D-4.2	D
3D-4.3	C
3D-4.4	B
3D-4.5	B
3D-5.1	B
3D-5.5	A

3D-5.6	B
3D-5.7	B
3D-6.1	D
3D-6.2	A
3D-6.3	D
3D-6.4	B
3D-9.1	C
3D-9.2	A
3D-9.3	D
3D-10.1	B
3D-10.2	B
3D-10.3	C
3D-10.4	C
3D-10.5	A
3D-12.2	D
3D-12.3	B
3D-12.4	C
3D-12.5	D
3D-13.1	A
3D-13.2	C
3D-13.3	D
3D-14.6	B
3D-14.7	C
3D-15.1	B
3D-15.2	A
3D-15.3	B
3D-15.4	D
3D-17.2	A
3D-17.3	C
3D-17.4	A
3D-17.5	B
3D-17.6	C
3E-1.1	C
3E-1.2	C
3E-3.1	B
3E-3.2	D
3E-3.3	D
3E-3.4	D
3E-3.5	A
3E-6.1	A
3E-6.2	D
3E-6.3	D
3E-6.4	A
3E-7.2	B
3E-7.4	A
3E-10.1	A
3E-10.2	A
3E-10.3	D
3E-10.4	B
3E-10.5	D
3E-10.6	B
3E-10.7	C
3E-10.8	D
3E-10.9	C
3E-12.1	D
3E-12.3	B
3E-13.1	B

3E-13.2	D
3E-13.3	A
3E-14.1	C
3E-14.2	D
3E-14.3	A
3E-14.4	B
3E-14.5	B
3E-14.6	B
3E-14.7	A
3E-15.1	C
3E-15.2	A
3E-15.3	A
3E-15.4	D
3E-16.1	B
3E-16.2	D
3E-16.3	B
3F-1.5	C
3F-2.6	D
3F-2.7	D
3F-3.5	C
3F-4.1	A
3F-4.2	B
3F-4.3	A
3F-4.4	D
3F-5.1	C
3F-5.2	B
3F-5.4	D
3G-1.1	A
3G-1.2	C
3G-1.3	D
3G-1.4	B
3G-1.5	D
3G-1.6	A
3G-1.7	D
3G-1.8	D
3G-1.9	D
3G-2.8	B
3H-2.1	D
3H-2.3	B
3H-2.4	D
3H-3.1	D
3H-3.2	A
3H-4.1	C
3H-4.2	C
3H-5.1	A
3H-5.2	C
3H-7.2	B
3H-8.1	D
3H-8.2	C
3H-9.1	C
3H-10.1	B
3H-10.2	D
3H-11.1	A
3H-13.1	D
3H-13.2	B
3H-15.1	B
3H-15.2	A

3H-16.4	A
3H-16.5	C
3I-1.3	C
3I-1.7	D
3I-1.9	A
3I-2.1	C
3I-3.1	B
3I-3.2	B
3I-3.3	B
3I-3.4	C
3I-3.5	C
3I-3.6	C
3I-3.7	B
3I-3.8	B
3I-3.9	C
3I-5.1	D
3I-5.2	B
3I-5.3	D
3I-5.4	B
3I-6.1	C
3I-6.2	A
3I-6.3	B
3I-6.4	C
3I-6.5	D
3I-6.6	C
3I-7.1	A
3I-7.2	B
3I-7.3	A
3I-7.4	D
3I-8.4	C
3I-9.3	A
3I-9.4	D
3I-9.5	C
3I-11.1	C
3I-11.2	A
3I-11.4	D
3I-11.7	B
3I-11.8	D
3I-11.10	D
3I-11.12	A
3I-12.1	D
3I-12.2	A
3I-12.5	D





Subject: Novice License Exam Questions

\*\*\*\*\*  
\*\*\* Note: A graphics sheet must be used with this question pool. \*\*\*  
\*\*\* It can be obtained from the ARRL/VEC (225 Main St, \*\*\*  
\*\*\* Newington CT 06111) for an SASE. \*\*\*  
\*\*\*\*\*

QUESTION POOL  
Amateur Radio Examination  
Element 2 (Novice Class) Final Version  
as released by  
Question Pool Committee  
National Conference of  
Volunteer Examiner Coordinators  
December 1, 1992

Subelement N1 - Commission's Rules - [10 exam questions - 10 groups]

N1A Basis and purpose of amateur service and definitions.

N1A01 (A) [97]

What document contains the rules and regulations for the amateur service in the US?

- A. Part 97 of Title 47 CFR (Code of Federal Regulations)
- B. The Communications Act of 1934 (as amended)
- C. The Radio Amateur's Handbook
- D. The minutes of the International Telecommunication Union meetings

N1A02 (B) [97]

Who makes and enforces the rules and regulations of the amateur service in the US?

- A. The Congress of the United States
- B. The Federal Communications Commission (FCC)
- C. The Volunteer Examiner Coordinators (VECs)
- D. The Federal Bureau of Investigation (FBI)

N1A03 (A) [97]

Which three topics are part of the rules and regulations of the amateur service?

- A. Station operation standards, technical standards, emergency communications
- B. Notice of Violation, common operating procedures, antenna lengths
- C. Frequency band plans, repeater locations, Ohm's Law
- D. Station construction standards, FCC approved radios, FCC approved antennas

N1A04 (D) [97]

Which of these topics is NOT part of the rules and regulations of the amateur service?

- A. Qualifying examination systems
- B. Technical standards
- C. Providing emergency communications

D. Station construction standards

N1A05 (A) [97.1]

What are three reasons that the amateur service exists?

- A. To recognize the value of emergency communications, advance the radio art, and improve communication and technical skills
- B. To learn about business communications, increase testing by trained technicians, and improve amateur communications
- C. To preserve old radio techniques, maintain a pool of people familiar with early tube-type equipment, and improve tube radios
- D. To improve patriotism, preserve nationalism, and promote world peace

N1A06 (D) [97.1]

What are two of the five purposes for the amateur service?

- A. To protect historical radio data, and help the public understand radio history
- B. To help foreign countries improve communication and technical skills, and encourage visits from foreign hams
- C. To modernize radio schematic drawings, and increase the pool of electrical drafting people
- D. To increase the number of trained radio operators and electronics experts, and improve international goodwill

N1A07 (B) [97.3a1]

What is the definition of an amateur operator?

- A. A person who has not received any training in radio operations
- B. A person who has a written authorization to be the control operator of an amateur station
- C. A person who has very little practice operating a radio station
- D. A person who is in training to become the control operator of a radio station

N1A08 (C) [97.3a4]

What is the definition of the amateur service?

- A. A private radio service used for profit and public benefit
- B. A public radio service for US citizens which requires no exam
- C. A personal radio service used for self-training, communication, and technical studies
- D. A private radio service used for self-training of radio announcers and technicians

N1A09 (D) [97.3a5]

What is the definition of an amateur station?

- A. A station in a public radio service used for radiocommunications
- B. A station using radiocommunications for a commercial purpose
- C. A station using equipment for training new radiocommunications operators
- D. A station in an Amateur Radio service used for radiocommunications

N1A10 (C) [97.3a11]

What is the definition of a control operator of an amateur station?

- A. Anyone who operates the controls of the station
- B. Anyone who is responsible for the station's equipment
- C. Any licensed amateur operator who is responsible for the station's transmissions
- D. The amateur operator with the highest class of license who is near the controls of the station

N1A11 (C) [97.513a]

What is a Volunteer Examiner (VE)?

- A. An amateur who volunteers to check amateur teaching manuals
- B. An amateur who volunteers to teach amateur classes
- C. An amateur who volunteers to test others for amateur licenses
- D. An amateur who volunteers to examine amateur station equipment

N1B Station/Operator license.

N1B01 (D) [97.5a]

Which one of these must you have an amateur license to do?

- A. Transmit on public-service frequencies
- B. Retransmit shortwave broadcasts
- C. Repair broadcast station equipment
- D. Transmit on amateur service frequencies

N1B02 (B) [97.5a]

What does an amateur license allow you to control?

- A. A shortwave-broadcast station's transmissions
- B. An amateur station's transmissions
- C. Non-commercial FM broadcast transmissions
- D. Any type of transmitter, as long as it is used for non-commercial transmissions

N1B03 (C) [97.5a]

What allows someone to operate an amateur station in the US?

- A. An FCC operator's training permit for a licensed radio station
- B. An FCC Form 610 together with a license examination fee
- C. An FCC amateur operator/primary station license
- D. An FCC Certificate of Successful Completion of Amateur Training

N1B04 (B) [97.5d]

Where does a US amateur license allow you to operate?

- A. Anywhere in the world
- B. Wherever the amateur service is regulated by the FCC
- C. Within 50 km of your primary station location
- D. Only at your primary station location

N1B05 (C) [97.5e]

If you have a Novice license, how many transmitters may you control in your station at the same time?

- A. Only one at a time
- B. Only one at a time, except for emergency communications
- C. Any number
- D. Any number, as long as they are transmitting on different bands

N1B06 (A) [97.5e]

What document must you keep at your amateur station?

- A. A copy of your written authorization for an amateur station
- B. A copy of the Rules and Regulations of the Amateur Service (Part 97)
- C. A copy of the Amateur Radio Handbook for instant reference
- D. A chart of the frequencies allowed for your class of license

N1B07 (C) [97.7]

Which one of the following does not allow a person to control a US amateur station?

- A. An operator/primary station license from the FCC
- B. A reciprocal permit for alien amateur licensee from the FCC
- C. An amateur service license from any government which is a member of the European Community (EC)
- D. An amateur service license from the Government of Canada, if it is held by a Canadian citizen

N1B08 (D) [97.9a]

What are the five US amateur operator license classes?

- A. Novice, Communicator, General, Advanced, Amateur Extra
- B. Novice, Technician, General, Advanced, Expert
- C. Novice, Communicator, General, Amateur, Extra
- D. Novice, Technician, General, Advanced, Amateur Extra

N1B09 (A) [97.9]

What does the FCC consider to be the first two classes of US amateur operator licenses (one of which most new amateurs initially hold)?

- A. Novice and Technician
- B. CB and Communicator
- C. Novice and General
- D. CB and Novice

N1B10 (B) [97.9]

What must you have with you when you are the control operator of an amateur station?

- A. A copy of the Rules and Regulations of the Amateur Service (Part 97)
- B. The original or a photocopy of your amateur license
- C. A list of countries which allow third-party communications from the US
- D. A chart of the frequencies allowed for your class of license

N1B11 (D) [97.501d]

Which US amateur license has no Morse code requirements?

- A. Amateur Extra
- B. Advanced
- C. General
- D. Technician

N1C Novice control operator frequency privileges.

N1C01 (B) [97.301e]

What are the frequency limits of the 80-meter Novice band?

- A. 3500 - 4000 kHz
- B. 3675 - 3725 kHz

- C. 7100 - 7150 kHz
- D. 7000 - 7300 kHz

N1C02 (C) [97.301e]

What are the frequency limits of the 40-meter Novice band (ITU Region 2)?

- A. 3500 - 4000 kHz
- B. 3700 - 3750 kHz
- C. 7100 - 7150 kHz
- D. 7000 - 7300 kHz

N1C03 (A) [97.301e]

What are the frequency limits of the 15-meter Novice band?

- A. 21.100 - 21.200 MHz
- B. 21.000 - 21.450 MHz
- C. 28.000 - 29.700 MHz
- D. 28.100 - 28.200 MHz

N1C04 (C) [97.301e]

What are the frequency limits of the 10-meter Novice band?

- A. 28.000 - 28.500 MHz
- B. 28.100 - 29.500 MHz
- C. 28.100 - 28.500 MHz
- D. 29.100 - 29.500 MHz

N1C05 (B) [97.301f]

What are the frequency limits of the 1.25-meter Novice band (ITU Region 2)?

- A. 225.0 - 230.5 MHz
- B. 222.1 - 223.91 MHz
- C. 224.1 - 225.1 MHz
- D. 222 - 225 MHz

N1C06 (C) [97.301f]

What are the frequency limits of the 23-centimeter Novice band?

- A. 1260 - 1270 MHz
- B. 1240 - 1300 MHz
- C. 1270 - 1295 MHz
- D. 1240 - 1246 MHz

N1C07 (A) [97.301e]

If you are operating on 3700 kHz, in what amateur band are you operating?

- A. 80 meters
- B. 40 meters
- C. 15 meters
- D. 10 meters

N1C08 (B) [97.301e]

If you are operating on 7125 kHz, in what amateur band are you operating?

- A. 80 meters
- B. 40 meters
- C. 15 meters
- D. 10 meters

N1C09 (C) [97.301e]

If you are operating on 21.150 MHz, in what amateur band are you operating?

- A. 80 meters
- B. 40 meters
- C. 15 meters
- D. 10 meters

N1C10 (D) [97.301e]

If you are operating on 28.150 MHz, in what amateur band are you operating?

- A. 80 meters
- B. 40 meters
- C. 15 meters
- D. 10 meters

N1C11 (D) [97.301f]

If you are operating on 223 MHz, in what amateur band are you operating?

- A. 15 meters
- B. 10 meters
- C. 2 meters
- D. 1.25 meters

N1D Novice eligibility, exam elements, mailing addresses, US call sign assignment and life of license.

N1D01 (A) [97.5d1]

Who can become an amateur licensee in the US?

- A. Anyone except a representative of a foreign government
- B. Only a citizen of the United States
- C. Anyone except an employee of the US government
- D. Anyone

N1D02 (D) [no ref]

What age must you be to hold an amateur license?

- A. 14 years or older
- B. 18 years or older
- C. 70 years or younger
- D. There are no age limits

N1D03 (C) [97.501e]

What minimum examinations must you pass for a Novice amateur license?

- A. A written exam, Element 1(A); and a 5 WPM code exam, Element 2(A)
- B. A 5 WPM code exam, Element 1(A); and a written exam, Element 3(A)
- C. A 5 WPM code exam, Element 1(A); and a written exam, Element 2
- D. A written exam, Element 2; and a 5 WPM code exam, Element 4

N1D04 (B) [97.21]

Why must an amateur operator have a current US Postal mailing address?

- A. So the FCC has a record of the location of each amateur station
- B. To follow the FCC rules and so the licensee can receive mail

from the FCC

- C. So the FCC can send license-renewal notices
- D. So the FCC can publish a call-sign directory

N1D05 (D) [97.27]

What must you do to replace your license if it is lost, mutilated or destroyed?

- A. Nothing; no replacement is needed
- B. Send a change of address to the FCC using a current FCC Form 610
- C. Retake all examination elements for your license
- D. Request a new one from the FCC, explaining what happened to the original

N1D06 (B) [97.19]

What must you do to notify the FCC if your mailing address changes?

- A. Fill out an FCC Form 610 using your new address, attach a copy of your license, and mail it to your local FCC Field Office
- B. Fill out an FCC Form 610 using your new address, attach a copy of your license, and mail it to the FCC office in Gettysburg, PA
- C. Call your local FCC Field Office and give them your new address over the phone
- D. Call the FCC office in Gettysburg, PA, and give them your new address over the phone

N1D07 (C) [no ref]

Which of the following call signs is a valid US amateur call?

- A. UA4HAK
- B. KBL7766
- C. KA9OLS
- D. BY7HY

N1D08 (B) [no ref]

What letters must be used for the first letter in US amateur call signs?

- A. K, N, U and W
- B. A, K, N and W
- C. A, B, C and D
- D. A, N, V and W

N1D09 (D) [no ref]

What numbers are normally used in US amateur call signs?

- A. Any two-digit number, 10 through 99
- B. Any two-digit number, 22 through 45
- C. A single digit, 1 through 9
- D. A single digit, 0 through 9

N1D10 (C) [97.23]

For how many years is an amateur license normally issued?

- A. 2
- B. 5
- C. 10
- D. 15

N1D11 (A) [97.19c]

How soon before your license expires should you send the FCC a completed 610 for a renewal?

- A. 60 to 90 days
- B. Within 21 days of the expiration date
- C. 6 to 9 months
- D. 6 months to a year

N1E Novice control operator emission privileges.

N1E01 (A) [97.305/.307f9]

What emission types are Novice control operators allowed to use in the 80-meter band?

- A. CW only
- B. Data only
- C. RTTY only
- D. Phone only

N1E02 (A) [97.305/307f9]

What emission types are Novice control operators allowed to use in the 40-meter band?

- A. CW only
- B. Data only
- C. RTTY only
- D. Phone only

N1E03 (A) [97.305/307f9]

What emission types are Novice control operators allowed to use in the 15-meter band?

- A. CW only
- B. Data only
- C. RTTY only
- D. Phone only

N1E04 (D) [97.305/307f9]

What emission types are Novice control operators allowed to use from 3675 to 3725 kHz?

- A. Phone only
- B. Image only
- C. Data only
- D. CW only

N1E05 (D) [97.305/307f9]

What emission types are Novice control operators allowed to use from 7100 to 7150 kHz in ITU Region 2?

- A. CW and data
- B. Phone
- C. Data only
- D. CW only

N1E06 (D) [97.305/307f9]

What emission types are Novice control operators allowed to use on frequencies from 21.1 to 21.2 MHz?

- A. CW and data
- B. CW and phone
- C. Data only
- D. CW only



N1E07 (C) [97.305]

What emission types are Novice control operators allowed to use on frequencies from 28.1 to 28.3 MHz?

- A. All authorized amateur emission privileges
- B. Data or phone
- C. CW, RTTY and data
- D. CW and phone

N1E08 (C) [97.305/307f10]

What emission types are Novice control operators allowed to use on frequencies from 28.3 to 28.5 MHz?

- A. All authorized amateur emission privileges
- B. CW and data
- C. CW and single-sideband phone
- D. Data and phone

N1E09 (D) [97.305]

What emission types are Novice control operators allowed to use on the amateur 1.25-meter band in ITU Region 2?

- A. CW and phone
- B. CW and data
- C. Data and phone
- D. All amateur emission privileges authorized for use on the band

N1E10 (D) [97.305]

What emission types are Novice control operators allowed to use on the amateur 23-centimeter band?

- A. Data and phone
- B. CW and data
- C. CW and phone
- D. All amateur emission privileges authorized for use on the band

N1E11 (D) [97.305/.307f10]

On what HF frequencies may Novice control operators use single-sideband (SSB) phone?

- A. 3700 - 3750 kHz
- B. 7100 - 7150 kHz
- C. 21100 - 21200 kHz
- D. 28300 - 28500 kHz

N1E12 (C) [97.305]

On what frequencies in ITU Region 2 may Novice control operators use FM phone?

- A. 28.3 - 28.5 MHz
- B. 144.0 - 148.0 MHz
- C. 222.1 - 223.91 MHz
- D. 1240 - 1270 MHz

N1E13 (B) [97.301e/.305]

On what frequencies in the 10-meter band may Novice control operators use RTTY?

- A. 28.0 - 28.3 MHz
- B. 28.1 - 28.3 MHz
- C. 28.0 - 29.3 MHz
- D. 29.1 - 29.3 MHz

N1E14 (B) [97.301e/.305]

On what frequencies in the 10-meter band may Novice control operators use data emissions?

- A. 28.0 - 28.3 MHz
- B. 28.1 - 28.3 MHz
- C. 28.0 - 29.3 MHz
- D. 29.1 - 29.3 MHz

N1F Transmitter power on Novice sub-bands and digital communications (limited to concepts only).

N1F01 (D) [97.313a]

What amount of transmitter power must amateur stations use at all times?

- A. 25 watts PEP output
- B. 250 watts PEP output
- C. 1500 watts PEP output
- D. The minimum legal power necessary to communicate

N1F02 (C) [97.313c1]

What is the most transmitter power an amateur station may use on 3700 kHz?

- A. 5 watts PEP output
- B. 25 watts PEP output
- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F03 (C) [97.313c1]

What is the most transmitter power an amateur station may use on 7125 kHz?

- A. 5 watts PEP output
- B. 25 watts PEP output
- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F04 (C) [97.313c1]

What is the most transmitter power an amateur station may use on 21.125 MHz?

- A. 5 watts PEP output
- B. 25 watts PEP output
- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F05 (C) [97.313c2]

What is the most transmitter power a Novice station may use on 28.125 MHz?

- A. 5 watts PEP output
- B. 25 watts PEP output
- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F06 (C) [97.313c2]

What is the most transmitter power a Novice station may use on the 10-meter band?

- A. 5 watts PEP output
- B. 25 watts PEP output

- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F07 (B) [97.313d]

What is the most transmitter power a Novice station may use on the 1.25-meter band?

- A. 5 watts PEP output
- B. 25 watts PEP output
- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F08 (A) [97.313e]

What is the most transmitter power a Novice station may use on the 23-centimeter band?

- A. 5 watts PEP output
- B. 25 watts PEP output
- C. 200 watts PEP output
- D. 1500 watts PEP output

N1F09 (A) [97.313c]

On which bands may a Novice station use up to 200 watts PEP output power?

- A. 80, 40, 15, and 10 meters
- B. 80, 40, 20, and 10 meters
- C. 1.25 meters
- D. 23 centimeters

N1F10 (C) [97.313d]

On which band(s) must a Novice station use no more than 25 watts PEP output power?

- A. 80, 40, 15, and 10 meters
- B. 80, 40, 20, and 10 meters
- C. 1.25 meters
- D. 23 centimeters

N1F11 (D) [97.313e]

On which band(s) must a Novice station use no more than 5 watts PEP output power?

- A. 80, 40, 15, and 10 meters
- B. 80, 40, 20, and 10 meters
- C. 1.25 meters
- D. 23 centimeters

N1G Responsibility of licensee, control operator requirements.

N1G01 (D) [97.3a11]

If you allow another amateur to be responsible for the transmissions from your station, what is the other operator called?

- A. An auxiliary operator
- B. The operations coordinator
- C. A third-party operator
- D. A control operator

N1G02 (C) [97.103a]

Who is responsible for the proper operation of an amateur station?

- A. Only the control operator
- B. Only the station licensee
- C. Both the control operator and the station licensee
- D. The person who owns the station equipment

N1G03 (A) [97.103a]

If you transmit from another amateur's station, who is responsible for its proper operation?

- A. Both of you
- B. The other amateur (the station licensee)
- C. You, the control operator
- D. The station licensee, unless the station records show that you were the control operator at the time

N1G04 (D) [97.103a]

What is your responsibility as a station licensee?

- A. You must allow another amateur to operate your station upon request
- B. You must be present whenever the station is operated
- C. You must notify the FCC if another amateur acts as the control operator
- D. You are responsible for the proper operation of the station in accordance with the FCC rules

N1G05 (C) [97.103b]

Who may be the control operator of an amateur station?

- A. Any person over 21 years of age
- B. Any person over 21 years of age with a General class license or higher
- C. Any licensed amateur chosen by the station licensee
- D. Any licensed amateur with a Technician class license or higher

N1G06 (B) [97.103]

If another amateur transmits from your station, which of these is NOT true?

- A. You must first give permission for the other amateur to use your station
- B. You must keep the call sign of the other amateur, together with the time and date of transmissions, in your station records
- C. The FCC will think that you are the station's control operator unless your station records show that you were not
- D. Both of you are equally responsible for the proper operation of the station

N1G07 (A) [97.105b]

If you let another amateur with a higher class license than yours control your station, what operating privileges are allowed?

- A. Any privileges allowed by the higher license
- B. Only the privileges allowed by your license
- C. All the emission privileges of the higher license, but only the frequency privileges of your license
- D. All the frequency privileges of the higher license, but only the emission privileges of your license

N1G08 (B) [97.105b]

If you are the control operator at the station of another amateur

who has a higher class license than yours, what operating privileges are you allowed?

- A. Any privileges allowed by the higher license
- B. Only the privileges allowed by your license
- C. All the emission privileges of the higher license, but only the frequency privileges of your license
- D. All the frequency privileges of the higher license, but only the emission privileges of your license

N1G09 (C) [97.7]

When must an amateur station have a control operator?

- A. Only when training another amateur
- B. Whenever the station receiver is operated
- C. Whenever the station is transmitting
- D. A control operator is not needed

N1G10 (A) [97.109b]

When a Novice station is transmitting, where must its control operator be?

- A. At the station's control point
- B. Anywhere in the same building as the transmitter
- C. At the station's entrance, to control entry to the room
- D. Anywhere within 50 km of the station location

N1G11 (B) [97.109b]

Why can't unlicensed persons in your family transmit using your amateur station if they are alone with your equipment?

- A. They must not use your equipment without your permission
- B. They must be licensed before they are allowed to be control operators
- C. They must first know how to use the right abbreviations and Q signals
- D. They must first know the right frequencies and emissions for transmitting

N1H Station identification, points of communication and operation, and business communications.

N1H01 (D) [97.5a]

When may you operate your amateur station somewhere in the US besides the location listed on your license?

- A. Only during times of emergency
- B. Only after giving proper notice to the FCC
- C. During an emergency or an FCC-approved emergency practice
- D. Whenever you want to

N1H02 (C) [97.111]

With which non-amateur stations is a US amateur station allowed to communicate?

- A. No non-amateur stations
- B. All non-amateur stations
- C. Only those authorized by the FCC
- D. Only those who use international Morse code

N1H03 (A) [97.113a]

When are communications for business allowed in the amateur service?

- A. Only if they are for the safety of human life or immediate protection of property
- B. There are no rules against business communications
- C. No business communications are ever allowed
- D. Business communications are allowed between the hours of 9 AM to 5 PM, weekdays

N1H04 (A) [97.113a]

Which of the following CANNOT be discussed on an amateur club net?

- A. Business planning
- B. Recreation planning
- C. Code practice planning
- D. Emergency planning

N1H05 (B) [97.113a]

If you wanted to join a radio club, would you be allowed to send a message to them via Amateur Radio requesting an application?

- A. Yes, if the club is a not-for-profit organization
- B. No. This would facilitate the commercial affairs of the club
- C. Yes, but only during normal business hours, between 9 AM and 5 PM, weekdays
- D. Yes, since there are no rules against business communications in the amateur service

N1H06 (C) [97.119a]

How often must an amateur station be identified?

- A. At the beginning of a contact and at least every ten minutes after that
- B. At least once during each transmission
- C. At least every ten minutes during and at the end of a contact
- D. At the beginning and end of each transmission

N1H07 (B) [97.119a]

What do you transmit to identify your amateur station?

- A. Your "handle"
- B. Your call sign
- C. Your first name and your location
- D. Your full name

N1H08 (A) [97.119a]

What identification, if any, is required when two amateur stations begin communications?

- A. No identification is required
- B. One of the stations must give both stations' call signs
- C. Each station must transmit its own call sign
- D. Both stations must transmit both call signs

N1H09 (C) [97.119a]

What identification, if any, is required when two amateur stations end communications?

- A. No identification is required
- B. One of the stations must transmit both stations' call signs
- C. Each station must transmit its own call sign
- D. Both stations must transmit both call signs

N1H10 (B) [97.115c]

Besides normal identification, what else must a US station do when sending third-party communications internationally?

- A. The US station must transmit its own call sign at the beginning of each communication, and at least every ten minutes after that
- B. The US station must transmit both call signs at the end of each communication
- C. The US station must transmit its own call sign at the beginning of each communication, and at least every five minutes after that
- D. Each station must transmit its own call sign at the end of each communication, and at least every five minutes after that

N1H11 (B) [97.119a]

What is the longest period of time an amateur station can operate without transmitting its call sign?

- A. 5 minutes
- B. 10 minutes
- C. 15 minutes
- D. 20 minutes

N1I International and space communications, authorized and prohibited transmissions.

N1I01 (A) [97.3a39]

What is the definition of third-party communications?

- A. A message sent between two amateur stations for someone else
- B. Public service communications for a political party
- C. Any messages sent by amateur stations
- D. A three-minute transmission to another amateur

N1I02 (D) [97.111a1]

When are you allowed to communicate with an amateur in a foreign country?

- A. Only when the foreign amateur uses English
- B. Only when you have permission from the FCC
- C. Only when a third-party agreement exists between the US and the foreign country
- D. At any time, unless it is not allowed by either government

N1I03 (C) [97.3a36]

What is an amateur space station?

- A. An amateur station operated on an unused frequency
- B. An amateur station awaiting its new call letters from the FCC
- C. An amateur station located more than 50 kilometers above the Earth's surface
- D. An amateur station that communicates with Space Shuttles

N1I04 (B) [New 97.207a per FCC 92-310]

Who may be the licensee of an amateur space station?

- A. An amateur holding an Amateur Extra class operator license
- B. Any licensed amateur operator
- C. Anyone designated by the commander of the spacecraft
- D. No one unless specifically authorized by the government

N1I05 (D) [97.113b]

When may someone be paid to transmit messages from an amateur

station?

- A. Only if he or she works for a public service agency such as the Red Cross
- B. Under no circumstances
- C. Only if he or she reports all such payments to the IRS
- D. Only if he or she works for a club station and special requirements are met

N1I06 (A) [97.113c]

When is an amateur allowed to broadcast information to the general public?

- A. Never
- B. Only when the operator is being paid
- C. Only when broadcasts last less than 1 hour
- D. Only when broadcasts last longer than 15 minutes

N1I07 (A) [97.113d]

When is an amateur station permitted to transmit music?

- A. Never
- B. Only if the music played produces no spurious emissions
- C. Only if it is used to jam an illegal transmission
- D. Only if it is above 1280 MHz

N1I08 (C) [97.113d]

When is the use of codes or ciphers allowed to hide the meaning of an amateur message?

- A. Only during contests
- B. Only during nationally declared emergencies
- C. Never, except when special requirements are met
- D. Only on frequencies above 1280 MHz

N1I09 (B) [97.3a42]

What is a "third-party" in amateur communications?

- A. An amateur station that breaks in to talk
- B. A person who is sent a message by amateur communications other than a control operator who handles the message
- C. A shortwave listener who monitors amateur communications
- D. An unlicensed control operator

N1I10 (A) [97.115a2]

If you are allowing a non-amateur friend to use your station to talk to someone in the US, and a foreign station breaks in to talk to your friend, what should you do?

- A. Have your friend wait until you find out if the US has a third-party agreement with the foreign station's government
- B. Stop all discussions and quickly sign off
- C. Since you can talk to any foreign amateurs, your friend may keep talking as long as you are the control operator
- D. Report the incident to the foreign amateur's government

N1I11 (D) [97.115a2]

When are you allowed to transmit a message to a station in a foreign country for a third party?

- A. Anytime
- B. Never
- C. Anytime, unless there is a third-party agreement between the US and the foreign government



D. If there is a third-party agreement with the US government, or if the third party could be the control operator

N1J False signals or unidentified communications and malicious interference.

N1J01 (B) [97.3a21]

What is a transmission called that disturbs other communications?

- A. Interrupted CW
- B. Harmful interference
- C. Transponder signals
- D. Unidentified transmissions

N1J02 (B) [97.3a21]

Why is transmitting on a police frequency as a "joke" called harmful interference that deserves a large penalty?

- A. It annoys everyone who listens
- B. It blocks police calls which might be an emergency and interrupts police communications
- C. It is in bad taste to communicate with non-amateurs, even as a joke
- D. It is poor amateur practice to transmit outside the amateur bands

N1J03 (C) [97.101d]

When may you deliberately interfere with another station's communications?

- A. Only if the station is operating illegally
- B. Only if the station begins transmitting on a frequency you are using
- C. Never
- D. You may expect, and cause, deliberate interference because it can't be helped during crowded band conditions

N1J04 (A) [97.113d]

When may false or deceptive amateur signals or communications be transmitted?

- A. Never
- B. When operating a beacon transmitter in a "fox hunt" exercise
- C. When playing a harmless "practical joke"
- D. When you need to hide the meaning of a message for secrecy

N1J05 (C) [97.113d]

If an amateur pretends there is an emergency and transmits the word "MAYDAY," what is this called?

- A. A traditional greeting in May
- B. An emergency test transmission
- C. False or deceptive signals
- D. Nothing special; "MAYDAY" has no meaning in an emergency

N1J06 (C) [97.119a]

When may an amateur transmit unidentified communications?

- A. Only for brief tests not meant as messages
- B. Only if it does not interfere with others
- C. Never, except to control a model craft
- D. Only for two-way or third-party communications

N1J07 (A) [97.119a]

What is an amateur communication called that does not have the required station identification?

- A. Unidentified communications or signals
- B. Reluctance modulation
- C. Test emission
- D. Tactical communication

N1J08 (D) [97.405a]

If you hear a voice distress signal on a frequency outside of your license privileges, what are you allowed to do to help the station in distress?

- A. You are NOT allowed to help because the frequency of the signal is outside your privileges
- B. You are allowed to help only if you keep your signals within the nearest frequency band of your privileges
- C. You are allowed to help on a frequency outside your privileges only if you use international Morse code
- D. You are allowed to help on a frequency outside your privileges in any way possible

N1J09 (D) [97.119a]

If you answer someone on the air without giving your call sign, what type of communication have you just conducted?

- A. Test transmission
- B. Tactical signal
- C. Packet communication
- D. Unidentified communication

N1J10 (C) [97.403]

When may you use your amateur station to transmit an "SOS" or "MAYDAY"?

- A. Never
- B. Only at specific times (at 15 and 30 minutes after the hour)
- C. In a life- or property-threatening emergency
- D. When the National Weather Service has announced a severe weather watch

N1J11 (B) [97.405a]

When may you send a distress signal on any frequency?

- A. Never
- B. In a life- or property-threatening emergency
- C. Only at specific times (at 15 and 30 minutes after the hour)
- D. When the National Weather Service has announced a severe weather watch

SUBELEMENT N2 - OPERATING PROCEDURES [2 exam questions - 2 groups]

N2A Choosing a frequency for tune-up, operating or emergencies; understanding the Morse code; RST signal reports; Q signals; voice communications and phonetics.

N2A01 (A)

What should you do before you transmit on any frequency?

- A. Listen to make sure others are not using the frequency
- B. Listen to make sure that someone will be able to hear you

- C. Check your antenna for resonance at the selected frequency
- D. Make sure the SWR on your antenna feed line is high enough

N2A02 (D)

If you make contact with another station and your signal is extremely strong and perfectly readable, what adjustment might you make to your transmitter?

- A. Turn on your speech processor
- B. Reduce your SWR
- C. Continue with your contact, making no changes
- D. Turn down your power output to the minimum necessary

N2A03 (C)

What is one way to shorten transmitter tune-up time on the air to cut down on interference?

- A. Use a random wire antenna
- B. Tune up on 40 meters first, then switch to the desired band
- C. Tune the transmitter into a dummy load
- D. Use twin lead instead of coaxial-cable feed lines

N2A04 (D)

If you are in contact with another station and you hear an emergency call for help on your frequency, what should you do?

- A. Tell the calling station that the frequency is in use
- B. Direct the calling station to the nearest emergency net frequency
- C. Call your local Civil Preparedness Office and inform them of the emergency
- D. Stop your QSO immediately and take the emergency call

N2A05 (B)

What is the correct way to call CQ when using Morse code?

- A. Send the letters "CQ" three times, followed by "DE," followed by your call sign sent once
- B. Send the letters "CQ" three times, followed by "DE," followed by your call sign sent three times
- C. Send the letters "CQ" ten times, followed by "DE," followed by your call sign sent once
- D. Send the letters "CQ" over and over

N2A06 (B)

How should you answer a Morse code CQ call?

- A. Send your call sign four times
- B. Send the other station's call sign twice, followed by "DE," followed by your call sign twice
- C. Send the other station's call sign once, followed by "DE," followed by your call sign four times
- D. Send your call sign followed by your name, station location and a signal report

N2A07 (C)

At what speed should a Morse code CQ call be transmitted?

- A. Only speeds below five WPM
- B. The highest speed your keyer will operate
- C. Any speed at which you can reliably receive
- D. The highest speed at which you can control the keyer

N2A08 (D)

What is the meaning of the procedural signal "CQ"?

- A. "Call on the quarter hour"
- B. "New antenna is being tested" (no station should answer)
- C. "Only the called station should transmit"
- D. "Calling any station"

N2A09 (A)

What is the meaning of the procedural signal "DE"?

- A. "From" or "this is," as in "W9NGT DE N9BTT"
- B. "Directional Emissions" from your antenna
- C. "Received all correctly"
- D. "Calling any station"

N2A10 (A)

What is the meaning of the procedural signal "K"?

- A. "Any station transmit"
- B. "All received correctly"
- C. "End of message"
- D. "Called station only transmit"

N2A11 (B)

What is meant by the term "DX"?

- A. Best regards
- B. Distant station
- C. Calling any station
- D. Go ahead

N2A12 (B)

What is the meaning of the term "73"?

- A. Long distance
- B. Best regards
- C. Love and kisses
- D. Go ahead

N2A13 (C)

What are RST signal reports?

- A. A short way to describe ionospheric conditions
- B. A short way to describe transmitter power
- C. A short way to describe signal reception
- D. A short way to describe sunspot activity

N2A14 (D)

What does RST mean in a signal report?

- A. Recovery, signal strength, tempo
- B. Recovery, signal speed, tone
- C. Readability, signal speed, tempo
- D. Readability, signal strength, tone

N2A15 (B)

What is one meaning of the Q signal "QRS"?

- A. Interference from static
- B. Send more slowly
- C. Send RST report
- D. Radio station location is

N2A16 (D)

What is one meaning of the Q signal "QTH"?

- A. Time here is
- B. My name is
- C. Stop sending
- D. My location is

N2A17 (C)

What is a QSL card?

- A. A letter or postcard from an amateur pen pal
- B. A Notice of Violation from the FCC
- C. A written proof of communication between two amateurs
- D. A postcard reminding you when your license will expire

N2A18 (C)

What is the correct way to call CQ when using voice?

- A. Say "CQ" once, followed by "this is," followed by your call sign spoken three times
- B. Say "CQ" at least five times, followed by "this is," followed by your call sign spoken once
- C. Say "CQ" three times, followed by "this is," followed by your call sign spoken three times
- D. Say "CQ" at least ten times, followed by "this is," followed by your call sign spoken once

N2A19 (D)

How should you answer a voice CQ call?

- A. Say the other station's call sign at least ten times, followed by "this is," then your call sign at least twice
- B. Say the other station's call sign at least five times phonetically, followed by "this is," then your call sign at least once
- C. Say the other station's call sign at least three times, followed by "this is," then your call sign at least five times phonetically
- D. Say the other station's call sign once, followed by "this is," then your call sign given phonetically

N2A20 (A)

To make your call sign better understood when using voice transmissions, what should you do?

- A. Use Standard International Phonetics for each letter of your call
- B. Use any words which start with the same letters as your call sign for each letter of your call
- C. Talk louder
- D. Turn up your microphone gain

N2B Radio teleprinting; packet; repeater operating procedures; special operations.

N2B01 (B)

What is the correct way to call CQ when using RTTY?

- A. Send the letters "CQ" three times, followed by "DE," followed by your call sign sent once
- B. Send the letters "CQ" three to six times, followed by "DE," followed by your call sign sent three times
- C. Send the letters "CQ" ten times, followed by the procedural

signal "DE," followed by your call sent one time  
D. Send the letters "CQ" over and over

N2B02 (B)

What speed should you use when answering a CQ call using RTTY?

- A. Half the speed of the received signal
- B. The same speed as the received signal
- C. Twice the speed of the received signal
- D. Any speed, since RTTY systems adjust to any signal speed

N2B03 (C)

What does "connected" mean in a packet-radio link?

- A. A telephone link is working between two stations
- B. A message has reached an amateur station for local delivery
- C. A transmitting station is sending data to only one receiving station; it replies that the data is being received correctly
- D. A transmitting and receiving station are using a digipeater, so no other contacts can take place until they are finished

N2B04 (D)

What does "monitoring" mean on a packet-radio frequency?

- A. The FCC is copying all messages
- B. A member of the Amateur Auxiliary to the FCC's Field Operations Bureau is copying all messages
- C. A receiving station is displaying all messages sent to it, and replying that the messages are being received correctly
- D. A receiving station is displaying messages that may not be sent to it, and is not replying to any message

N2B05 (A)

What is a digipeater?

- A. A packet-radio station that retransmits only data that is marked to be retransmitted
- B. A packet-radio station that retransmits any data that it receives
- C. A repeater that changes audio signals to digital data
- D. A repeater built using only digital electronics parts

N2B06 (B)

What does "network" mean in packet radio?

- A. A way of connecting terminal-node controllers by telephone so data can be sent over long distances
- B. A way of connecting packet-radio stations so data can be sent over long distances
- C. The wiring connections on a terminal-node controller board
- D. The programming in a terminal-node controller that rejects other callers if a station is already connected

N2B07 (A)

What is simplex operation?

- A. Transmitting and receiving on the same frequency
- B. Transmitting and receiving over a wide area
- C. Transmitting on one frequency and receiving on another
- D. Transmitting one-way communications

N2B08 (B)

When should you use simplex operation instead of a repeater?

- A. When the most reliable communications are needed
- B. When a contact is possible without using a repeater
- C. When an emergency telephone call is needed
- D. When you are traveling and need some local information

N2B09 (C)

What is a good way to make contact on a repeater?

- A. Say the call sign of the station you want to contact three times
- B. Say the other operator's name, then your call sign three times
- C. Say the call sign of the station you want to contact, then your call sign
- D. Say, "Breaker, breaker," then your call sign

N2B10 (A)

When using a repeater to communicate, what do you need to know about the repeater besides its output frequency?

- A. Its input frequency
- B. Its call sign
- C. Its power level
- D. Whether or not it has a phone patch

N2B11 (D)

What is the main purpose of a repeater?

- A. To make local information available 24 hours a day
- B. To link amateur stations with the telephone system
- C. To retransmit NOAA weather information during severe storm warnings
- D. To increase the range of portable and mobile stations

N2B12 (A)

What does it mean to say that a repeater has an input and an output frequency?

- A. The repeater receives on one frequency and transmits on another
- B. The repeater offers a choice of operating frequency, in case one is busy
- C. One frequency is used to control the repeater and another is used to retransmit received signals
- D. The repeater must receive an access code on one frequency before retransmitting received signals

N2B13 (C)

What is an autopatch?

- A. Something that automatically selects the strongest signal to be repeated
- B. A device which connects a mobile station to the next repeater if it moves out of range of the first
- C. A device that allows repeater users to make telephone calls from their stations
- D. A device which locks other stations out of a repeater when there is an important conversation in progress

N2B14 (D)

What is the purpose of a repeater time-out timer?

- A. It lets a repeater have a rest period after heavy use

- B. It logs repeater transmit time to predict when a repeater will fail
- C. It tells how long someone has been using a repeater
- D. It limits the amount of time someone can transmit on a repeater

N2B15 (B)

What is a CTCSS (or PL) tone?

- A. A special signal used for telecommand control of model craft
- B. A sub-audible tone added to a carrier which may cause a receiver to accept a signal
- C. A tone used by repeaters to mark the end of a transmission
- D. A special signal used for telemetry between amateur space stations and Earth stations

SUBELEMENT N3 - RADIO WAVE PROPAGATION [1 exam question - 1 group]

N3A Radio wave propagation, line of sight, ground wave, sky wave, sunspots and the sunspot cycle, reflection of VHF/UHF signals.

N3A01 (A)

When a signal travels in a straight line from one antenna to another, what is this called?

- A. Line-of-sight propagation
- B. Straight-line propagation
- C. Knife-edge diffraction
- D. Tunnel propagation

N3A02 (C)

What type of propagation usually occurs from one hand-held VHF transceiver to another nearby?

- A. Tunnel propagation
- B. Sky-wave propagation
- C. Line-of-sight propagation
- D. Auroral propagation

N3A03 (B)

How do VHF and UHF radio waves usually travel from a transmitting antenna to a receiving antenna?

- A. They bend through the ionosphere
- B. They go in a straight line
- C. They wander in any direction
- D. They move in a circle going either east or west from the transmitter

N3A04 (C)

What can happen to VHF or UHF signals going towards a metal-framed building?

- A. They will go around the building
- B. They can be bent by the ionosphere
- C. They can be easily reflected by the building
- D. They are sometimes scattered in the ectosphere

N3A05 (D)

When a signal travels along the surface of the Earth, what is this called?

- A. Sky-wave propagation



- B. Knife-edge diffraction
- C. E-region propagation
- D. Ground-wave propagation

N3A06 (B)

How does the range of sky-wave propagation compare to ground-wave propagation?

- A. It is much shorter
- B. It is much longer
- C. It is about the same
- D. It depends on the weather

N3A07 (A)

When a signal is returned to earth by the ionosphere, what is this called?

- A. Sky-wave propagation
- B. Earth-moon-earth propagation
- C. Ground-wave propagation
- D. Tropospheric propagation

N3A08 (C)

What is the usual cause of sky-wave propagation?

- A. Signals are reflected by a mountain
- B. Signals are reflected by the moon
- C. Signals are bent back to earth by the ionosphere
- D. Signals are repeated by a repeater

N3A09 (C)

What is a skip zone?

- A. An area covered by ground-wave propagation
- B. An area covered by sky-wave propagation
- C. An area which is too far away for ground-wave propagation, but too close for sky-wave propagation
- D. An area which is too far away for ground-wave or sky-wave propagation

N3A10 (A)

What are the regions of ionized gases high above the earth called?

- A. The ionosphere
- B. The troposphere
- C. The gas region
- D. The ion zone

N3A11 (A)

How do sunspots change the ionization of the atmosphere?

- A. The more sunspots there are, the greater the ionization
- B. The more sunspots there are, the less the ionization
- C. Unless there are sunspots, the ionization is zero
- D. They have no effect

N3A12 (C)

How long is an average sunspot cycle?

- A. 2 years
- B. 5 years
- C. 11 years
- D. 17 years

SUBELEMENT N4 - AMATEUR RADIO PRACTICES [4 exam questions - 4 groups]

N4A Unauthorized use prevention, lightning protection, and station grounding.

N4A01 (B)

How could you best keep unauthorized persons from using your amateur station at home?

- A. Use a carrier-operated relay in the main power line
- B. Use a key-operated on/off switch in the main power line
- C. Put a "Danger - High Voltage" sign in the station
- D. Put fuses in the main power line

N4A02 (A)

How could you best keep unauthorized persons from using a mobile amateur station in your car?

- A. Disconnect the microphone when you are not using it
- B. Put a "do not touch" sign on the radio
- C. Turn the radio off when you are not using it
- D. Tune the radio to an unused frequency when you are done using it

N4A03 (A)

Why would you use a key-operated on/off switch in the main power line of your station?

- A. To keep unauthorized persons from using your station
- B. For safety, in case the main fuses fail
- C. To keep the power company from turning off your electricity during an emergency
- D. For safety, to turn off the station in the event of an emergency

N4A04 (D)

Why should you ground all antenna and rotator cables when your amateur station is not in use?

- A. To lock the antenna system in one position
- B. To avoid radio frequency interference
- C. To save electricity
- D. To protect the station and building from lightning damage

N4A05 (C)

How can an antenna system best be protected from lightning damage?

- A. Install a balun at the antenna feed point
- B. Install an RF choke in the antenna feed line
- C. Ground all antennas when they are not in use
- D. Install a fuse in the antenna feed line

N4A06 (D)

How can amateur station equipment best be protected from lightning damage?

- A. Use heavy insulation on the wiring
- B. Never turn off the equipment
- C. Disconnect the ground system from all radios
- D. Disconnect all equipment from the power lines and antenna

cables

N4A07 (B)

For best protection from electrical shock, what should be grounded in an amateur station?

- A. The power supply primary
- B. All station equipment
- C. The antenna feed line
- D. The AC power mains

N4A08 (A)

What is usually a good indoor grounding point for an amateur station?

- A. A metallic cold water pipe
- B. A plastic cold water pipe
- C. A window screen
- D. A metallic natural gas pipe

N4A09 (C)

Where should you connect the chassis of each piece of your station equipment to best protect against electrical shock?

- A. To insulated shock mounts
- B. To the antenna
- C. To a good ground connection
- D. To a circuit breaker

N4A10 (B)

Which of these materials is best for a ground rod driven into the earth?

- A. Hard plastic
- B. Copper or copper-clad steel
- C. Iron or steel
- D. Fiberglass

N4A11 (C)

If you ground your station equipment to a ground rod driven into the earth, what is the shortest length the rod should be?

- A. 4 feet
- B. 6 feet
- C. 8 feet
- D. 10 feet

N4B Radio frequency safety precautions, safety interlocks, antenna installation safety procedures.

N4B01 (B)

What should you do for safety when operating at 1270 MHz?

- A. Make sure that an RF leakage filter is installed at the antenna feed point
- B. Keep antenna away from your eyes when RF is applied
- C. Make sure the standing wave ratio is low before you conduct a test
- D. Never use a shielded horizontally polarized antenna

N4B02 (A)

What should you do for safety if you put up a UHF transmitting antenna?

- A. Make sure the antenna will be in a place where no one can get near it when you are transmitting
- B. Make sure that RF field screens are in place
- C. Make sure the antenna is near the ground to keep its RF energy pointing in the correct direction
- D. Make sure you connect an RF leakage filter at the antenna feed point

N4B03 (C)

What should you do for safety before removing the shielding on a UHF power amplifier?

- A. Make sure all RF screens are in place at the antenna feed line
- B. Make sure the antenna feed line is properly grounded
- C. Make sure the amplifier cannot accidentally be turned on
- D. Make sure that RF leakage filters are connected

N4B04 (A)

Why should you use only good quality coaxial cable and connectors for a UHF antenna system?

- A. To keep RF loss low
- B. To keep television interference high
- C. To keep the power going to your antenna system from getting too high
- D. To keep the standing wave ratio of your antenna system high

N4B05 (B)

Why should you make sure the antenna of a hand-held transceiver is not close to your head when transmitting?

- A. To help the antenna radiate energy equally in all directions
- B. To reduce your exposure to the radio-frequency energy
- C. To use your body to reflect the signal in one direction
- D. To keep static charges from building up

N4B06 (D)

Microwave oven radiation is similar to what type of amateur station RF radiation?

- A. Signals in the 3.5 MHz range
- B. Signals in the 21 MHz range
- C. Signals in the 50 MHz range
- D. Signals in the 1270 MHz range

N4B07 (D)

Why would there be a switch in a high-voltage power supply to turn off the power if its cabinet is opened?

- A. To keep dangerous RF radiation from leaking out through an open cabinet
- B. To keep dangerous RF radiation from coming in through an open cabinet
- C. To turn the power supply off when it is not being used
- D. To keep anyone opening the cabinet from getting shocked by dangerous high voltages

N4B08 (D)

What kind of safety equipment should you wear if you are working on an antenna tower?

- A. A grounding chain

- B. A reflective vest of approved color
- C. A flashing red, yellow or white light
- D. A carefully inspected safety belt, hard hat and safety glasses

N4B09 (D)

Why should you wear a safety belt if you are working on an antenna tower?

- A. To safely hold your tools so they don't fall and injure someone on the ground
- B. To keep the tower from becoming unbalanced while you are working
- C. To safely bring any tools you might use up and down the tower
- D. To prevent you from accidentally falling

N4B10 (A)

For safety, how high should you place a horizontal wire antenna?

- A. High enough so that no one can touch any part of it from the ground
- B. As close to the ground as possible
- C. Just high enough so you can easily reach it for adjustments or repairs
- D. Above high-voltage electrical lines

N4B11 (C)

Why should you wear a hard hat if you are on the ground helping someone work on an antenna tower?

- A. So you won't be hurt if the tower should accidentally fall
- B. To keep RF energy away from your head during antenna testing
- C. To protect your head from something dropped from the tower
- D. So someone passing by will know that work is being done on the tower and will stay away

N4C SWR meaning and measurements.

N4C01 (C)

What instrument is used to measure standing wave ratio?

- A. An ohmmeter
- B. An ammeter
- C. An SWR meter
- D. A current bridge

N4C02 (D)

What instrument is used to measure the relative impedance match between an antenna and its feed line?

- A. An ammeter
- B. An ohmmeter
- C. A voltmeter
- D. An SWR meter

N4C03 (A)

Where would you connect an SWR meter to measure standing wave ratio?

- A. Between the feed line and the antenna
- B. Between the transmitter and the power supply
- C. Between the transmitter and the receiver
- D. Between the transmitter and the ground

N4C04 (B)

What does an SWR reading of 1:1 mean?

- A. An antenna for another frequency band is probably connected
- B. The best impedance match has been attained
- C. No power is going to the antenna
- D. The SWR meter is broken

N4C05 (C)

What does an SWR reading of less than 1.5:1 mean?

- A. An impedance match which is too low
- B. An impedance mismatch; something may be wrong with the antenna system
- C. A fairly good impedance match
- D. An antenna gain of 1.5

N4C06 (D)

What does an SWR reading of 4:1 mean?

- A. An impedance match which is too low
- B. An impedance match which is good, but not the best
- C. An antenna gain of 4
- D. An impedance mismatch; something may be wrong with the antenna system

N4C07 (A)

What kind of SWR reading may mean poor electrical contact between parts of an antenna system?

- A. A jumpy reading
- B. A very low reading
- C. No reading at all
- D. A negative reading

N4C08 (A)

What does a very high SWR reading mean?

- A. The antenna is the wrong length, or there may be an open or shorted connection somewhere in the feed line
- B. The signals coming from the antenna are unusually strong, which means very good radio conditions
- C. The transmitter is putting out more power than normal, showing that it is about to go bad
- D. There is a large amount of solar radiation, which means very poor radio conditions

N4C09 (B)

If an SWR reading at the low frequency end of an amateur band is 2.5:1, and is 5:1 at the high frequency end of the same band, what does this tell you about your 1/2-wavelength dipole antenna?

- A. The antenna is broadbanded
- B. The antenna is too long for operation on the band
- C. The antenna is too short for operation on the band
- D. The antenna is just right for operation on the band

N4C10 (C)

If an SWR reading at the low frequency end of an amateur band is 5:1, and 2.5:1 at the high frequency end of the same band, what does this tell you about your 1/2-wavelength dipole antenna?

- A. The antenna is broadbanded

- B. The antenna is too long for operation on the band
- C. The antenna is too short for operation on the band
- D. The antenna is just right for operation on the band

N4C11 (A)

If you use a 3-30 MHz RF-power meter at UHF frequencies, how accurate will its readings be?

- A. They may not be accurate at all
- B. They will be accurate enough to get by
- C. They will be accurate but the readings must be divided by two
- D. They will be accurate but the readings must be multiplied by two

N4D RFI and its complications.

N4D01 (C)

What is meant by receiver overload?

- A. Too much voltage from the power supply
- B. Too much current from the power supply
- C. Interference caused by strong signals from a nearby transmitter
- D. Interference caused by turning the volume up too high

N4D02 (B)

What is one way to tell if radio-frequency interference to a receiver is caused by front-end overload?

- A. If connecting a low-pass filter to the transmitter greatly cuts down the interference
- B. If the interference is about the same no matter what frequency is used for the transmitter
- C. If connecting a low-pass filter to the receiver greatly cuts down the interference
- D. If grounding the receiver makes the problem worse

N4D03 (C)

If your neighbor reports television interference whenever you are transmitting from your amateur station, no matter what frequency band you use, what is probably the cause of the interference?

- A. Too little transmitter harmonic suppression
- B. Receiver VR tube discharge
- C. Receiver overload
- D. Incorrect antenna length

N4D04 (D)

If your neighbor reports television interference on one or two channels only when you are transmitting on the 15-meter band, what is probably the cause of the interference?

- A. Too much low-pass filtering on the transmitter
- B. De-ionization of the ionosphere near your neighbor's TV antenna
- C. TV receiver front-end overload
- D. Harmonic radiation from your transmitter

N4D05 (B)

What type of filter should be connected to a TV receiver as the first step in trying to prevent RF overload from an amateur HF station transmission?

- A. Low-pass
- B. High-pass
- C. Band pass
- D. Notch

N4D06 (B)

What type of filter might be connected to an amateur HF transmitter to cut down on harmonic radiation?

- A. A key-click filter
- B. A low-pass filter
- C. A high-pass filter
- D. A CW filter

N4D07 (A)

What is meant by harmonic radiation?

- A. Unwanted signals at frequencies which are multiples of the fundamental (chosen) frequency
- B. Unwanted signals that are combined with a 60-Hz hum
- C. Unwanted signals caused by sympathetic vibrations from a nearby transmitter
- D. Signals which cause skip propagation to occur

N4D08 (A)

Why is harmonic radiation from an amateur station not wanted?

- A. It may cause interference to other stations and may result in out-of-band signals
- B. It uses large amounts of electric power
- C. It may cause sympathetic vibrations in nearby transmitters
- D. It may cause auroras in the air

N4D09 (A)

What type of interference may come from a multi-band antenna connected to a poorly tuned transmitter?

- A. Harmonic radiation
- B. Auroral distortion
- C. Parasitic excitation
- D. Intermodulation

N4D10 (C)

What is the main purpose of shielding in a transmitter?

- A. It gives the low-pass filter a solid support
- B. It helps the sound quality of transmitters
- C. It prevents unwanted RF radiation
- D. It helps keep electronic parts warmer and more stable

N4D11 (A)

If you are told that your amateur station is causing television interference, what should you do?

- A. First make sure that your station is operating properly, and that it does not cause interference to your own television
- B. Immediately turn off your transmitter and contact the nearest FCC office for assistance
- C. Connect a high-pass filter to the transmitter output and a low-pass filter to the antenna-input terminals of the television
- D. Continue operating normally, because you have no reason to worry about the interference



SUBELEMENT N5 - ELECTRICAL PRINCIPLES [4 exam questions - 4 groups]

N5A Metric prefixes, ie pico, micro, milli, centi, kilo, mega, giga.

N5A01 (B)

If a dial marked in kilohertz shows a reading of 7125 kHz, what would it show if it were marked in megahertz?

- A. 0.007125 MHz
- B. 7.125 MHz
- C. 71.25 MHz
- D. 7,125,000 MHz

N5A02 (C)

If a dial marked in megahertz shows a reading of 3.525 MHz, what would it show if it were marked in kilohertz?

- A. 0.003525 kHz
- B. 35.25 kHz
- C. 3525 kHz
- D. 3,525,000 kHz

N5A03 (D)

If a dial marked in kilohertz shows a reading of 3725 kHz, what would it show if it were marked in hertz?

- A. 3,725 Hz
- B. 37.25 Hz
- C. 3,725 Hz
- D. 3,725,000 Hz

N5A04 (B)

How long is an antenna that is 400 centimeters long?

- A. 0.0004 meters
- B. 4 meters
- C. 40 meters
- D. 40,000 meters

N5A05 (C)

If an ammeter marked in amperes is used to measure a 3000-milliampere current, what reading would it show?

- A. 0.003 amperes
- B. 0.3 amperes
- C. 3 amperes
- D. 3,000,000 amperes

N5A06 (B)

If a voltmeter marked in volts is used to measure a 3500-millivolt potential, what reading would it show?

- A. 0.35 volts
- B. 3.5 volts
- C. 35 volts
- D. 350 volts

N5A07 (B)

How many farads is 500,000 microfarads?

- A. 0.0005 farads
- B. 0.5 farads

- C. 500 farads
- D. 500,000,000 farads

N5A08 (B)

How many microfarads is 1,000,000 picofarads?

- A. 0.001 microfarads
- B. 1 microfarad
- C. 1,000 microfarads
- D. 1,000,000,000 microfarads

N5A09 (C)

How many hertz are in a kilohertz?

- A. 10
- B. 100
- C. 1000
- D. 1000000

N5A10 (C)

How many kilohertz are in a megahertz?

- A. 10
- B. 100
- C. 1000
- D. 1000000

N5A11 (B)

If you have a hand-held transceiver which puts out 500 milliwatts, how many watts would this be?

- A. 0.02
- B. 0.5
- C. 5
- D. 50

N5B Concepts of current, voltage, conductor, insulator, resistance, and the measurements thereof.

N5B01 (D)

What is the flow of electrons in an electric circuit called?

- A. Voltage
- B. Resistance
- C. Capacitance
- D. Current

N5B02 (C)

What is the basic unit of electric current?

- A. The volt
- B. The watt
- C. The ampere
- D. The ohm

N5B03 (B)

What is the pressure that forces electrons to flow through a circuit?

- A. Magnetomotive force, or inductance
- B. Electromotive force, or voltage
- C. Farad force, or capacitance
- D. Thermal force, or heat

N5B04 (A)

What is the basic unit of voltage?

- A. The volt
- B. The watt
- C. The ampere
- D. The ohm

N5B05 (A)

How much voltage does an automobile battery usually supply?

- A. About 12 volts
- B. About 30 volts
- C. About 120 volts
- D. About 240 volts

N5B06 (C)

How much voltage does a wall outlet usually supply (in the US)?

- A. About 12 volts
- B. About 30 volts
- C. About 120 volts
- D. About 480 volts

N5B07 (C)

What are three good electrical conductors?

- A. Copper, gold, mica
- B. Gold, silver, wood
- C. Gold, silver, aluminum
- D. Copper, aluminum, paper

N5B08 (A)

What are four good electrical insulators?

- A. Glass, air, plastic, porcelain
- B. Glass, wood, copper, porcelain
- C. Paper, glass, air, aluminum
- D. Plastic, rubber, wood, carbon

N5B09 (B)

What does an electrical insulator do?

- A. It lets electricity flow through it in one direction
- B. It does not let electricity flow through it
- C. It lets electricity flow through it when light shines on it
- D. It lets electricity flow through it

N5B10 (D)

What limits the amount of current that flows through a circuit if the voltage stays the same?

- A. Reliance
- B. Reactance
- C. Saturation
- D. Resistance

N5B11 (D)

What is the basic unit of resistance?

- A. The volt
- B. The watt
- C. The ampere
- D. The ohm

N5C Ohm's Law (any calculations will be kept to a very low level - no fractions or decimals) and the concepts of energy and power, and open and short circuits.

N5C01 (A)

What formula shows how voltage, current and resistance relate to each other in an electric circuit?

- A. Ohm's Law
- B. Kirchhoff's Law
- C. Ampere's Law
- D. Tesla's Law

N5C02 (C)

If a current of 2 amperes flows through a 50-ohm resistor, what is the voltage across the resistor?

- A. 25 volts
- B. 52 volts
- C. 100 volts
- D. 200 volts

N5C03 (B)

If a 100-ohm resistor is connected to 200 volts, what is the current through the resistor?

- A. 1/2 ampere
- B. 2 amperes
- C. 300 amperes
- D. 20000 amperes

N5C04 (A)

If a current of 3 amperes flows through a resistor connected to 90 volts, what is the resistance?

- A. 30 ohms
- B. 93 ohms
- C. 270 ohms
- D. 1/30 ohm

N5C05 (C)

What is the word used to describe how fast electrical energy is used?

- A. Resistance
- B. Current
- C. Power
- D. Voltage

N5C06 (C)

If you have light bulbs marked 60 watts, 75 watts and 100 watts, which one will use electrical energy the fastest?

- A. The 60 watt bulb
- B. The 75 watt bulb
- C. The 100 watt bulb
- D. They will all be the same

N5C07 (B)

What is the basic unit of electrical power?

- A. The ohm
- B. The watt
- C. The volt

D. The ampere

N5C08 (C)

Which electrical circuit can have no current?

- A. A closed circuit
- B. A short circuit
- C. An open circuit
- D. A complete circuit

N5C09 (D)

Which electrical circuit uses too much current?

- A. An open circuit
- B. A dead circuit
- C. A closed circuit
- D. A short circuit

N5C10 (B)

What is the name of a current that flows only in one direction?

- A. An alternating current
- B. A direct current
- C. A normal current
- D. A smooth current

N5C11 (A)

What is the name of a current that flows back and forth, first in one direction, then in the opposite direction?

- A. An alternating current
- B. A direct current
- C. A rough current
- D. A reversing current

N5D Concepts of frequency, including AC vs DC, frequency units, AF vs RF and wavelength.

N5D01 (D)

What term means the number of times per second that an alternating current flows back and forth?

- A. Pulse rate
- B. Speed
- C. Wavelength
- D. Frequency

N5D02 (A)

What is the basic unit of frequency?

- A. The hertz
- B. The watt
- C. The ampere
- D. The ohm

N5D03 (B)

What frequency can humans hear?

- A. 0 - 20 Hz
- B. 20 - 20,000 Hz
- C. 200 - 200,000 Hz
- D. 10,000 - 30,000 Hz

N5D04 (B)

Why do we call signals in the range 20 Hz to 20,000 Hz audio frequencies?

- A. Because the human ear cannot sense anything in this range
- B. Because the human ear can sense sounds in this range
- C. Because this range is too low for radio energy
- D. Because the human ear can sense radio waves in this range

N5D05 (C)

What is the lowest frequency of electrical energy that is usually known as a radio frequency?

- A. 20 Hz
- B. 2,000 Hz
- C. 20,000 Hz
- D. 1,000,000 Hz

N5D06 (B)

Electrical energy at a frequency of 7125 kHz is in what frequency range?

- A. Audio
- B. Radio
- C. Hyper
- D. Super-high

N5D07 (C)

If a radio wave makes 3,725,000 cycles in one second, what does this mean?

- A. The radio wave's voltage is 3,725 kilovolts
- B. The radio wave's wavelength is 3,725 kilometers
- C. The radio wave's frequency is 3,725 kilohertz
- D. The radio wave's speed is 3,725 kilometers per second

N5D08 (C)

What is the name for the distance an AC signal travels during one complete cycle?

- A. Wave speed
- B. Waveform
- C. Wavelength
- D. Wave spread

N5D09 (A)

What happens to a signal's wavelength as its frequency increases?

- A. It gets shorter
- B. It gets longer
- C. It stays the same
- D. It disappears

N5D10 (A)

What happens to a signal's frequency as its wavelength gets longer?

- A. It goes down
- B. It goes up
- C. It stays the same
- D. It disappears

N5D11 (B)

What does 60 hertz (Hz) mean?

- A. 6000 cycles per second

- B. 60 cycles per second
- C. 6000 meters per second
- D. 60 meters per second

SUBELEMENT N6 - CIRCUIT COMPONENTS [2 exam questions - 2 groups]

N6A Electrical function and/or schematic representation of resistor, switch, fuse, or battery.

N6A01 (B)

What can a single-pole, double-throw switch do?

- A. It can switch one input to one output
- B. It can switch one input to either of two outputs
- C. It can switch two inputs at the same time, one input to either of two outputs, and the other input to either of two outputs
- D. It can switch two inputs at the same time, one input to one output, and the other input to another output

N6A02 (D)

What can a double-pole, single-throw switch do?

- A. It can switch one input to one output
- B. It can switch one input to either of two outputs
- C. It can switch two inputs at the same time, one input to either of two outputs, and the other input to either of two outputs
- D. It can switch two inputs at the same time, one input to one output, and the other input to the other output

N6A03 (A)

Which component has a positive and a negative side?

- A. A battery
- B. A potentiometer
- C. A fuse
- D. A resistor

N6A04 (B)

Which component has a value that can be changed?

- A. A single-cell battery
- B. A potentiometer
- C. A fuse
- D. A resistor

N6A05 (B)

In Figure N6-1 which symbol represents a variable resistor or potentiometer?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A06 (C)

In Figure N6-1 which symbol represents a fixed resistor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A07 (A)

In Figure N6-1 which symbol represents a fuse?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A08 (D)

In Figure N6-1 which symbol represents a single-cell battery?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A09 (A)

In Figure N6-2 which symbol represents a single-pole, single-throw switch?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A10 (D)

In Figure N6-2 which symbol represents a single-pole, double-throw switch?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A11 (C)

In Figure N6-2 which symbol represents a double-pole, single-throw switch?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6A12 (B)

In Figure N6-2 which symbol represents a double-pole, double-throw switch?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B Electrical function and/or schematic representation of a ground, antenna, transistor, or a triode vacuum tube.

N6B01 (A)

Which component can amplify a small signal using low voltages?

- A. A PNP transistor
- B. A variable resistor
- C. An electrolytic capacitor
- D. A multiple-cell battery



N6B02 (B)

Which component conducts electricity from a negative emitter to a positive collector when its base voltage is made positive?

- A. A variable resistor
- B. An NPN transistor
- C. A triode vacuum tube
- D. A multiple-cell battery

N6B03 (A)

Which component is used to radiate radio energy?

- A. An antenna
- B. An earth ground
- C. A chassis ground
- D. A potentiometer

N6B04 (D)

In Figure N6-3 which symbol represents an earth ground?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B05 (A)

In Figure N6-3 which symbol represents a chassis ground?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B06 (C)

In Figure N6-3 which symbol represents an antenna?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B07 (D)

In Figure N6-4 which symbol represents an NPN transistor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B08 (A)

In Figure N6-4 which symbol represents a PNP transistor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B09 (B)

In Figure N6-4 which symbol represents a triode vacuum tube?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

N6B10 (A)

What is one reason a triode vacuum tube might be used instead of a transistor in a circuit?

- A. It handles higher power
- B. It uses lower voltages
- C. It uses less current
- D. It is much smaller

N6B11 (C)

Which component can amplify a small signal but must use high voltages?

- A. A transistor
- B. An electrolytic capacitor
- C. A vacuum tube
- D. A multiple-cell battery

SUBELEMENT N7 - PRACTICAL CIRCUITS [2 exam questions - 2 groups]

N7A Functional layout of transmitter, transceiver, receiver, power supply, antenna, antenna switch, antenna feed line, impedance-matching device, SWR meter.

N7A01 (B)

What would you connect to your transceiver if you wanted to switch it between more than one type of antenna?

- A. A terminal-node switch
- B. An antenna switch
- C. A telegraph key switch
- D. A high-pass filter

N7A02 (C)

What device might allow use of an antenna on a band it was not designed for?

- A. An SWR meter
- B. A low-pass filter
- C. An antenna tuner
- D. A high-pass filter

N7A03 (D)

What connects your transceiver to your antenna?

- A. A dummy load
- B. A ground wire
- C. The power cord
- D. A feed line

N7A04 (B)

What might you connect between your transceiver and an antenna switch connected to several types of antennas?

- A. A high-pass filter
- B. An SWR meter
- C. A key-click filter
- D. A mixer

N7A05 (D)

If your SWR meter is connected to an antenna tuner on one side, what would you connect to the other side of it?

- A. A power supply

- B. An antenna
- C. An antenna switch
- D. A transceiver

N7A06 (D)

Which of these should never be connected to the output of a transceiver?

- A. An antenna switch
- B. An SWR meter
- C. An antenna
- D. A receiver

N7A07 (A)

If your mobile transceiver works in your car but not in your home, what should you check first?

- A. The power supply
- B. The speaker
- C. The microphone
- D. The SWR meter

N7A08 (A)

What does an antenna tuner do?

- A. It matches a transceiver to a mismatched antenna system
- B. It helps a receiver automatically tune in stations that are far away
- C. It switches an antenna system to a transceiver when sending, and to a receiver when listening
- D. It switches a transceiver between different kinds of antennas connected to one feed line

N7A09 (B)

In Figure N7-1, if block 1 is a transceiver and block 3 is a dummy antenna what is block 2?

- A. A terminal-node switch
- B. An antenna switch
- C. A telegraph key switch
- D. A high-pass filter

N7A10 (A)

In Figure N7-2, if block 2 is an SWR meter and block 3 is an antenna switch, what is block 1?

- A. A transceiver
- B. A high-pass filter
- C. An antenna tuner
- D. A modem

N7A11 (B)

In Figure N7-3, if block 1 is a transceiver and block 2 is an SWR meter, what is block 3?

- A. An antenna switch
- B. An antenna tuner
- C. A key-click filter
- D. A terminal-node controller

N7A12 (C)

What device converts household current to 12 VDC?

- A. A catalytic converter

- B. A low-pass filter
- C. A power supply
- D. An RS-232 interface

N7A13 (C)

Which of these usually needs a heavy-duty power supply?

- A. An SWR meter
- B. A receiver
- C. A transceiver
- D. An antenna switch

N7B Station layout and accessories for telegraphy, radiotelephone, radioteleprinter or packet

N7B01 (B)

What would you connect to a transceiver to send Morse code?

- A. A terminal-node controller
- B. A telegraph key
- C. An SWR meter
- D. An antenna switch

N7B02 (C) Where would you connect a telegraph key to send Morse code?

- A. To a power supply
- B. To an antenna switch
- C. To a transceiver
- D. To an antenna

N7B03 (B)

What do many amateurs use to help form good Morse code characters?

- A. A key-operated on/off switch
- B. An electronic keyer
- C. A key-click filter
- D. A DTMF keypad

N7B04 (C)

Where would you connect a microphone for voice operation?

- A. To a power supply
- B. To an antenna switch
- C. To a transceiver
- D. To an antenna

N7B05 (D)

What would you connect to a transceiver for voice operation?

- A. A splatter filter
- B. A terminal-voice controller
- C. A receiver audio filter
- D. A microphone

N7B06 (A)

What would you connect to a transceiver for RTTY operation?

- A. A modem and a teleprinter or computer system
- B. A computer, a printer and a RTTY refresh unit
- C. A terminal voice controller
- D. A modem, a monitor and a DTMF keypad

N7B07 (C)

What would you connect between a transceiver and a computer system or teleprinter for RTTY operation?

- A. An RS-232 interface
- B. A DTMF keypad
- C. A modem
- D. A terminal-network controller

N7B08 (A)

What would you connect between a computer system and a transceiver for packet-radio operation?

- A. A terminal-node controller
- B. A DTMF keypad
- C. An SWR bridge
- D. An antenna tuner

N7B09 (C)

Where would you connect a terminal-node controller for packet-radio operation?

- A. Between your antenna and transceiver
- B. Between your computer and monitor
- C. Between your computer and transceiver
- D. Between your keyboard and computer

N7B10 (D)

In RTTY operation, what equipment connects to a modem?

- A. A DTMF keypad, a monitor and a transceiver
- B. A DTMF microphone, a monitor and a transceiver
- C. A transceiver and a terminal-network controller
- D. A transceiver and a teleprinter or computer system

N7B11 (B)

In packet-radio operation, what equipment connects to a terminal-node controller?

- A. A transceiver and a modem
- B. A transceiver and a terminal or computer system
- C. A DTMF keypad, a monitor and a transceiver
- D. A DTMF microphone, a monitor and a transceiver

SUBELEMENT N8 - SIGNALS AND EMISSIONS [2 exam questions - 2 groups]

N8A Emission types, key clicks, chirps or superimposed hum.

N8A01 (B)

How is CW usually transmitted?

- A. By frequency-shift keying an RF signal
- B. By on/off keying an RF signal
- C. By audio-frequency-shift keying an oscillator tone
- D. By on/off keying an audio-frequency signal

N8A02 (A)

How is RTTY usually transmitted?

- A. By frequency-shift keying an RF signal
- B. By on/off keying an RF signal
- C. By digital pulse-code keying of an unmodulated carrier
- D. By on/off keying an audio-frequency signal

N8A03 (C)

What is the name for international Morse code emissions?

- A. RTTY
- B. Data
- C. CW
- D. Phone

N8A04 (A)

What is the name for narrow-band direct-printing telegraphy emissions?

- A. RTTY
- B. Data
- C. CW
- D. Phone

N8A05 (B)

What is the name for packet-radio emissions?

- A. RTTY
- B. Data
- C. CW
- D. Phone

N8A06 (D)

What is the name for voice emissions?

- A. RTTY
- B. Data
- C. CW
- D. Phone

N8A07 (D)

How can you prevent key clicks?

- A. By sending CW more slowly
- B. By increasing power
- C. By using a better power supply
- D. By using a key-click filter

N8A08 (C)

What does chirp mean?

- A. An overload in a receiver's audio circuit whenever CW is received
- B. A high-pitched tone which is received along with a CW signal
- C. A small change in a transmitter's frequency each time it is keyed
- D. A slow change in transmitter frequency as the circuit warms up

N8A09 (D)

What can be done to keep a CW transmitter from chirping?

- A. Add a low-pass filter
- B. Use an RF amplifier
- C. Keep the power supply current very steady
- D. Keep the power supply voltages very steady

N8A10 (D)

What may cause a buzzing or hum in the signal of an HF transmitter?

- A. Using an antenna which is the wrong length
- B. Energy from another transmitter
- C. Bad design of the transmitter's RF power output circuit
- D. A bad filter capacitor in the transmitter's power supply

N8A11 (A)

Which sideband is commonly used for 10-meter phone operation?

- A. Upper-sideband
- B. Lower-sideband
- C. Amplitude-compandored sideband
- D. Double-sideband

N8B Harmonics and unwanted signals, equipment and adjustments to help reduce interference to others.

N8B01 (C)

How does the frequency of a harmonic compare to the desired transmitting frequency?

- A. It is slightly more than the desired frequency
- B. It is slightly less than the desired frequency
- C. It is exactly two, or three, or more times the desired frequency
- D. It is much less than the desired frequency

N8B02 (A)

What is the fourth harmonic of a 7160-kHz signal?

- A. 28,640 kHz
- B. 35,800 kHz
- C. 28,160 kHz
- D. 1790 kHz

N8B03 (C)

If you are told your station was heard on 21,375 kHz, but at the time you were operating on 7125 kHz, what is one reason this could happen?

- A. Your transmitter's power-supply filter capacitor was bad
- B. You were sending CW too fast
- C. Your transmitter was radiating harmonic signals
- D. Your transmitter's power-supply filter choke was bad

N8B04 (D)

If someone tells you that signals from your hand-held transceiver are interfering with other signals on a frequency near yours, what may be the cause?

- A. You may need a power amplifier for your hand-held
- B. Your hand-held may have chirp from weak batteries
- C. You may need to turn the volume up on your hand-held
- D. Your hand-held may be transmitting spurious emissions

N8B05 (D)

If your transmitter sends signals outside the band where it is transmitting, what is this called?

- A. Off-frequency emissions
- B. Transmitter chirping
- C. Side tones
- D. Spurious emissions

N8B06 (A)

What problem may occur if your transmitter is operated without the cover and other shielding in place?

- A. It may transmit spurious emissions
- B. It may transmit a chirpy signal
- C. It may transmit a weak signal
- D. It may interfere with other stations operating near its frequency

N8B07 (B)

What may happen if an SSB transmitter is operated with the microphone gain set too high?

- A. It may cause digital interference to computer equipment
- B. It may cause splatter interference to other stations operating near its frequency
- C. It may cause atmospheric interference in the air around the antenna
- D. It may cause interference to other stations operating on a higher frequency band

N8B08 (B)

What may happen if an SSB transmitter is operated with too much speech processing?

- A. It may cause digital interference to computer equipment
- B. It may cause splatter interference to other stations operating near its frequency
- C. It may cause atmospheric interference in the air around the antenna
- D. It may cause interference to other stations operating on a higher frequency band

N8B09 (B)

What may happen if an FM transmitter is operated with the microphone gain or deviation control set too high?

- A. It may cause digital interference to computer equipment
- B. It may cause interference to other stations operating near its frequency
- C. It may cause atmospheric interference in the air around the antenna
- D. It may cause interference to other stations operating on a higher frequency band

N8B10 (B)

What may your FM hand-held or mobile transceiver do if you shout into its microphone?

- A. It may cause digital interference to computer equipment
- B. It may cause interference to other stations operating near its frequency
- C. It may cause atmospheric interference in the air around the antenna
- D. It may cause interference to other stations operating on a higher frequency band

N8B11 (D)

What can you do if you are told your FM hand-held or mobile transceiver is over deviating?

- A. Talk louder into the microphone



- B. Let the transceiver cool off
- C. Change to a higher power level
- D. Talk farther away from the microphone

SUBELEMENT N9 - ANTENNAS AND FEED LINES [3 exam questions - 3 groups]

N9A Wavelength vs antenna length.

N9A01 (D)

How do you calculate the length (in feet) of a half-wavelength dipole antenna?

- A. Divide 150 by the antenna's operating frequency (in MHz)  
[ $150/f$  (in MHz)]
- B. Divide 234 by the antenna's operating frequency (in MHz)  
[ $234/f$  (in MHz)]
- C. Divide 300 by the antenna's operating frequency (in MHz)  
[ $300/f$  (in MHz)]
- D. Divide 468 by the antenna's operating frequency (in MHz)  
[ $468/f$  (in MHz)]

N9A02 (B)

How do you calculate the length (in feet) of a quarter-wavelength vertical antenna?

- A. Divide 150 by the antenna's operating frequency (in MHz)  
[ $150/f$  (in MHz)]
- B. Divide 234 by the antenna's operating frequency (in MHz)  
[ $234/f$  (in MHz)]
- C. Divide 300 by the antenna's operating frequency (in MHz)  
[ $300/f$  (in MHz)]
- D. Divide 468 by the antenna's operating frequency (in MHz)  
[ $468/f$  (in MHz)]

N9A03 (A)

If you made a half-wavelength dipole antenna for 3725 kHz, how long would it be (to the nearest foot)?

- A. 126 ft
- B. 81 ft
- C. 63 ft
- D. 40 ft

N9A04 (C)

If you made a half-wavelength dipole antenna for 28.150 MHz, how long would it be (to the nearest foot)?

- A. 22 ft
- B. 11 ft
- C. 17 ft
- D. 34 ft

N9A05 (D)

If you made a quarter-wavelength vertical antenna for 7125 kHz, how long would it be (to the nearest foot)?

- A. 11 ft
- B. 16 ft
- C. 21 ft
- D. 33 ft

N9A06 (B)

If you made a quarter-wavelength vertical antenna for 21.125 MHz, how long would it be (to the nearest foot)?

- A. 7 ft
- B. 11 ft
- C. 14 ft
- D. 22 ft

N9A07 (C)

If you made a half-wavelength vertical antenna for 223 MHz, how long would it be (to the nearest inch)?

- A. 112 inches
- B. 50 inches
- C. 25 inches
- D. 12 inches

N9A08 (A)

If an antenna is made longer, what happens to its resonant frequency?

- A. It decreases
- B. It increases
- C. It stays the same
- D. It disappears

N9A09 (B)

If an antenna is made shorter, what happens to its resonant frequency?

- A. It decreases
- B. It increases
- C. It stays the same
- D. It disappears

N9A10 (A)

How could you lower the resonant frequency of a dipole antenna?

- A. Lengthen the antenna
- B. Shorten the antenna
- C. Use less feed line
- D. Use a smaller size feed line

N9A11 (B)

How could you raise the resonant frequency of a dipole antenna?

- A. Lengthen the antenna
- B. Shorten the antenna
- C. Use more feed line
- D. Use a larger size feed line

N9B Yagi parts, concept of directional antennas, and safety near antennas.

N9B01 (B)

In what direction does a Yagi antenna send out radio energy?

- A. It goes out equally in all directions
- B. Most of it goes in one direction
- C. Most of it goes equally in two opposite directions
- D. Most of it is aimed high into the air

N9B02 (C)

About how long is the driven element of a Yagi antenna?

- A. 1/4 wavelength
- B. 1/3 wavelength
- C. 1/2 wavelength
- D. 1 wavelength

N9B03 (D)

In Diagram N9-1, what is the name of element 2 of the Yagi antenna?

- A. Director
- B. Reflector
- C. Boom
- D. Driven element

N9B04 (A)

In Diagram N9-1, what is the name of element 3 of the Yagi antenna?

- A. Director
- B. Reflector
- C. Boom
- D. Driven element

N9B05 (B)

In Diagram N9-1, what is the name of element 1 of the Yagi antenna?

- A. Director
- B. Reflector
- C. Boom
- D. Driven element

N9B06 (B)

Looking at the Yagi antenna in Diagram N9-1, in which direction on the page would it send most of its radio energy?

- A. Left
- B. Right
- C. Top
- D. Bottom

N9B07 (B)

Why is a 5/8-wavelength vertical antenna better than a 1/4-wavelength vertical antenna for VHF or UHF mobile operations?

- A. A 5/8-wavelength antenna can handle more power
- B. A 5/8-wavelength antenna has more gain
- C. A 5/8-wavelength antenna has less corona loss
- D. A 5/8-wavelength antenna is easier to install on a car

N9B08 (C)

In what direction does a vertical antenna send out radio energy?

- A. Most of it goes in two opposite directions
- B. Most of it goes high into the air
- C. Most of it goes equally in all horizontal directions
- D. Most of it goes in one direction

N9B09 (C)

If the ends of a half-wave dipole antenna point east and west, which way would the antenna send out radio energy?

- A. Equally in all directions

- B. Mostly up and down
- C. Mostly north and south
- D. Mostly east and west

N9B10 (A)

How should you hold the antenna of a hand-held transceiver while you are transmitting?

- A. Away from your head and away from others
- B. Pointed towards the station you are contacting
- C. Pointed away from the station you are contacting
- D. Pointed down to bounce the signal off the ground

N9B11 (B)

Why should your outside antennas be high enough so that no one can touch them while you are transmitting?

- A. Touching the antenna might cause television interference
- B. Touching the antenna might cause RF burns
- C. Touching the antenna might radiate harmonics
- D. Touching the antenna might reflect the signal back to the transmitter and cause damage

N9C Feed lines, baluns and polarization via element orientation.

N9C01 (D)

What is a coaxial cable?

- A. Two wires side-by-side in a plastic ribbon
- B. Two wires side-by-side held apart by insulating rods
- C. Two wires twisted around each other in a spiral
- D. A center wire inside an insulating material covered by a metal sleeve or shield

N9C02 (B)

Why does coaxial cable make a good antenna feed line?

- A. You can make it at home, and its impedance matches most amateur antennas
- B. It is weatherproof, and its impedance matches most amateur antennas
- C. It is weatherproof, and its impedance is higher than that of most amateur antennas
- D. It can be used near metal objects, and its impedance is higher than that of most amateur antennas

N9C03 (B)

Which kind of antenna feed line can carry radio energy very well even if it is buried in the ground?

- A. Twin lead
- B. Coaxial cable
- C. Parallel conductor
- D. Twisted pair

N9C04 (A)

What is the best antenna feed line to use if it must be put near grounded metal objects?

- A. Coaxial cable
- B. Twin lead
- C. Twisted pair
- D. Ladder-line

N9C05 (B)

What is parallel-conductor feed line?

- A. Two wires twisted around each other in a spiral
- B. Two wires side-by-side held apart by insulating rods
- C. A center wire inside an insulating material which is covered by a metal sleeve or shield
- D. A metal pipe which is as wide or slightly wider than a wavelength of the signal it carries

N9C06 (D)

What are some reasons to use parallel-conductor feed line?

- A. It has low impedance, and will operate with a high SWR
- B. It will operate with a high SWR, and it works well when tied down to metal objects
- C. It has a low impedance, and has less loss than coaxial cable
- D. It will operate with a high SWR, and has less loss than coaxial cable

N9C07 (A)

What are some reasons not to use parallel-conductor feed line?

- A. It does not work well when tied down to metal objects, and you must use an impedance-matching device with your transceiver
- B. It is difficult to make at home, and it does not work very well with a high SWR
- C. It does not work well when tied down to metal objects, and it cannot operate under high power
- D. You must use an impedance-matching device with your transceiver, and it does not work very well with a high SWR

N9C08 (B)

What kind of antenna feed line is made of two conductors held apart by insulated rods?

- A. Coaxial cable
- B. Open-conductor ladder line
- C. Twin lead in a plastic ribbon
- D. Twisted pair

N9C09 (C)

What would you use to connect a coaxial cable of 50-ohms impedance to an antenna of 35-ohms impedance?

- A. A terminating resistor
- B. An SWR meter
- C. An impedance-matching device
- D. A low-pass filter

N9C10 (D)

What does balun mean?

- A. Balanced antenna network
- B. Balanced unloader
- C. Balanced unmodulator
- D. Balanced to unbalanced

N9C11 (A)

Where would you install a balun to feed a dipole antenna with 50-ohm coaxial cable?

- A. Between the coaxial cable and the antenna

- B. Between the transmitter and the coaxial cable
- C. Between the antenna and the ground
- D. Between the coaxial cable and the ground



Subject: Technician License Exam Questions

\*\*\*\*\*  
\*\*\* Note: A graphics sheet must be used with this question pool. \*\*\*  
\*\*\* It can be obtained from the ARRL/VEC (225 Main St, \*\*\*  
\*\*\* Newington CT 06111) for an SASE. \*\*\*  
\*\*\*\*\*

QUESTION POOL  
Amateur Radio Examination  
Element 3A (Technician Class) Final Version  
as released by  
Question Pool Committee  
National Conference of  
Volunteer Examiner Coordinators  
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SUBELEMENT T1 COMMISSION'S RULES [5 exam questions - 5 groups]

T1A Station control, frequency privileges authorized to the Technician-class control operator, term of licenses, grace periods and modifications of licenses.

T1A01 (D) [97.3a12]

What is the control point of an amateur station?

- A. The on/off switch of the transmitter
- B. The input/output port of a packet controller
- C. The variable frequency oscillator of a transmitter
- D. The location at which the control operator function is performed

T1A02 (B) [97.3a12]

What is the term for the location at which the control operator function is performed?

- A. The operating desk
- B. The control point
- C. The station location
- D. The manual control location

T1A03 (A) [97.19a/b]

What must you do to renew or change your operator/primary station license?

- A. Properly fill out FCC Form 610 and send it to the FCC in Gettysburg, PA
- B. Properly fill out FCC Form 610 and send it to the nearest FCC field office
- C. Properly fill out FCC Form 610 and send it to the FCC in Washington, DC
- D. An amateur license never needs changing or renewing

T1A04 (A) [97.19c]

What is the "grace period" during which the FCC will renew an expired 10-year license?

- A. 2 years
- B. 5 years
- C. 10 years



D. There is no grace period

T1A05 (C) [97.301/305e]

Which of the following frequencies may a Technician operator who has passed a Morse code test use?

- A. 7.1 - 7.2 MHz
- B. 14.1 - 14.2 MHz
- C. 21.1 - 21.2 MHz
- D. 28.1 - 29.2 MHz

T1A06 (C) [97.301a]

Which operator licenses authorize privileges on 52.525 MHz?

- A. Extra, Advanced only
- B. Extra, Advanced, General only
- C. Extra, Advanced, General, Technician only
- D. Extra, Advanced, General, Technician, Novice

T1A07 (B) [97.301a]

Which operator licenses authorize privileges on 146.52 MHz?

- A. Extra, Advanced, General, Technician, Novice
- B. Extra, Advanced, General, Technician only
- C. Extra, Advanced, General only
- D. Extra, Advanced only

T1A08 (A) [97.301a]

Which operator licenses authorize privileges on 223.50 MHz?

- A. Extra, Advanced, General, Technician, Novice
- B. Extra, Advanced, General, Technician only
- C. Extra, Advanced, General only
- D. Extra, Advanced only

T1A09 (B) [97.301a]

Which operator licenses authorize privileges on 446.0 MHz?

- A. Extra, Advanced, General, Technician, Novice
- B. Extra, Advanced, General, Technician only
- C. Extra, Advanced, General only
- D. Extra, Advanced only

T1A10 (D) [97.301e]

In addition to passing the Technician written examination (Elements 2 and 3A), what must you do before you are allowed to use amateur frequencies below 30 MHz?

- A. Nothing special is needed; all Technicians may use the HF bands at any time
- B. You must notify the FCC that you intend to operate on the HF bands
- C. You must attend a class to learn about HF communications
- D. You must pass a Morse code test (either Element 1A, 1B or 1C)

T1A11 (C) [97.301e]

If you are a Technician licensee, what must you have to prove that you are authorized to use the Novice amateur frequencies below 30 MHz?

- A. A certificate from the FCC showing that you have notified them that you will be using the HF bands
- B. A certificate from an instructor showing that you have attended a class in HF communications

- C. Written proof of having passed a Morse code test
- D. No special proof is required before using the HF bands

T1B Emission privileges for Technician-class control operator, frequency selection and sharing, transmitter power.

T1B01 (C) [97.3b6]

At what point in your station is transceiver power measured?

- A. At the power supply terminals inside the transmitter or amplifier
- B. At the final amplifier input terminals inside the transmitter or amplifier
- C. At the antenna terminals of the transmitter or amplifier
- D. On the antenna itself, after the feed line

T1B02 (D) [97.3b6]

What is the term for the average power supplied to an antenna transmission line during one RF cycle at the crest of the modulation envelope?

- A. Peak transmitter power
- B. Peak output power
- C. Average radio-frequency power
- D. Peak envelope power

T1B03 (B) [97.203c]

What is the maximum transmitting power permitted an amateur station in beacon operation?

- A. 10 watts PEP output
- B. 100 watts PEP output
- C. 500 watts PEP output
- D. 1500 watts PEP output

T1B04 (C) [97.303]

If the FCC rules say that the amateur service is a secondary user of a frequency band, and another service is a primary user, what does this mean?

- A. Nothing special; all users of a frequency band have equal rights to operate
- B. Amateurs are only allowed to use the frequency band during emergencies
- C. Amateurs are allowed to use the frequency band only if they do not cause harmful interference to primary users
- D. Amateurs must increase transmitter power to overcome any interference caused by primary users

T1B05 (D) [97.303]

If you are using a frequency within a band assigned to the amateur service on a secondary basis, and a station assigned to the primary service on that band causes interference, what action should you take?

- A. Notify the FCC's regional Engineer in Charge of the interference
- B. Increase your transmitter's power to overcome the interference
- C. Attempt to contact the station and request that it stop the interference
- D. Change frequencies; you may be causing harmful interference

to the other station, in violation of FCC rules

T1B06 (C) [97.101b]

What rule applies if two amateur stations want to use the same frequency?

- A. The station operator with a lesser class of license must yield the frequency to a higher-class licensee
- B. The station operator with a lower power output must yield the frequency to the station with a higher power output
- C. Both station operators have an equal right to operate on the frequency
- D. Station operators in ITU Regions 1 and 3 must yield the frequency to stations in ITU Region 2

T1B07 (A) [97.305a]

What emission type may always be used for station identification, regardless of the transmitting frequency?

- A. CW
- B. RTTY
- C. MCW
- D. Phone

T1B08 (B) [97.305c]

On what frequencies within the 6-meter band may phone emissions be transmitted?

- A. 50.0 - 54.0 MHz only
- B. 50.1 - 54.0 MHz only
- C. 51.0 - 54.0 MHz only
- D. 52.0 - 54.0 MHz only

T1B09 (A) [97.305c]

On what frequencies within the 2-meter band may image emissions be transmitted?

- A. 144.1 - 148.0 MHz only
- B. 146.0 - 148.0 MHz only
- C. 144.0 - 148.0 MHz only
- D. 146.0 - 147.0 MHz only

T1B10 (D) [97.313b]

What is the maximum transmitting power permitted an amateur station on 146.52 MHz?

- A. 200 watts PEP output
- B. 500 watts ERP
- C. 1000 watts DC input
- D. 1500 watts PEP output

T1B11 (A) [97.209b2]

Which band may NOT be used by Earth stations for satellite communications?

- A. 6 meters
- B. 2 meters
- C. 70 centimeters
- D. 23 centimeters

T1C Digital communications, station identification, ID with CSCE.

T1C01 (A) [97.119e1]

If you are a Novice licensee with a Certificate of Successful Completion of Examination (CSCE) for Technician privileges, how do you identify your station when transmitting on 146.34 MHz?

- A. You must give your call sign, followed by any suitable word that denotes the slant mark and the identifier "KT"
- B. You may not operate on 146.34 until your new license arrives
- C. No special form of identification is needed
- D. You must give your call sign and the location of the VE examination where you obtained the CSCE

T1C02 (C) [97.307f3/4]

What is the maximum frequency shift permitted for RTTY or data transmissions below 50 MHz?

- A. 0.1 kHz
- B. 0.5 kHz
- C. 1 kHz
- D. 5 kHz

T1C03 (D) [97.307]

What is the maximum frequency shift permitted for RTTY or data transmissions above 50 MHz?

- A. 0.1 kHz or the sending speed, in bauds, whichever is greater
- B. 0.5 kHz or the sending speed, in bauds, whichever is greater
- C. 5 kHz or the sending speed, in bauds, whichever is greater
- D. The FCC rules do not specify a maximum frequency shift above 50 MHz

T1C04 (B) [97.307f4]

What is the maximum symbol rate permitted for packet transmissions on the 10-meter band?

- A. 300 bauds
- B. 1200 bauds
- C. 19.6 kilobauds
- D. 56 kilobauds

T1C05 (C) [97.307f5]

What is the maximum symbol rate permitted for packet transmissions on the 2-meter band?

- A. 300 bauds
- B. 1200 bauds
- C. 19.6 kilobauds
- D. 56 kilobauds

T1C06 (C) [97.307f4]

What is the maximum symbol rate permitted for RTTY or data transmissions between 28 and 50 MHz?

- A. 56 kilobauds
- B. 19.6 kilobauds
- C. 1200 bauds
- D. 300 bauds

T1C07 (B) [97.307f5]

What is the maximum symbol rate permitted for RTTY or data transmissions between 50 and 222 MHz?

- A. 56 kilobauds
- B. 19.6 kilobauds

- C. 1200 bauds
- D. 300 bauds

T1C08 (A) [97.307f5]

What is the maximum authorized bandwidth of RTTY, data or multiplexed emissions using an unspecified digital code within the frequency range of 50 to 222 MHz?

- A. 20 kHz
- B. 50 kHz
- C. The total bandwidth shall not exceed that of a single-sideband phone emission
- D. The total bandwidth shall not exceed 10 times that of a CW emission

T1C09 (D) [97.307f6]

What is the maximum symbol rate permitted for RTTY or data transmissions above 222 MHz?

- A. 300 bauds
- B. 1200 bauds
- C. 19.6 kilobauds
- D. 56 kilobauds

T1C10 (B) [97.307f6]

What is the maximum authorized bandwidth of RTTY, data or multiplexed emissions using an unspecified digital code within the frequency range of 222 to 450 MHz?

- A. 50 kHz
- B. 100 kHz
- C. 150 kHz
- D. 200 kHz

T1C11 (C) [97.307f6]

What is the maximum authorized bandwidth of RTTY, data or multiplexed emissions using an unspecified digital code within the 70-cm amateur band?

- A. 300 kHz
- B. 200 kHz
- C. 100 kHz
- D. 50 kHz

T1D Correct language, Phonetics, Beacons and Radio Control of model craft and vehicles.

T1D01 (A) [97.3a9]

What is an amateur station called which transmits communications for the purpose of observation of propagation and reception?

- A. A beacon
- B. A repeater
- C. An auxiliary station
- D. A radio control station

T1D02 (B) [97.119b1]

What is the fastest code speed a repeater may use for automatic identification?

- A. 13 words per minute
- B. 20 words per minute
- C. 25 words per minute

D. There is no limitation

T1D03 (C) [97.119b2]

If you are using a language besides English to make a contact, what language must you use when identifying your station?

- A. The language being used for the contact
- B. The language being used for the contact, providing the US has a third-party communications agreement with that country
- C. English
- D. Any language of a country which is a member of the International Telecommunication Union

T1D04 (C) [97.119b2]

What do the FCC rules suggest you use as an aid for correct station identification when using phone?

- A. A speech compressor
- B. Q signals
- C. A phonetic alphabet
- D. Unique words of your choice

T1D05 (B) [97.203a]

What minimum class of amateur license must you hold to operate a beacon station?

- A. Novice
- B. Technician
- C. General
- D. Amateur Extra

T1D06 (A) [97.205c]

If a repeater is causing harmful interference to another repeater and a frequency coordinator has recommended the operation of one station only, who is responsible for resolving the interference?

- A. The licensee of the unrecommended repeater
- B. Both repeater licensees
- C. The licensee of the recommended repeater
- D. The frequency coordinator

T1D07 (D) [97.205c]

If a repeater is causing harmful interference to another amateur repeater and a frequency coordinator has recommended the operation of both stations, who is responsible for resolving the interference?

- A. The licensee of the repeater which has been recommended for the longest period of time
- B. The licensee of the repeater which has been recommended the most recently
- C. The frequency coordinator
- D. Both repeater licensees

T1D08 (A) [97.205c]

If a repeater is causing harmful interference to another repeater and a frequency coordinator has NOT recommended either station, who is primarily responsible for resolving the interference?

- A. Both repeater licensees
- B. The licensee of the repeater which has been in operation for the longest period of time
- C. The licensee of the repeater which has been in operation for

the shortest period of time  
D. The frequency coordinator

T1D09 (C) [97.215a]

What minimum information must be on a label affixed to a transmitter used for telecommand (control) of model craft?  
A. Station call sign  
B. Station call sign and the station licensee's name  
C. Station call sign and the station licensee's name and address  
D. Station call sign and the station licensee's class of license

T1D10 (D) [97.215a]

What are the station identification requirements for an amateur transmitter used for telecommand (control) of model craft?  
A. Once every ten minutes  
B. Once every ten minutes, and at the beginning and end of each transmission  
C. At the beginning and end of each transmission  
D. Station identification is not required if the transmitter is labeled with the station licensee's name, address and call sign

T1D11 (B) [97.215c]

What is the maximum transmitter power an amateur station is allowed when used for telecommand (control) of model craft?  
A. One milliwatt  
B. One watt  
C. Two watts  
D. Three watts

T1E Emergency communications; broadcasting; permissible one-way, satellite and third-party communication; indecent and profane language.

T1E01 (A) [97.3a10]

What is meant by the term broadcasting?  
A. Transmissions intended for reception by the general public, either direct or relayed  
B. Retransmission by automatic means of programs or signals from non-amateur stations  
C. One-way radio communications, regardless of purpose or content  
D. One-way or two-way radio communications between two or more stations

T1E02 (B) [97.3a10]

Which of the following one-way communications may not be transmitted in the amateur service?  
A. Telecommands to model craft  
B. Broadcasts intended for the general public  
C. Brief transmissions to make adjustments to the station  
D. Morse code practice

T1E03 (D) [97.113b]

What kind of payment is allowed for third-party messages sent by an amateur station?  
A. Any amount agreed upon in advance  
B. Donation of equipment repairs

- C. Donation of amateur equipment
- D. No payment of any kind is allowed

T1E04 (B) [97.113d]

When may you send obscene words from your amateur station?

- A. Only when they do not cause interference to other communications
- B. Never; obscene words are prohibited in amateur transmissions
- C. Only when they are not retransmitted through a repeater
- D. Any time, but there is an unwritten rule among amateurs that they should not be used on the air

T1E05 (D) [97.113d]

When may you send indecent words from your amateur station?

- A. Only when they do not cause interference to other communications
- B. Only when they are not retransmitted through a repeater
- C. Any time, but there is an unwritten rule among amateurs that they should not be used on the air
- D. Never; indecent words are prohibited in amateur transmissions

T1E06 (C) [97.113d]

When may you send profane words from your amateur station?

- A. Only when they do not cause interference to other communications
- B. Only when they are not retransmitted through a repeater
- C. Never; profane words are prohibited in amateur transmissions
- D. Any time, but there is an unwritten rule among amateurs that they should not be used on the air

T1E07 (C) [97.113e]

If you wanted to use your amateur station to retransmit communications between a space shuttle and its associated Earth stations, what agency must first give its approval?

- A. The FCC in Washington, DC
- B. The office of your local FCC Engineer In Charge (EIC)
- C. The National Aeronautics and Space Administration
- D. The Department of Defense

T1E08 (D) [97.115a2]

When are third-party messages allowed to be sent to a foreign country?

- A. When sent by agreement of both control operators
- B. When the third party speaks to a relative
- C. They are not allowed under any circumstances
- D. When the US has a third-party agreement with the foreign country or the third party is qualified to be a control operator

T1E09 (A) [97.115b1]

If you let an unlicensed third party use your amateur station, what must you do at your station's control point?

- A. You must continuously monitor and supervise the third-party's participation
- B. You must monitor and supervise the communication only if contacts are made in countries which have no third-party communications agreement with the US
- C. You must monitor and supervise the communication only if



contacts are made on frequencies below 30 MHz

D. You must key the transmitter and make the station identification

T1E10 (A) [97.401a]

If a disaster disrupts normal communication systems in an area where the amateur service is regulated by the FCC, what kinds of transmissions may stations make?

A. Those which are necessary to meet essential communication needs and facilitate relief actions

B. Those which allow a commercial business to continue to operate in the affected area

C. Those for which material compensation has been paid to the amateur operator for delivery into the affected area

D. Those which are to be used for program production or newsgathering for broadcasting purposes

T1E11 (C) [97.401c]

What information is included in an FCC declaration of a temporary state of communication emergency?

A. A list of organizations authorized to use radio communications in the affected area

B. A list of amateur frequency bands to be used in the affected area

C. Any special conditions and special rules to be observed during the emergency

D. An operating schedule for authorized amateur emergency stations

SUBELEMENT T2 OPERATING PROCEDURES [3 exam questions - 3 groups]

T2A Repeater operation, courteous operation.

T2A01 (B)

How do you call another station on a repeater if you know the station's call sign?

A. Say "break, break 79," then say the station's call sign

B. Say the station's call sign, then identify your own station

C. Say "CQ" three times, then say the station's call sign

D. Wait for the station to call "CQ," then answer it

T2A02 (C)

Why should you pause briefly between transmissions when using a repeater?

A. To check the SWR of the repeater

B. To reach for pencil and paper for third-party communications

C. To listen for anyone wanting to break in

D. To dial up the repeater's autopatch

T2A03 (A)

Why should you keep transmissions short when using a repeater?

A. A long transmission may prevent someone with an emergency from using the repeater

B. To see if the receiving station operator is still awake

C. To give any listening non-hams a chance to respond

D. To keep long-distance charges down

T2A04 (D)

What is the proper way to break into a conversation on a repeater?

- A. Wait for the end of a transmission and start calling the desired party
- B. Shout, "break, break!" to show that you're eager to join the conversation
- C. Turn on an amplifier and override whoever is talking
- D. Say your call sign during a break between transmissions

T2A05 (B)

What is the purpose of repeater operation?

- A. To cut your power bill by using someone else's higher power system
- B. To help mobile and low-power stations extend their usable range
- C. To transmit signals for observing propagation and reception
- D. To make calls to stores more than 50 miles away

T2A06 (B)

What causes a repeater to "time out"?

- A. The repeater's battery supply runs out
- B. Someone's transmission goes on longer than the repeater allows
- C. The repeater gets too hot and stops transmitting until its circuitry cools off
- D. Something is wrong with the repeater

T2A07 (D)

During commuting rush hours, which type of repeater operation should be discouraged?

- A. Mobile stations
- B. Low-power stations
- C. Highway traffic information nets
- D. Third-party communications nets

T2A08 (B)

What is a courtesy tone (used in repeater operations)?

- A. A sound used to identify the repeater
- B. A sound used to indicate when a transmission is complete
- C. A sound used to indicate that a message is waiting for someone
- D. A sound used to activate a receiver in case of severe weather

T2A09 (A)

What is the meaning of: "Your signal is full quieting..."?

- A. Your signal is strong enough to overcome all receiver noise
- B. Your signal has no spurious sounds
- C. Your signal is not strong enough to be received
- D. Your signal is being received, but no audio is being heard

T2A10 (C)

How should you give a signal report over a repeater?

- A. Say what your receiver's S-meter reads
- B. Always say: "Your signal report is five five..."
- C. Say the amount of signal quieting into the repeater

D. Try to imitate the sound quality you are receiving

T2A11 (A)

What is a repeater called which is available for anyone to use?

- A. An open repeater
- B. A closed repeater
- C. An autopatch repeater
- D. A private repeater

T2A12 (A)

What is the usual input/output frequency separation for repeaters in the 2-meter band?

- A. 600 kHz
- B. 1.0 MHz
- C. 1.6 MHz
- D. 5.0 MHz

T2A13 (C)

What is the usual input/output frequency separation for repeaters in the 1.25-meter band?

- A. 600 kHz
- B. 1.0 MHz
- C. 1.6 MHz
- D. 5.0 MHz

T2A14 (D)

What is the usual input/output frequency separation for repeaters in the 70-centimeter band?

- A. 600 kHz
- B. 1.0 MHz
- C. 1.6 MHz
- D. 5.0 MHz

T2A15 (A)

Why should local amateur communications use VHF and UHF frequencies instead of HF frequencies?

- A. To minimize interference on HF bands capable of long-distance communication
- B. Because greater output power is permitted on VHF and UHF
- C. Because HF transmissions are not propagated locally
- D. Because signals are louder on VHF and UHF frequencies

T2A16 (A)

How might you join a closed repeater system?

- A. Contact the control operator and ask to join
- B. Use the repeater until told not to
- C. Use simplex on the repeater input until told not to
- D. Write the FCC and report the closed condition

T2A17 (B)

How can on-the-air interference be minimized during a lengthy transmitter testing or loading-up procedure?

- A. Choose an unoccupied frequency
- B. Use a dummy load
- C. Use a non-resonant antenna
- D. Use a resonant antenna that requires no loading-up procedure

T2A18 (C)

What is the proper way to ask someone their location when using a repeater?

- A. What is your QTH
- B. What is your 20
- C. Where are you
- D. Locations are not normally told by radio

T2B Simplex operations, Q signals, RST signal reporting, repeater frequency coordination.

T2B01 (C)

Why should simplex be used where possible, instead of using a repeater?

- A. Signal range will be increased
- B. Long distance toll charges will be avoided
- C. The repeater will not be tied up unnecessarily
- D. Your antenna's effectiveness will be better tested

T2B02 (A)

If you are talking to a station using a repeater, how would you find out if you could communicate using simplex instead?

- A. See if you can clearly receive the station on the repeater's input frequency
- B. See if you can clearly receive the station on a lower frequency band
- C. See if you can clearly receive a more distant repeater
- D. See if a third station can clearly receive both of you

T2B03 (C)

If you are operating simplex on a repeater frequency, why would it be good amateur practice to change to another frequency?

- A. The repeater's output power may ruin your station's receiver
- B. There are more repeater operators than simplex operators
- C. Changing the repeater's frequency is not practical
- D. Changing the repeater's frequency requires the authorization of the FCC

T2B04 (D)

What is a repeater frequency coordinator?

- A. Someone who organizes the assembly of a repeater station
- B. Someone who provides advice on what kind of repeater to buy
- C. The person whose call sign is used for a repeater's identification
- D. A person or group that recommends frequencies for repeater usage

T2B05 (C)

What is the proper Q signal to use to see if a frequency is in use before transmitting on CW?

- A. QRV?
- B. QRU?
- C. QRL?
- D. QRZ?

T2B06 (A)

What is one meaning of the Q signal "QSY"?

- A. Change frequency
- B. Send more slowly
- C. Send faster
- D. Use more power

T2B07 (B)

What is one meaning of the Q signal "QSO"?

- A. A contact is confirmed
- B. A conversation is in progress
- C. A contact is ending
- D. A conversation is desired

T2B08 (B)

What is the proper Q signal to use to ask if someone is calling you on CW?

- A. QSL?
- B. QRZ?
- C. QRL?
- D. QRT?

T2B09 (A)

What is the meaning of: "Your signal report is five seven...?"

- A. Your signal is perfectly readable and moderately strong
- B. Your signal is perfectly readable, but weak
- C. Your signal is readable with considerable difficulty
- D. Your signal is perfectly readable with near pure tone

T2B10 (C)

What is the meaning of: "Your signal report is three three...?"

- A. The contact is serial number thirty-three
- B. The station is located at latitude 33 degrees
- C. Your signal is readable with considerable difficulty and weak in strength
- D. Your signal is unreadable, very weak in strength

T2B11 (D)

What is the meaning of: "Your signal report is five nine plus 20 dB...?"

- A. Your signal strength has increased by a factor of 100
- B. Repeat your transmission on a frequency 20 kHz higher
- C. The bandwidth of your signal is 20 decibels above linearity
- D. A relative signal-strength meter reading is 20 decibels greater than strength 9

T2C Distress calling and emergency drills and communications - operations and equipment, Radio Amateur Civil Emergency Service (RACES)

T2C01 (A)

What is the proper distress call to use when operating phone?

- A. Say "MAYDAY" several times
- B. Say "HELP" several times
- C. Say "EMERGENCY" several times
- D. Say "SOS" several times

T2C02 (D)

What is the proper distress call to use when operating CW?

- A. MAYDAY
- B. QRRR
- C. QRZ
- D. SOS

T2C03 (A)

What is the proper way to interrupt a repeater conversation to signal a distress call?

- A. Say "BREAK" twice, then your call sign
- B. Say "HELP" as many times as it takes to get someone to answer
- C. Say "SOS," then your call sign
- D. Say "EMERGENCY" three times

T2C04 (C)

With what organization must you register before you can participate in RACES drills?

- A. A local Amateur Radio club
- B. A local racing organization
- C. The responsible civil defense organization
- D. The Federal Communications Commission

T2C05 (A)

What is the maximum number of hours allowed per week for RACES drills?

- A. One
- B. Six, but not more than one hour per day
- C. Eight
- D. As many hours as you want

T2C06 (D)

How must you identify messages sent during a RACES drill?

- A. As emergency messages
- B. As amateur traffic
- C. As official government messages
- D. As drill or test messages

T2C07 (B)

What is one reason for using tactical call signs such as "command post" or "weather center" during an emergency?

- A. They keep the general public informed about what is going on
- B. They are more efficient and help coordinate public-service communications
- C. They are required by the FCC
- D. They increase goodwill between amateurs

T2C08 (D)

What type of messages concerning a person's well-being are sent into or out of a disaster area?

- A. Routine traffic
- B. Tactical traffic
- C. Formal message traffic
- D. Health and Welfare traffic

T2C09 (B)

What are messages called which are sent into or out of a disaster area concerning the immediate safety of human life?

- A. Tactical traffic

- B. Emergency traffic
- C. Formal message traffic
- D. Health and Welfare traffic

T2C10 (B)

Why is it a good idea to have a way to operate your amateur station without using commercial AC power lines?

- A. So you may use your station while mobile
- B. So you may provide communications in an emergency
- C. So you may operate in contests where AC power is not allowed
- D. So you will comply with the FCC rules

T2C11 (C)

What is the most important accessory to have for a hand-held radio in an emergency?

- A. An extra antenna
- B. A portable amplifier
- C. Several sets of charged batteries
- D. A microphone headset for hands-free operation

T2C12 (C)

Which type of antenna would be a good choice as part of a portable HF amateur station that could be set up in case of an emergency?

- A. A three-element quad
- B. A three-element Yagi
- C. A dipole
- D. A parabolic dish

SUBLELEMENT T3 RADIO-WAVE PROPAGATION - [3 exam questions - 3 groups]

T3A Ionosphere, ionospheric regions, solar radiation.

T3A01 (A)

What is the ionosphere?

- A. An area of the outer atmosphere where enough ions and free electrons exist to propagate radio waves
- B. An area between two air masses of different temperature and humidity, along which radio waves can travel
- C. An ionized path in the atmosphere where lightning has struck
- D. An area of the atmosphere where weather takes place

T3A02 (D) What is the name of the area that makes long-distance radio communications possible by bending radio waves?

- A. Troposphere
- B. Stratosphere
- C. Magnetosphere
- D. Ionosphere

T3A03 (A)

What causes the ionosphere to form?

- A. Solar radiation ionizing the outer atmosphere
- B. Temperature changes ionizing the outer atmosphere
- C. Lightning ionizing the outer atmosphere
- D. Release of fluorocarbons into the atmosphere

T3A04 (C)

What type of solar radiation is most responsible for ionization in the outer atmosphere?

- A. Thermal
- B. Ionized particle
- C. Ultraviolet
- D. Microwave

T3A05 (A)

Which ionospheric region limits daytime radio communications on the 80-meter band to short distances?

- A. D region
- B. E region
- C. F1 region
- D. F2 region

T3A06 (B)

Which ionospheric region is closest to the earth?

- A. The A region
- B. The D region
- C. The E region
- D. The F region

T3A07 (B)

Which ionospheric region most affects sky-wave propagation on the 6-meter band?

- A. The D region
- B. The E region
- C. The F1 region
- D. The F2 region

T3A08 (A)

Which region of the ionosphere is the least useful for long-distance radio-wave propagation?

- A. The D region
- B. The E region
- C. The F1 region
- D. The F2 region

T3A09 (D)

Which region of the ionosphere is mainly responsible for long-distance sky-wave radio communications?

- A. D region
- B. E region
- C. F1 region
- D. F2 region

T3A10 (B)

What two sub-regions of ionosphere exist only in the daytime?

- A. Troposphere and stratosphere
- B. F1 and F2
- C. Electrostatic and electromagnetic
- D. D and E

T3A11 (C)

Which two daytime ionospheric regions combine into one region at night?



- A. E and F1
- B. D and E
- C. F1 and F2
- D. E1 and E2

T3B Ionospheric absorption, causes and variation, maximum usable frequency.

T3B01 (D)

Which region of the ionosphere is mainly responsible for absorbing radio signals during the daytime?

- A. The F2 region
- B. The F1 region
- C. The E region
- D. The D region

T3B02 (B)

When does ionospheric absorption of radio signals occur?

- A. When tropospheric ducting occurs
- B. When long-wavelength signals enter the D region
- C. When signals travel to the F region
- D. When a temperature inversion occurs

T3B03 (A)

What effect does the D region of the ionosphere have on lower-frequency HF signals in the daytime?

- A. It absorbs the signals
- B. It bends the radio waves out into space
- C. It refracts the radio waves back to earth
- D. It has little or no effect on 80-meter radio waves

T3B04 (B)

What causes the ionosphere to absorb radio waves?

- A. The weather below the ionosphere
- B. The ionization of the D region
- C. The presence of ionized clouds in the E region
- D. The splitting of the F region

T3B05 (D)

What is the condition of the ionosphere just before local sunrise?

- A. Atmospheric attenuation is at a maximum
- B. The D region is above the E region
- C. The E region is above the F region
- D. Ionization is at a minimum

T3B06 (C)

When is the ionosphere most ionized?

- A. Dusk
- B. Midnight
- C. Midday
- D. Dawn

T3B07 (A)

When is the ionosphere least ionized?

- A. Shortly before dawn
- B. Just after noon

- C. Just after dusk
- D. Shortly before midnight

T3B08 (B)

When is the E region most ionized?

- A. Dawn
- B. Midday
- C. Dusk
- D. Midnight

T3B09 (A)

What happens to signals higher in frequency than the critical frequency?

- A. They pass through the ionosphere
- B. They are absorbed by the ionosphere
- C. Their frequency is changed by the ionosphere to be below the maximum usable frequency
- D. They are reflected back to their source

T3B10 (C)

What causes the maximum usable frequency to vary?

- A. The temperature of the ionosphere
- B. The speed of the winds in the upper atmosphere
- C. The amount of radiation received from the sun, mainly ultraviolet
- D. The type of weather just below the ionosphere

T3B11 (A)

What does maximum usable frequency mean?

- A. The highest frequency signal that will reach its intended destination
- B. The lowest frequency signal that will reach its intended destination
- C. The highest frequency signal that is most absorbed by the ionosphere
- D. The lowest frequency signal that is most absorbed by the ionosphere

T3C Propagation, including ionospheric, tropospheric, line-of-sight scatter propagation, and Maximum Usable Frequency.

T3C01 (C)

What kind of propagation would best be used by two stations within each other's skip zone on a certain frequency?

- A. Ground-wave
- B. Sky-wave
- C. Scatter-mode
- D. Ducting

T3C02 (C)

If you are receiving a weak and distorted signal from a distant station on a frequency close to the maximum usable frequency, what type of propagation is probably occurring?

- A. Ducting
- B. Line-of-sight
- C. Scatter
- D. Ground-wave

T3C03 (B)

How are VHF signals propagated within the range of the visible horizon?

- A. By sky wave
- B. By direct wave
- C. By plane wave
- D. By geometric wave

T3C04 (C)

Ducting occurs in which region of the atmosphere?

- A. F2
- B. Ectosphere
- C. Troposphere
- D. Stratosphere

T3C05 (A)

What effect does tropospheric bending have on 2-meter radio waves?

- A. It lets you contact stations farther away
- B. It causes them to travel shorter distances
- C. It garbles the signal
- D. It reverses the sideband of the signal

T3C06 (D)

What causes tropospheric ducting of radio waves?

- A. A very low pressure area
- B. An aurora to the north
- C. Lightning between the transmitting and receiving stations
- D. A temperature inversion

T3C07 (B)

What causes VHF radio waves to be propagated several hundred miles over oceans?

- A. A polar air mass
- B. A widespread temperature inversion
- C. An overcast of cirriform clouds
- D. A high-pressure zone

T3C08 (D)

In what frequency range does tropospheric ducting most often occur?

- A. SW
- B. MF
- C. HF
- D. VHF

T3C09 (D)

In what frequency range does sky-wave propagation least often occur?

- A. LF
- B. MF
- C. HF
- D. VHF

T3C10 (A)

What weather condition may cause tropospheric ducting?

- A. A stable high-pressure system
- B. An unstable low-pressure system

- C. A series of low-pressure waves
- D. Periods of heavy rainfall

T3C11 (D)

What band conditions might indicate long-range skip on the 6-meter and 2-meter bands?

- A. Noise on the 80-meter band
- B. The absence of signals on the 10-meter band
- C. Very long-range skip on the 10-meter band
- D. Strong signals on the 10-meter band from stations about 500-600 miles away

SUBELEMENT T4 AMATEUR RADIO PRACTICES [4 exam questions - 4 groups]

T4A Electrical wiring, including switch location, dangerous voltages and currents.

T4A01 (C)

Where should the green wire in a three-wire AC line cord be connected in a power supply?

- A. To the fuse
- B. To the "hot" side of the power switch
- C. To the chassis
- D. To the white wire

T4A02 (D)

Where should the black (or red) wire in a three-wire AC line cord be connected in a power supply?

- A. To the white wire
- B. To the green wire
- C. To the chassis
- D. To the fuse

T4A03 (B)

Where should the white wire in a three-wire AC line cord be connected in a power supply?

- A. To the side of the power transformer's primary winding that has a fuse
- B. To the side of the power transformer's primary winding that does not have a fuse
- C. To the chassis
- D. To the black wire

T4A04 (D)

What document is used by almost every US city as the basis for electrical safety requirements for power wiring and antennas?

- A. The Code of Federal Regulations
- B. The Proceedings of the IEEE
- C. The ITU Radio Regulations
- D. The National Electrical Code

T4A05 (C)

What document would you use to see if you comply with standard electrical safety rules when building an amateur antenna?

- A. The Code of Federal Regulations
- B. The Proceedings of the IEEE

- C. The National Electrical Code
- D. The ITU Radio Regulations

T4A06 (D)

Where should fuses be connected on a mobile transceiver's DC power cable?

- A. Between the red and black wires
- B. In series with just the black wire
- C. In series with just the red wire
- D. In series with both the red and black wires

T4A07 (B)

Why is the retaining screw in one terminal of a wall outlet made of brass while the other one is silver colored?

- A. To prevent corrosion
- B. To indicate correct wiring polarity
- C. To better conduct current
- D. To reduce skin effect

T4A08 (A)

How much electrical current flowing through the human body is usually fatal?

- A. As little as 1/10 of an ampere
- B. Approximately 10 amperes
- C. More than 20 amperes
- D. Current flow through the human body is never fatal

T4A09 (A)

Which body organ can be fatally affected by a very small amount of electrical current?

- A. The heart
- B. The brain
- C. The liver
- D. The lungs

T4A10 (A)

How much electrical current flowing through the human body is usually painful?

- A. As little as 1/500 of an ampere
- B. Approximately 10 amperes
- C. More than 20 amperes
- D. Current flow through the human body is never painful

T4A11 (A)

What is the minimum voltage which is usually dangerous to humans?

- A. 30 volts
- B. 100 volts
- C. 1000 volts
- D. 2000 volts

T4A12 (C)

Where should the main power switch for a high-voltage power supply be located?

- A. Inside the cabinet, to kill the power if the cabinet is opened
- B. On the back side of the cabinet, out of sight
- C. Anywhere that can be seen and reached easily

D. A high-voltage power supply should not be switch-operated

T4A13 (B)

What precaution should you take when leaning over a power amplifier?

- A. Take your shoes off
- B. Watch out for loose jewelry contacting high voltage
- C. Shield your face from the heat produced by the power supply
- D. Watch out for sharp edges which may snag your clothing

T4A14 (C)

What is an important safety rule concerning the main electrical box in your home?

- A. Make sure the door cannot be opened easily
- B. Make sure something is placed in front of the door so no one will be able to get to it easily
- C. Make sure others in your home know where it is and how to shut off the electricity
- D. Warn others in your home never to touch the switches, even in an emergency

T4A15 (B)

What should you do if you discover someone who is being burned by high voltage?

- A. Run from the area so you won't be burned too
- B. Turn off the power, call for emergency help and give CPR if needed
- C. Immediately drag the person away from the high voltage
- D. Wait for a few minutes to see if the person can get away from the high voltage on their own, then try to help

T4B Meters, including volt, amp, multi, peak-reading, RF watt and placement, and ratings of fuses and switches.

T4B01 (B)

How is a voltmeter usually connected to a circuit under test?

- A. In series with the circuit
- B. In parallel with the circuit
- C. In quadrature with the circuit
- D. In phase with the circuit

T4B02 (C)

How can the range of a voltmeter be increased?

- A. By adding resistance in series with the circuit under test
- B. By adding resistance in parallel with the circuit under test
- C. By adding resistance in series with the meter, between the meter and the circuit under test
- D. By adding resistance in parallel with the meter, between the meter and the circuit under test

T4B03 (A)

What happens inside a voltmeter when you switch it from a lower to a higher voltage range?

- A. Resistance is added in series with the meter
- B. Resistance is added in parallel with the meter
- C. Resistance is reduced in series with the meter
- D. Resistance is reduced in parallel with the meter

T4B04 (A)

How is an ammeter usually connected to a circuit under test?

- A. In series with the circuit
- B. In parallel with the circuit
- C. In quadrature with the circuit
- D. In phase with the circuit

T4B05 (D)

How can the range of an ammeter be increased?

- A. By adding resistance in series with the circuit under test
- B. By adding resistance in parallel with the circuit under test
- C. By adding resistance in series with the meter
- D. By adding resistance in parallel with the meter

T4B06 (D)

What does a multimeter measure?

- A. SWR and power
- B. Resistance, capacitance and inductance
- C. Resistance and reactance
- D. Voltage, current and resistance

T4B07 (A)

Where should an RF wattmeter be connected for the most accurate readings of transmitter output power?

- A. At the transmitter output connector
- B. At the antenna feed point
- C. One-half wavelength from the transmitter output
- D. One-half wavelength from the antenna feed point

T4B08 (B)

At what line impedance do most RF wattmeters usually operate?

- A. 25 ohms
- B. 50 ohms
- C. 100 ohms
- D. 300 ohms

T4B09 (A)

What does a directional wattmeter measure?

- A. Forward and reflected power
- B. The directional pattern of an antenna
- C. The energy used by a transmitter
- D. Thermal heating in a load resistor

T4B10 (B)

If a directional RF wattmeter reads 90 watts forward power and 10 watts reflected power, what is the actual transmitter output power?

- A. 10 watts
- B. 80 watts
- C. 90 watts
- D. 100 watts

T4B11 (C)

If a directional RF wattmeter reads 96 watts forward power and 4 watts reflected power, what is the actual transmitter output power?

- A. 80 watts
- B. 88 watts
- C. 92 watts
- D. 100 watts

T4C Marker generator, crystal calibrator, signal generators and impedance-match indicator.

T4C01 (A)

What is a marker generator?

- A. A high-stability oscillator that generates reference signals at exact frequency intervals
- B. A low-stability oscillator that "sweeps" through a range of frequencies
- C. A low-stability oscillator used to inject a signal into a circuit under test
- D. A high-stability oscillator which can produce a wide range of frequencies and amplitudes

T4C02 (A)

How is a marker generator used?

- A. To calibrate the tuning dial on a receiver
- B. To calibrate the volume control on a receiver
- C. To test the amplitude linearity of a transmitter
- D. To test the frequency deviation of a transmitter

T4C03 (D)

What device is used to inject a frequency calibration signal into a receiver?

- A. A calibrated voltmeter
- B. A calibrated oscilloscope
- C. A calibrated wavemeter
- D. A crystal calibrator

T4C04 (B)

What frequency standard may be used to calibrate the tuning dial of a receiver?

- A. A calibrated voltmeter
- B. Signals from WWV and WWVH
- C. A deviation meter
- D. A sweep generator

T4C05 (C)

How might you check the accuracy of your receiver's tuning dial?

- A. Tune to the frequency of a shortwave broadcasting station
- B. Tune to a popular amateur net frequency
- C. Tune to one of the frequencies of station WWV or WWVH
- D. Tune to another amateur station and ask what frequency the operator is using

T4C06 (C)

What device produces a stable, low-level signal that can be set to a desired frequency?

- A. A wavemeter
- B. A reflectometer
- C. A signal generator
- D. An oscilloscope



T4C07 (B)

What is an RF signal generator used for?

- A. Measuring RF signal amplitudes
- B. Aligning tuned circuits
- C. Adjusting transmitter impedance-matching networks
- D. Measuring transmission-line impedances

T4C08 (D)

What device can measure an impedance mismatch in your antenna system?

- A. A field-strength meter
- B. An ammeter
- C. A wavemeter
- D. A reflectometer

T4C09 (A)

Where should a reflectometer be connected for best accuracy when reading the impedance match between an antenna and its feed line?

- A. At the antenna feed point
- B. At the transmitter output connector
- C. At the midpoint of the feed line
- D. Anywhere along the feed line

T4C10 (A)

If you use a 3-30 MHz RF power meter for VHF, how accurate will its readings be?

- A. They will not be accurate
- B. They will be accurate enough to get by
- C. If it properly calibrates to full scale in the set position, they may be accurate
- D. They will be accurate providing the readings are multiplied by 4.5

T4C11 (C)

If you use a 3-30 MHz SWR meter for VHF, how accurate will its readings be?

- A. They will not be accurate
- B. They will be accurate enough to get by
- C. If it properly calibrates to full scale in the set position, they may be accurate
- D. They will be accurate providing the readings are multiplied by 4.5

T4D Dummy antennas, S-meter, exposure of the human body to RF.

T4D01 (D)

What device should be connected to a transmitter's output when you are making transmitter adjustments?

- A. A multimeter
- B. A reflectometer
- C. A receiver
- D. A dummy antenna

T4D02 (B)

What is a dummy antenna?

- A. An nondirectional transmitting antenna

- B. A nonradiating load for a transmitter
- C. An antenna used as a reference for gain measurements
- D. A flexible antenna usually used on hand-held transceivers

T4D03 (C)

What is the main component of a dummy antenna?

- A. A wire-wound resistor
- B. An iron-core coil
- C. A noninductive resistor
- D. An air-core coil

T4D04 (B)

What device is used in place of an antenna during transmitter tests so that no signal is radiated?

- A. An antenna matcher
- B. A dummy antenna
- C. A low-pass filter
- D. A decoupling resistor

T4D05 (A)

Why would you use a dummy antenna?

- A. For off-the-air transmitter testing
- B. To reduce output power
- C. To give comparative signal reports
- D. To allow antenna tuning without causing interference

T4D06 (A)

What minimum rating should a dummy antenna have for use with a 100-watt single-sideband phone transmitter?

- A. 100 watts continuous
- B. 141 watts continuous
- C. 175 watts continuous
- D. 200 watts continuous

T4D07 (D)

Why might a dummy antenna get warm when in use?

- A. Because it stores electric current
- B. Because it stores radio waves
- C. Because it absorbs static electricity
- D. Because it changes RF energy into heat

T4D08 (A)

What is used to measure relative signal strength in a receiver?

- A. An S meter
- B. An RST meter
- C. A signal deviation meter
- D. An SSB meter

T4D09 (B)

How can exposure to a large amount of RF energy affect body tissue?

- A. It causes radiation poisoning
- B. It heats the tissue
- C. It paralyzes the tissue
- D. It produces genetic changes in the tissue

T4D10 (A)

Which body organ is the most likely to be damaged from the heating effects of RF radiation?

- A. Eyes
- B. Hands
- C. Heart
- D. Liver

T4D11 (D)

What organization has published safety guidelines for the maximum limits of RF energy near the human body?

- A. The Institute of Electrical and Electronics Engineers (IEEE)
- B. The Federal Communications Commission (FCC)
- C. The Environmental Protection Agency (EPA)
- D. The American National Standards Institute (ANSI)

T4D12 (B)

What is the purpose of the ANSI RF protection guide?

- A. It lists all RF frequency allocations for interference protection
- B. It gives RF exposure limits for the human body
- C. It sets transmitter power limits for interference protection
- D. It sets antenna height limits for aircraft protection

T4D13 (D)

According to the ANSI RF protection guide, what frequencies cause us the greatest risk from RF energy?

- A. 3 to 30 MHz
- B. 300 to 3000 MHz
- C. Above 1500 MHz
- D. 30 to 300 MHz

T4D14 (D)

Why is the limit of exposure to RF the lowest in the frequency range of 30 MHz to 300 MHz, according to the ANSI RF protection guide?

- A. There are more transmitters operating in this range
- B. There are fewer transmitters operating in this range
- C. Most transmissions in this range are for a longer time
- D. The human body absorbs RF energy the most in this range

T4D15 (B)

According to the ANSI RF protection guide, what is the maximum safe power output to the antenna of a hand-held VHF or UHF radio?

- A. 125 milliwatts
- B. 7 watts
- C. 10 watts
- D. 25 watts

T4D16 (C)

After you have opened a VHF power amplifier to make internal tuning adjustments, what should you do before you turn the amplifier on?

- A. Remove all amplifier shielding to ensure maximum cooling
- B. Make sure that the power interlock switch is bypassed so you can test the amplifier
- C. Be certain all amplifier shielding is fastened in place
- D. Be certain no antenna is attached so that you will not cause

any interference

SUBELEMENT T5 - ELECTRICAL PRINCIPLES [2 exam questions - 2 groups]

T5A Definition of resistance, inductance, and capacitance and unit of measurement, calculation of values in series and parallel.

T5A01 (D)

What does resistance do in an electric circuit?

- A. It stores energy in a magnetic field
- B. It stores energy in an electric field
- C. It provides electrons by a chemical reaction
- D. It opposes the flow of electrons

T5A02 (D)

What is the ability to store energy in a magnetic field called?

- A. Admittance
- B. Capacitance
- C. Resistance
- D. Inductance

T5A03 (C)

What is the basic unit of inductance?

- A. The coulomb
- B. The farad
- C. The henry
- D. The ohm

T5A04 (C)

What is a henry?

- A. The basic unit of admittance
- B. The basic unit of capacitance
- C. The basic unit of inductance
- D. The basic unit of resistance

T5A05 (D)

What is the ability to store energy in an electric field called?

- A. Inductance
- B. Resistance
- C. Tolerance
- D. Capacitance

T5A06 (A)

What is the basic unit of capacitance?

- A. The farad
- B. The ohm
- C. The volt
- D. The henry

T5A07 (B)

What is a farad?

- A. The basic unit of resistance
- B. The basic unit of capacitance
- C. The basic unit of inductance
- D. The basic unit of admittance

T5A08 (B)

If two equal-value inductors are connected in series, what is their total inductance?

- A. Half the value of one inductor
- B. Twice the value of one inductor
- C. The same as the value of either inductor
- D. The value of one inductor times the value of the other

T5A09 (A)

If two equal-value inductors are connected in parallel, what is their total inductance?

- A. Half the value of one inductor
- B. Twice the value of one inductor
- C. The same as the value of either inductor
- D. The value of one inductor times the value of the other

T5A10 (C)

If two equal-value capacitors are connected in series, what is their total capacitance?

- A. Twice the value of one capacitor
- B. The same as the value of either capacitor
- C. Half the value of either capacitor
- D. The value of one capacitor times the value of the other

T5A11 (A)

If two equal-value capacitors are connected in parallel, what is their total capacitance?

- A. Twice the value of one capacitor
- B. Half the value of one capacitor
- C. The same as the value of either capacitor
- D. The value of one capacitor times the value of the other

T5B Ohm's Law.

T5B01 (D)

Ohm's Law describes the mathematical relationship between what three electrical quantities?

- A. Resistance, voltage and power
- B. Current, resistance and power
- C. Current, voltage and power
- D. Resistance, current and voltage

T5B02 (C)

How is the current in a DC circuit calculated when the voltage and resistance are known?

- A.  $I = R \times E$  [current equals resistance multiplied by voltage]
- B.  $I = R / E$  [current equals resistance divided by voltage]
- C.  $I = E / R$  [current equals voltage divided by resistance]
- D.  $I = P / E$  [current equals power divided by voltage]

T5B03 (B)

How is the resistance in a DC circuit calculated when the voltage and current are known?

- A.  $R = I / E$  [resistance equals current divided by voltage]
- B.  $R = E / I$  [resistance equals voltage divided by current]
- C.  $R = I \times E$  [resistance equals current multiplied by voltage]

D.  $R = P / E$  [resistance equals power divided by voltage]

T5B04 (C)

How is the voltage in a DC circuit calculated when the current and resistance are known?

- A.  $E = I / R$  [voltage equals current divided by resistance]
- B.  $E = R / I$  [voltage equals resistance divided by current]
- C.  $E = I \times R$  [voltage equals current multiplied by resistance]
- D.  $E = P / I$  [voltage equals power divided by current]

T5B05 (D)

If a 12-volt battery supplies 0.25 ampere to a circuit, what is the circuit's resistance?

- A. 0.25 ohm
- B. 3 ohm
- C. 12 ohms
- D. 48 ohms

T5B06 (D)

If a 12-volt battery supplies 0.15 ampere to a circuit, what is the circuit's resistance?

- A. 0.15 ohm
- B. 1.8 ohm
- C. 12 ohms
- D. 80 ohms

T5B07 (B)

If a 4800-ohm resistor is connected to 120 volts, how much current will flow through it?

- A. 4 A
- B. 25 mA
- C. 25 A
- D. 40 mA

T5B08 (D)

If a 48000-ohm resistor is connected to 120 volts, how much current will flow through it?

- A. 400 A
- B. 40 A
- C. 25 mA
- D. 2.5 mA

T5B09 (A)

If a 4800-ohm resistor is connected to 12 volts, how much current will flow through it?

- A. 2.5 mA
- B. 25 mA
- C. 40 A
- D. 400 A

T5B10 (A)

If a 48000-ohm resistor is connected to 12 volts, how much current will flow through it?

- A. 250 uA
- B. 250 mA
- C. 4000 mA
- D. 4000 A

T5B11 (A)

If you know the voltage and current supplied to a circuit, what formula would you use to calculate the circuit's resistance?

- A. Ohm's Law
- B. Tesla's Law
- C. Ampere's Law
- D. Kirchhoff's Law

SUBELEMENT T6 - CIRCUIT COMPONENTS - [2 Exam Questions - 2 groups]

T6A Resistors, construction types, variable and fixed, color code, power ratings, schematic symbols.

T6A01 (B)

Which of the following are common resistor types?

- A. Plastic and porcelain
- B. Film and wire-wound
- C. Electrolytic and metal-film
- D. Iron core and brass core

T6A02 (C)

What does a variable resistor or potentiometer do?

- A. Its resistance changes when AC is applied to it
- B. It transforms a variable voltage into a constant voltage
- C. Its resistance changes when its slide or contact is moved
- D. Its resistance changes when it is heated

T6A03 (B)

How do you find a resistor's tolerance rating?

- A. By using a voltmeter
- B. By reading the resistor's color code
- C. By using Thevenin's theorem for resistors
- D. By reading its Baudot code

T6A04 (A)

What do the first three color bands on a resistor indicate?

- A. The value of the resistor in ohms
- B. The resistance tolerance in percent
- C. The power rating in watts
- D. The resistance material

T6A05 (B)

What does the fourth color band on a resistor indicate?

- A. The value of the resistor in ohms
- B. The resistance tolerance in percent
- C. The power rating in watts
- D. The resistance material

T6A06 (A)

Why do resistors sometimes get hot when in use?

- A. Some electrical energy passing through them is lost as heat
- B. Their reactance makes them heat up
- C. Hotter circuit components nearby heat them up
- D. They absorb magnetic energy which makes them hot

T6A07 (C)

Why would a large size resistor be used instead of a smaller one of the same resistance?

- A. For better response time
- B. For a higher current gain
- C. For greater power dissipation
- D. For less impedance in the circuit

T6A08 (C)

What are the possible values of a 100-ohm resistor with a 10% tolerance?

- A. 90 to 100 ohms
- B. 10 to 100 ohms
- C. 90 to 110 ohms
- D. 80 to 120 ohms

T6A09 (B)

How do you find a resistor's value?

- A. By using a voltmeter
- B. By using the resistor's color code
- C. By using Thevenin's theorem for resistors
- D. By using the Baudot code

T6A10 (A)

Which tolerance rating would a high-quality resistor have?

- A. 0.1%
- B. 5%
- C. 10%
- D. 20%

T6A11 (D)

Which tolerance rating would a low-quality resistor have?

- A. 0.1%
- B. 5%
- C. 10%
- D. 20%

T6B Schematic symbols - inductors and capacitors, construction of variable and fixed, factors affecting inductance and capacitance, capacitor construction.

T6B01 (D)

What is an inductor core?

- A. The place where a coil is tapped for resonance
- B. A tight coil of wire used in a transformer
- C. Insulating material placed between the wires of a transformer
- D. The place inside an inductor where its magnetic field is concentrated

T6B02 (C)

What does an inductor do?

- A. It stores a charge electrostatically and opposes a change in voltage
- B. It stores a charge electrochemically and opposes a change in current
- C. It stores a charge electromagnetically and opposes a change in current



D. It stores a charge electromechanically and opposes a change in voltage

T6B03 (D)

What determines the inductance of a coil?

- A. The core material, the core diameter, the length of the coil and whether the coil is mounted horizontally or vertically
- B. The core diameter, the number of turns of wire used to wind the coil and the type of metal used for the wire
- C. The core material, the number of turns used to wind the core and the frequency of the current through the coil
- D. The core material, the core diameter, the length of the coil and the number of turns of wire used to wind the coil

T6B04 (A)

As an iron core is inserted in a coil, what happens to the coil's inductance?

- A. It increases
- B. It decreases
- C. It stays the same
- D. It disappears

T6B05 (A)

What can happen if you tune a ferrite-core coil with a metal tool?

- A. The metal tool can change the coil's inductance and cause you to tune the coil incorrectly
- B. The metal tool can become magnetized so much that you might not be able to remove it from the coil
- C. The metal tool can pick up enough magnetic energy to become very hot
- D. The metal tool can pick up enough magnetic energy to become a shock hazard

T6B06 (B)

In Figure T6-1 which symbol represents an adjustable inductor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

T6B07 (D)

In Figure T6-1 which symbol represents an iron-core inductor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

T6B08 (D)

In Figure T6-1 which symbol represents an inductor wound over a toroidal core?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

T6B09 (A)

In Figure T6-1 which symbol represents an electrolytic capacitor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

T6B10 (C)

In Figure T6-1 which symbol represents a variable capacitor?

- A. Symbol 1
- B. Symbol 2
- C. Symbol 3
- D. Symbol 4

T6B11 (C)

What describes a capacitor?

- A. Two or more layers of silicon material with an insulating material between them
- B. The wire used in the winding and the core material
- C. Two or more conductive plates with an insulating material between them
- D. Two or more insulating plates with a conductive material between them

T6B12 (B)

What does a capacitor do?

- A. It stores a charge electrochemically and opposes a change in current
- B. It stores a charge electrostatically and opposes a change in voltage
- C. It stores a charge electromagnetically and opposes a change in current
- D. It stores a charge electromechanically and opposes a change in voltage

T6B13 (A)

What determines the capacitance of a capacitor?

- A. The material between the plates, the area of one side of one plate, the number of plates and the spacing between the plates
- B. The material between the plates, the number of plates and the size of the wires connected to the plates
- C. The number of plates, the spacing between the plates and whether the dielectric material is N type or P type
- D. The material between the plates, the area of one plate, the number of plates and the material used for the protective coating

T6B14 (B)

As the plate area of a capacitor is increased, what happens to its capacitance?

- A. It decreases
- B. It increases
- C. It stays the same
- D. It disappears

SUBELEMENT T7 - PRACTICAL CIRCUITS - [1 exam question - 1 group]

T7A Practical circuits.

T7A01 (C)

Why do modern HF transmitters have a built-in low-pass filter in their RF output circuits?

- A. To reduce RF energy below a cutoff point
- B. To reduce low-frequency interference to other amateurs
- C. To reduce harmonic radiation
- D. To reduce fundamental radiation

T7A02 (A)

What circuit blocks RF energy above and below a certain limit?

- A. A band-pass filter
- B. A high-pass filter
- C. An input filter
- D. A low-pass filter

T7A03 (A)

What type of filter is used in the IF section of receivers to block energy outside a certain frequency range?

- A. A band-pass filter
- B. A high-pass filter
- C. An input filter
- D. A low-pass filter

T7A04 (C)

What circuit is found in all types of receivers?

- A. An audio filter
- B. A beat-frequency oscillator
- C. A detector
- D. An RF amplifier

T7A05 (D)

What circuit has a variable-frequency oscillator connected to a driver and a power amplifier?

- A. A packet-radio transmitter
- B. A crystal-controlled transmitter
- C. A single-sideband transmitter
- D. A VFO-controlled transmitter

T7A06 (B)

What circuit combines signals from an IF amplifier stage and a beat-frequency oscillator (BFO), to produce an audio signal?

- A. An AGC circuit
- B. A detector circuit
- C. A power supply circuit
- D. A VFO circuit

T7A07 (D)

What circuit uses a limiter and a frequency discriminator to produce an audio signal?

- A. A double-conversion receiver
- B. A variable-frequency oscillator
- C. A superheterodyne receiver
- D. An FM receiver

T7A08 (D)

What circuit is pictured in Figure T7-1 if block 1 is a variable-frequency oscillator?

- A. A packet-radio transmitter
- B. A crystal-controlled transmitter
- C. A single-sideband transmitter
- D. A VFO-controlled transmitter

T7A09 (B)

What is the unlabeled block in Figure T7-2?

- A. An AGC circuit
- B. A detector
- C. A power supply
- D. A VFO circuit

T7A10 (D)

What circuit is pictured in Figure T7-3?

- A. A double-conversion receiver
- B. A variable-frequency oscillator
- C. A superheterodyne receiver
- D. An FM receiver

T7A11 (C)

What is the unlabeled block in Figure T7-4?

- A. A band-pass filter
- B. A crystal oscillator
- C. A reactance modulator
- D. A rectifier modulator

SUBELEMENT T8 - SIGNALS AND EMISSIONS [2 exam questions - 2 groups]

T8A Definition of modulation and emission types.

T8A01 (B)

What is the name for unmodulated carrier wave emissions?

- A. Phone
- B. Test
- C. CW
- D. RTTY

T8A02 (C)

What is the name for Morse code emissions produced by switching a transmitter's output on and off?

- A. Phone
- B. Test
- C. CW
- D. RTTY

T8A03 (B)

What is RTTY?

- A. Amplitude-keyed telegraphy
- B. Frequency-shift-keyed telegraphy
- C. Frequency-modulated telephony
- D. Phase-modulated telephony

T8A04 (B)

What is the name for packet-radio emissions?

- A. CW
- B. Data

- C. Phone
- D. RTTY

T8A05 (D)

How is tone-modulated Morse code produced?

- A. By feeding a microphone's audio signal into an FM transmitter
- B. By feeding an on/off keyed audio tone into a CW transmitter
- C. By on/off keying of a carrier
- D. By feeding an on/off keyed audio tone into a transmitter

T8A06 (D)

What is the name of the voice emission most used on VHF/UHF repeaters?

- A. Single-sideband phone
- B. Pulse-modulated phone
- C. Slow-scan phone
- D. Frequency-modulated phone

T8A07 (A)

What is the name of the voice emission most used on amateur HF bands?

- A. Single-sideband phone
- B. Pulse-modulated phone
- C. Slow-scan phone
- D. Frequency-modulated phone

T8A08 (A)

What is meant by the upper-sideband (USB)?

- A. The part of a single-sideband signal which is above the carrier frequency
- B. The part of a single-sideband signal which is below the carrier frequency
- C. Any frequency above 10 MHz
- D. The carrier frequency of a single-sideband signal

T8A09 (D)

What emissions are produced by a transmitter using a reactance modulator?

- A. CW
- B. Test
- C. Single-sideband, suppressed-carrier phone
- D. Phase-modulated phone

T8A10 (C)

What other emission does phase modulation most resemble?

- A. Amplitude modulation
- B. Pulse modulation
- C. Frequency modulation
- D. Single-sideband modulation

T8A11 (B)

What is the name for emissions produced by an on/off keyed audio tone?

- A. RTTY
- B. MCW
- C. CW
- D. Phone

T8B RF carrier, modulation, bandwidth and deviation.

T8B01 (A)

What is another name for a constant-amplitude radio-frequency signal?

- A. An RF carrier
- B. An AF carrier
- C. A sideband carrier
- D. A subcarrier

T8B02 (A)

What is modulation?

- A. Varying a radio wave in some way to send information
- B. Receiving audio information from a signal
- C. Increasing the power of a transmitter
- D. Suppressing the carrier in a single-sideband transmitter

T8B03 (A)

What kind of emission would your FM transmitter produce if its microphone failed to work?

- A. An unmodulated carrier
- B. A phase-modulated carrier
- C. An amplitude-modulated carrier
- D. A frequency-modulated carrier

T8B04 (B)

How would you modulate a 2-meter FM transceiver to produce packet-radio emissions?

- A. Connect a terminal-node controller to interrupt the transceiver's carrier wave
- B. Connect a terminal-node controller to the transceiver's microphone input
- C. Connect a keyboard to the transceiver's microphone input
- D. Connect a DTMF key pad to the transceiver's microphone input

T8B05 (C)

Why is FM voice best for local VHF/UHF radio communications?

- A. The carrier is not detectable
- B. It is more resistant to distortion caused by reflected signals
- C. It has high-fidelity audio which can be understood even when the signal is somewhat weak
- D. Its RF carrier stays on frequency better than the AM modes

T8B06 (D)

Why do many radio receivers have several IF filters of different bandwidths that can be selected by the operator?

- A. Because some frequency bands are wider than others
- B. Because different bandwidths help increase the receiver sensitivity
- C. Because different bandwidths improve S-meter readings
- D. Because some emission types need a wider bandwidth than others to be received properly

T8B07 (C)

Which list of emission types is in order from the narrowest

bandwidth to the widest bandwidth?

- A. RTTY, CW, SSB voice, FM voice
- B. CW, FM voice, RTTY, SSB voice
- C. CW, RTTY, SSB voice, FM voice
- D. CW, SSB voice, RTTY, FM voice

T8B08 (D)

What is the usual bandwidth of a single-sideband amateur signal?

- A. 1 kHz
- B. 2 kHz
- C. Between 3 and 6 kHz
- D. Between 2 and 3 kHz

T8B09 (C)

What is the usual bandwidth of a frequency-modulated amateur signal?

- A. Less than 5 kHz
- B. Between 5 and 10 kHz
- C. Between 10 and 20 kHz
- D. Greater than 20 kHz

T8B10 (B)

What is the result of overdeviation in an FM transmitter?

- A. Increased transmitter power
- B. Out-of-channel emissions
- C. Increased transmitter range
- D. Poor carrier suppression

T8B11 (C)

What causes splatter interference?

- A. Keying a transmitter too fast
- B. Signals from a transmitter's output circuit are being sent back to its input circuit
- C. Overmodulation of a transmitter
- D. The transmitting antenna is the wrong length

SUBELEMENT T9 - ANTENNAS AND FEED LINES [3 exam questions - 3 groups]

T9A Parasitic beam and non-directional antennas.

T9A01 (C)

What is a directional antenna?

- A. An antenna which sends and receives radio energy equally well in all directions
- B. An antenna that cannot send and receive radio energy by skywave or skip propagation
- C. An antenna which sends and receives radio energy mainly in one direction
- D. An antenna which sends and receives radio energy equally well in two opposite directions

T9A02 (A)

How is a Yagi antenna constructed?

- A. Two or more straight, parallel elements are fixed in line with each other
- B. Two or more square or circular loops are fixed in line with

each other

- C. Two or more square or circular loops are stacked inside each other
- D. A straight element is fixed in the center of three or more elements which angle toward the ground

T9A03 (C)

What type of beam antenna uses two or more straight elements arranged in line with each other?

- A. A delta loop antenna
- B. A quad antenna
- C. A Yagi antenna
- D. A Zepp antenna

T9A04 (B)

How many directly driven elements do most beam antennas have?

- A. None
- B. One
- C. Two
- D. Three

T9A05 (A)

What is a parasitic beam antenna?

- A. An antenna where some elements obtain their radio energy by induction or radiation from a driven element
- B. An antenna where wave traps are used to magnetically couple the elements
- C. An antenna where all elements are driven by direct connection to the feed line
- D. An antenna where the driven element obtains its radio energy by induction or radiation from director elements

T9A06 (D)

What are the parasitic elements of a Yagi antenna?

- A. The driven element and any reflectors
- B. The director and the driven element
- C. Only the reflectors (if any)
- D. Any directors or any reflectors

T9A07 (B)

What is a cubical quad antenna?

- A. Four straight, parallel elements in line with each other, each approximately 1/2-electrical wavelength long
- B. Two or more parallel four-sided wire loops, each approximately one-electrical wavelength long
- C. A vertical conductor 1/4-electrical wavelength high, fed at the bottom
- D. A center-fed wire 1/2-electrical wavelength long

T9A08 (A)

What is a delta loop antenna?

- A. A type of cubical quad antenna, except with triangular elements rather than square
- B. A large copper ring or wire loop, used in direction finding
- C. An antenna system made of three vertical antennas, arranged in a triangular shape
- D. An antenna made from several triangular coils of wire on an



insulating form

T9A09 (D)

What type of non-directional antenna is easy to make at home and works well outdoors?

- A. A Yagi
- B. A delta loop
- C. A cubical quad
- D. A ground plane

T9A10 (D)

What type of antenna is made when a magnetic-base whip antenna is placed on the roof of a car?

- A. A Yagi
- B. A delta loop
- C. A cubical quad
- D. A ground plane

T9A11 (A)

If a magnetic-base whip antenna is placed on the roof of a car, in what direction does it send out radio energy?

- A. It goes out equally well in all horizontal directions
- B. Most of it goes in one direction
- C. Most of it goes equally in two opposite directions
- D. Most of it is aimed high into the air

T9B Polarization, impedance matching and SWR, feed lines, balanced vs unbalanced (including baluns).

T9B01 (B)

What does horizontal wave polarization mean?

- A. The magnetic lines of force of a radio wave are parallel to the earth's surface
- B. The electric lines of force of a radio wave are parallel to the earth's surface
- C. The electric lines of force of a radio wave are perpendicular to the earth's surface
- D. The electric and magnetic lines of force of a radio wave are perpendicular to the earth's surface

T9B02 (C)

What does vertical wave polarization mean?

- A. The electric lines of force of a radio wave are parallel to the earth's surface
- B. The magnetic lines of force of a radio wave are perpendicular to the earth's surface
- C. The electric lines of force of a radio wave are perpendicular to the earth's surface
- D. The electric and magnetic lines of force of a radio wave are parallel to the earth's surface

T9B03 (C)

What electromagnetic-wave polarization does a Yagi antenna have when its elements are parallel to the earth's surface?

- A. Circular
- B. Helical
- C. Horizontal

D. Vertical

T9B04 (D)

What electromagnetic-wave polarization does a half-wavelength antenna have when it is perpendicular to the earth's surface?

- A. Circular
- B. Horizontal
- C. Parabolical
- D. Vertical

T9B05 (D)

What electromagnetic-wave polarization does most man-made electrical noise have in the HF and VHF spectrum?

- A. Horizontal
- B. Left-hand circular
- C. Right-hand circular
- D. Vertical

T9B06 (D)

What does standing-wave ratio mean?

- A. The ratio of maximum to minimum inductances on a feed line
- B. The ratio of maximum to minimum resistances on a feed line
- C. The ratio of maximum to minimum impedances on a feed line
- D. The ratio of maximum to minimum voltages on a feed line

T9B07 (A)

What does forward power mean?

- A. The power traveling from the transmitter to the antenna
- B. The power radiated from the top of an antenna system
- C. The power produced during the positive half of an RF cycle
- D. The power used to drive a linear amplifier

T9B08 (B)

What does reflected power mean?

- A. The power radiated down to the ground from an antenna
- B. The power returned to a transmitter from an antenna
- C. The power produced during the negative half of an RF cycle
- D. The power returned to an antenna by buildings and trees

T9B09 (C)

What happens to radio energy when it is sent through a poor quality coaxial cable?

- A. It causes spurious emissions
- B. It is returned to the transmitter's chassis ground
- C. It is converted to heat in the cable
- D. It causes interference to other stations near the transmitting frequency

T9B10 (C)

What is an unbalanced line?

- A. Feed line with neither conductor connected to ground
- B. Feed line with both conductors connected to ground
- C. Feed line with one conductor connected to ground
- D. Feed line with both conductors connected to each other

T9B11 (A)

What device can be installed to feed a balanced antenna with an

unbalanced feed line?

- A. A balun
- B. A loading coil
- C. A triaxial transformer
- D. A wavetrapp

T9C Line losses by line type, length and frequency, RF safety.

T9C01 (B)

What common connector usually joins RG-213 coaxial cable to an HF transceiver?

- A. An F-type cable connector
- B. A PL-259 connector
- C. A banana plug connector
- D. A binding post connector

T9C02 (A)

What common connector usually joins a hand-held transceiver to its antenna?

- A. A BNC connector
- B. A PL-259 connector
- C. An F-type cable connector
- D. A binding post connector

T9C03 (B)

Which of these common connectors has the lowest loss at UHF?

- A. An F-type cable connector
- B. A type-N connector
- C. A BNC connector
- D. A PL-259 connector

T9C04 (A)

If you install a 6-meter Yagi antenna on a tower 150 feet from your transmitter, which of the following feed lines is best?

- A. RG-213
- B. RG-58
- C. RG-59
- D. RG-174

T9C05 (C)

If you have a transmitter and an antenna which are 50 feet apart, but are connected by 200 feet of RG-58 coaxial cable, what should be done to reduce feed line loss?

- A. Cut off the excess cable so the feed line is an even number of wavelengths long
- B. Cut off the excess cable so the feed line is an odd number of wavelengths long
- C. Cut off the excess cable
- D. Roll the excess cable into a coil which is as small as possible

T9C06 (B)

As the length of a feed line is changed, what happens to signal loss?

- A. Signal loss is the same for any length of feed line
- B. Signal loss increases as length increases
- C. Signal loss decreases as length increases

D. Signal loss is the least when the length is the same as the signal's wavelength

T9C07 (B)

As the frequency of a signal is changed, what happens to signal loss in a feed line?

- A. Signal loss is the same for any frequency
- B. Signal loss increases with increasing frequency
- C. Signal loss increases with decreasing frequency
- D. Signal loss is the least when the signal's wavelength is the same as the feed line's length

T9C08 (D)

If your antenna feed line gets hot when you are transmitting, what might this mean?

- A. You should transmit using less power
- B. The conductors in the feed line are not insulated very well
- C. The feed line is too long
- D. The SWR may be too high, or the feed line loss may be high

T9C09 (D)

Why should you make sure that no one can touch an open-wire feed line while you are transmitting with it?

- A. Because contact might cause a short circuit and damage the transmitter
- B. Because contact might break the feed line
- C. Because contact might cause spurious emissions
- D. Because high-voltage radio energy might burn the person

T9C10 (C)

For RF safety, what is the best thing to do with your transmitting antennas?

- A. Use vertical polarization
- B. Use horizontal polarization
- C. Mount the antennas where no one can come near them
- D. Mount the antenna close to the ground

T9C11 (A)

Why should you regularly clean, tighten and re-solder all antenna connectors?

- A. To help keep their resistance at a minimum
- B. To keep them looking nice
- C. To keep them from getting stuck in place
- D. To increase their capacitance



