.....Ryte Data.....
Dedicated to 99/4A and 9900 Computer Systems
2.00 VER 1.5 1985

BOX 210 MOUNTAIN STREET
HALIBURTON, ONTARIO K0M 1S0
CANADA

R/D COMPUTING NEWSLETTER

Where to start. This past month has brought in a series of projects and sources of information. This is 32k month... Continuing with some of the themes from past issues is a bit difficult due to the VERY interesting ideas coming in. We'll elaborate on this later down the line.

First shot: Randy Holcomb of Computer Shopper fame announced the "32/16"; a new memory expansion board for the 99/4A. This is a 32k memory 'card' which fits INSIDE the console for portable usage or general expansion ie: running Logo II etc. with cassette only (no boxes hanging off the side port.) Randy explained that this new type of expansion works off the 16 BIT BUSS rather than the 8bit multiplexed approach used by TI. Essentially this board uses the 16bit lines DIRECTLY from the 9900 CPU chip.
This gives you memory access speeds 20 - 50% FASTER than the normal 4A response time. The wait state generator is bypassed completely. [One of the reasons the 4A can be so slow running under Basic is that it 'waits' between instructions to accomodate slow memories. Today you can get 150ns chips which can run with no wait states.] This will make various applications which use the 32k memory run faster - increasing the power of the already considerable computing ability of the 4A.
This board uses 8k x 8 CMOS memory chips and installs inside your console above the 9900 CPU socket. With each expansion board you get a new 9900 chip which plugs into the system in place of your old CPU. Some additional features are being explored for possible inclusion at a later date.
Drawbacks? Well, this approach gives one speed and portability (etc.) but it will not allow the use of 128k cards. For the majority of owners this is not a "problem" or a drawback at all... for me, I will do this to a new console as the others use 128k cards of both descriptions. As this board does not make use of the MEmory ENable line, it does not "see" any other banks of memory. Apparently you can even have an old 32k card in your system and it won't collide with this faster 32k design!
The 32/16 memory expansion board is available **NOW**, fully tested (24hr. burn-in is performed on each board) and installed for $125.00 US funds. Installation, parts etc. are fully guaranteed. Top Radio, in doing the installation, will also alter the power supply to run cooler and insure sufficient power in your console AND install a MOLEX connector to ease any future changes/repairs.
The board is also available as a kit with parts for $75.00 US. You must do the assembly and installation inside your console. The guarantee is reduced to 30days for kit builders.

For information and orders contact:
TOP RADIO SUPPLY
1785 Mt. Elliot, Detroit, MI 48212 or call (313) 366-9088

As of this writing the kit or factory installation cannot be reported on fully. A kit will be obtained for a comprehensive report next issue.

ANNOUNCEMENT: DUE TO THE SUPPORT AND ENCOURAGEMENT RECEIVED, R/D COMPUTING IS COMMITTING TO A YEARLY FORMAT. We feel that our favourite orphan really deserves a technical upgrade - third party innovation forum. Subscriptions are the sole means of support for this effort. For the time being product advertising is not carried - which can offset publishing costs. Please do inform other TI owners who may be interested! We would like to see the newsletter grow into a major force for the 3.5 million TI owners all over. Currently issues are mailed to several countries and numerous users groups. The vision is to "cross polinate" all the ideas from users and third party

innovators, give TI owners better technical knowledge as well as providing certain product input. A technical library is being established to distribute information, schematics, hardware designs & tips to TI users. Articles, designs, software, ideas, wish lists etc. are solicited for publication!

INTERESTING LETTER:

Dear Sir;

I would like to offer you some suggestions from things I learned when we sold our own compatible computer. Believe me, I can appreciate your difficulties.

From 1980 to 1983 we manufactured an Apple II compatible computer. We had the same problem you seem to have, how to economically produce an item in small quantities and have enough left over to advertise.

Our solution was the same one derived by a number of the other 30 companies making Apple II compatible systems at the time - simply sell the motherboard either populated or unpopulated. [stuffed with chips - Ed.]

In the case of a 99/4A compatible, you will in fact have to construct your own video board as well as the motherboard, but everything else, from disk drive controllers to RS232 cards have already been built. As long as you use a 99/4A bus, you should have no problems with them. You could in fact make a basic card carriage, put both the motherboard and the video processor within - with a space for your own custom cards - and a bus outlet on the back for connecting a PE Box cable so you can use 99/4A cards too. You could put an IBM standard keyboard connection on the front and let users select from hundreds of availabale keyboards in all shapes, sizes, colors and typestyles. If you cnstruct this card carriage out of impact plastic with a metal IRF cage to meet FCC standards, you could probably build it for under $30 in quantities of a thousand.

Additionally, hundreds of software companies like my own would jump in to fill the void of software for your machine, if the initial costs aren't to high. It would already have a substantial software base if it is fully assembly compatible. You would only have to write the basics.

You could begin manufacturing and delivery within a few weeks. Once you start getting a return on your investment, you could worry about fancy items like analog/digital cards, real time clocks and pascal cards (which are available on the 99/4A buss). Once you start making money, youcan worry about making it a real computer.

Finally, you have a time limit. If a new compatible isn't available by December, then more than likely, the community will have diminished to a point where it isn't possible to economically manufacture a compatible. Selling just the motherboard would not only work as a stopgap, it would bring in capital, and it would give THOUSANDS of user's hope for the long term. Morale in this community is plumeting, the sooner the release, the larger your market will be!

If possible, you should reserve the first 100-200 for software manufacturers. The more software available for this machine that will ONLY run on this machine, the better chance you have for survival. If you intend to become a single source manufacturer, you are doomed to repeat the mistakes of TI. No one company can be all things to all people. If you create an open machine that is compatible... let the hundreds of software and hardware companies have a crack at it, provide GOOD documentation, you will sell a LOT of computers. That is really the business you are oreintating yourself towards - the computer manufacturing business; not the software publishing and not the add-on market. You will have a monopoly for some time, which youwon't have in the other, faster moving industries.

It is very possible to turn a "dead" market into a very successful after-life. I sold thousands of motherboards and complete systems before I sold the rights. I never lost money, except at the very beginning. People still bought my Apple II mother boards even when Apple was selling Apple IIe's. You just have to know how to play your hand.

A 99/4A compatible would be fantastic. I hope your company can get then into the hands of consumers in time where it will be meaningful.

Sincerely, C.B., MD (name witheld)

Okay, that's fair experience. Why can't a 4A clone or upgrade be done this way? Are diehard TI users less capable than other clone owners? Open architecture is the key.

A CONFIRMED "RUMOUR"... a note about a new module passed this way with no real details or address (etc.) - that sounded good. The announcement came in todays mail-

UNIVERSAL MODULE FOR THE TI 99/4A

A powerful static ram module : 48k RAM and 8k ROM named "MAXIMEM"

This module expands the memory to 96k RAM through two sections of RAM: 32k GRAM and 16k RAM (added to the 16k VDP RAM & 32k expansion memory).

MAXIMEM gives you the ability to dump any module to disk and then run the program from disk! No additional power supply is needed - plugs into module port like Widget.

MAXIMEM starts automatically through an 8k GROM that displays choices:

1. TI BASIC (same old)
2. MAXIMEM (offers the catalog of modules contained on disk)
3. EDITOR ASSEMBLER (an improved TI Editor Assembler)

MAXIMEM stays plugged in - no other modules are needed. MAXIMEM holds data even after FCTN QUIT and can load a series of modules ie: TI Writer, MultiPlan, Extended Basic etc.

Requires console, 32k, drive & controller. Price is set at $199.00 CANADIAN (about $149.50 US) plus shipping, insurance & postage. (Estimated $6+)

ORDERS TO:
Guy Gournay
146178 Can Inc
933 Delorimier
Longueuil, Quebec
J4K 3M8 Canada
(514) 651-/280

We haven't seen this yet. Sounds excellent. Coupled with a GPL Assembler/Disassembler, source code and RAMDISK cards-TI owners will be free of "module slavery" forevermore should this be wished.

NEXT: 32K EXPANSION PROJECT:

From Bernie Elsner and Phil West T.I.U.P - Australia

[article is "edited" & updated]

THE 'ISADUDD' CLUB: Anyone using a computer which has been discontinued by the manufacturer, automatically qualifies for free membership of the rapidly expanding International Society of Amalgamated Dodo Users and Dead Ducks. (ISADUDD's)

TI ISADUDD's are luckier than most. Despite the 'DUDO' image, there are some real advantages in belonging to this group.

At a this stage, like us, you may develop an interest in the computer hardware. How it operates, how to fix some of the things that annoy you and how to provide extra features.

[Several modifications made were noted last issue] include locating CONSOLE ROM in an 8k (battery backed) RAM chip on the 8bit data bus. Slowed things down by 25%, but has some interesting potential. These modifications were made possible by using the Hitachi HM6264LP-15... this chip is just made for the TI-99/AT hacker. It is STATIC RAM which does not need the complex refresh circuitry of DYNAMIC RAM and the size is just right for the 8k blocks of CPU RAM.

ON THE DRAWING BOARD:

We are developing several other enhancements for the TI-99/4 AT. All components will be mounted on a board INSIDE the computer. An additional external power supply will be required later. The projects will include-

Extensive CRU decoding to allow for new facilities. Provision of a CRU selectable 8k CMOS RAM chip in the DSR area of CPU RAM from >4000->5FFF.

Console ROM to be hardware switchable between ROM and battery backed CMOS RAM. Installation of an EPROM copier-programmer in the computer w/ two Zero Insertion Force socked to be mounted above the ventilation slots.

To allow for future projects we have decided to mount everything on a single piece of STRIPBOARD, 23cm. wide by 9 cm. deep and up to 2.5 cm. high. This can be mounted on self adhesive NON-CONDUCTING stand-offs on top of the metal shielding covering the main computer board. (In the empty space between the keyboard and the back of the computer.)

Only a small portion on the board is needed for the 32k expansion. You can mount the four RAM chips in separate sockets and eliminate the "piggy back" soldering.

PARTS REQUIRED:

4 HITACHI HM6264LP-15 RAM CHIPS

1 pc COPPER STRIP BOARD 32 strips wide and 23 cm. long. (about 9")

2 - 4 28 pin sockets

1-4 22uF Tantalum capacitors

1 edge connector for 30+ lines

insulating stand-offs or material to separate the board from the shielding.

single conductor wire, multistrand wire or ribbon cable, solder, fine tipped iron, etc.

A	REDRAW SCHEMATIC 25-2-85.	
B	FORMAL RELEASE ✓	

REVISIONS

FIG. 3C.

EXISTING TI-99/4(A) "MOTHER BOARD"

* REAR VIEW OF GROM "EXTENDER" SHOWING PIN NUMBERING AND FUNCTION OF THE WIRES REQUIRED BY THE MEMORY CHIPS.

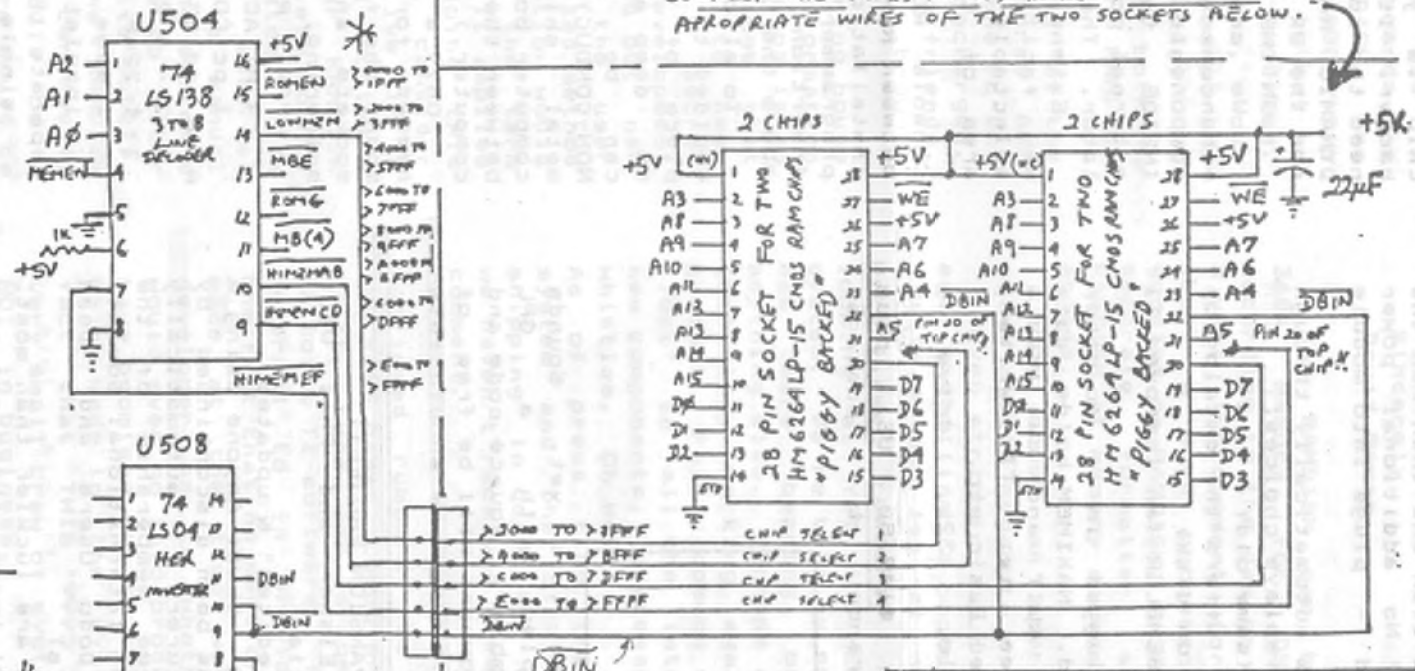
		WE	A4	A5	A6	A3	A7	A8	A9	A10	A11	A12	A13	A15			Dwn + 2
36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	
35	33	31	29	27	25	A14	23	+5V	D0	D1	D2	D3	D4	D5	D6	D7	
							21	19	17	15	13	11	9	7	5	3	1

* REAR VIEW OF GROM EXTENDER. A - INDICATES ADDRESS BUS. D - INDICATES DATA BUS.

CONNECT THE WIRES MARKED IN HEAVY OUTLINE TO THE APPROPRIATE WIRES OF THE TWO SOCKETS BELOW.

CONNECTIONS TO REAR OF GROM EXTENDER

FIG. 3A.



32K EXPANSION

FIG. 3B.

FOUR CHIPS ARE IN TWO SOCKETS W/ PINS 20 ON EACH CONNECTED TO ENABLE LINES ON THE 74LS138 DECODER INSIDE THE RF CASE.

ROMEN	ENABLES CONSOLE ROM.
ROMG	ENABLES MODULE PORT.
MBE	ENABLES DSR ROMS
MB(A)	ENABLES PAD.

ITEM NO	PART NO	DESCRIPTION	MATERIAL	REMARKS

PHIL WEST
BERNIE ELSNER
T.I.U.P. - W.A.
21-8-85

WESTRALIAN INSTRUMENTS
PROJ-01 TI-99/4A
32K. MATCHBOX EXP.
D | 1085397 16842 | 3 OF 3

IMPORTANT DISCLAIMER(S).

We cannot guarantee that any modification or enhancement described will work on YOUR computer. We develop our projects on old equipment and accept the risk that it may be damaged. If you have never taken your computer apart, handled CMOS chips or used a soldering iron you should NOT atempt any of the projects described (unless you can obtain assistance from someone who has). By modifying your equipment you will void any manufacturers' warranties still in force. WARNING* IF YOU ATTEMPT ANY OF THE MODIFICATIONS DESCRIBED IN THIS SERIES OF ARTICLES YOU DO SO AT YOUR OWN RISK.!!!!!!!

SOFTWARE WARNING* Moving CPU RAM into the computer is a major change to the TI-99/4A expansion system and may cause some software problems. Machine language progarms that use SPEECH or are dependent on critical timing MAY not operate correctly.

****

This expansion works fine with the major software packages: XBASIC, TI-WRITER, MULTIPLAN, TI-LOGO I & II, TI-FORTH, EDITOR ASSEMBLER and the P-CODE CARD - RS232, DISK CONTROLLERS (TI, CC etc.) all been used without any APPARENT problems.
This project should be regarded as a 'BUDGET' MEMORY EXPANSION for the unexpanded TI-99/4A user rather than as a replacement for existing 32k expansion cards. If you don't have a disk drive and controller, you should be aware that the extra memory is not fully usable by cassette based users. You may only SAVE Extended Basic programs up to 12k in size to cassette , though the programs will have a much larger operating space.

Flash update: The folks at MPB have a security system and weather station software which uses the A/D card. This note comes from the Ottawa Users Group - fortunately an influential, honourable and very ACTIVE users group. Thanks folks! Good input.

Speaking of which:
The CHICAGO AREA USERS GROUP is staging the third annual TI FAIRE at Triton College, River Grove, Illinois. This is an exclusive in the users community to our knowledge (A show 'down under' in Sidney I believe had a strong T.I.S.H.U.G. presence this year). Saturday, November 2nd, from 10:00 AM to 5:00 PM in the Ironwood Room. Some 21 vendors will exhibit TI hardware and software - to the (possible) 30,000 owners notified through the group efforts!

Which brings us around to beta testers again... hello? Are there any console only owners listening out there? We want you to try something on your systems. Drop us a line c/o BETA UNITS.

As noted above in earlier ramblings, we will get back to the home control subject Real Soon Now. Another board and software system is being interfaced over the next several weeks (given a few minutes here).

Dear Bruce,

A lot has happened regarding our RAMDISK since... August. The operating system is just about finished. (This) is a totally brand new piece of software that allows TI's file structures and conventions to work with our RAMDISK. It is not a rework of TI's disk DSR. I cannot emphasize enough the point that our RAMDISK works EXACILY like a TI floppy dirve and that it is totally compatible with any file type in BASIC, X-BASIC, FORTH, PASCAL and ASSEMBLY LANGUAGE. Any software that uses a standard TI DSRLNK will work with our RAMDISK... The only programs that won't work with our RAMDISK are CORCOMP's DISK MANAGER & MILLER GRAPHICS' ADVANCED DIAGNOSTICS. Both of these programs ignore CRU >1000 which is one place (in my opinion the best place) you can put our RAMDISK. The M.G. "EXPLORER" program is totally compatible. We havebeen using it to debug routines for the RAMDISK.

In addition, we have included a number of CALL statements from BASIC to enhance the RAMDISK's operation. CALL DR(drive #) sets the RAMDISK to DSK1-to DSK 5. If the RAMDISK is at CRU >1000 then setting the RAMDISK drive number supplants a floppy drive of the same number if it exists. I think the best set-up is to have the RAMDISK as DSK1 and a floppy as DSK2. With this set-up TI-WRITER AND E/A load their programs from the RAMDISK. CALL MAX(maximum

sectors) sets the maximum number of sectors available, determined by the number of chips you use. CALL WP/ON and CALL WP/OFF set the RAMDISK write protection. CALL EXC(address) allows you to execute any machine code from BASIC. If you have used CALL CRU/ON (turns on and leaves the RAMDISK) you can execute routines on the card. There is, of course, a CALL CRU/OFF. We will add a loader for assembly language programs.

At present artwork for the printed circuit board is being done and a company to manufacture the boards has been contacted. The RAMDISK was originally decoded at CRU >1000. Dip switches on the card allow you to set te RAMDISK to any unused CRU address. Since they are unique devices, our RAMDSK and Myarc's could be used at the same time with no modifications. We feel that the flexibility of both the hardware and software on our RAMDISK makes it a far superior design.

By the way, the contents of the RAMDISK are maintained by three AAA ni-cads on the board. When the PE-Box is ON the ni-cads are being recharged. You can take the RAMDISK to a friends, plug it in, and use it like you brought over a floppy!

I think the idea of a clearing house for hardware and software information from individuals or user's groups is an excellent idea. One of the things that killed TI was it's attempt to keep everything about the machine a secret and discourage other than TI development for the 99/4a. Since TI bailed out new development has come from the user groups. I think a more organized method of distributing that information would be most useful. I object to the term 'hacker', however. I think it implies 'amateur'. While we are not doing this work for profit we do not consider ourselves amateurs. We belive in a totally open hardware and software environment for the 99/4a. Our RAMDISK package will include the complete source code to the operating system. In addition to extensive internal documentation we have written a manual detailing all of the operating system's routines. We encourage people to alter our system if they wish or write totally new software for it. Since the RAMDISK operating system is in RAM it can easily be changed. The RAMDISK could be a print spooler or the whole card would be CALL statements to enhance BASIC... or assembly language programs could be moved in and out of memory expansion like overlays or... the possibilities are endless.

Information about ordering the RAMDISK package (printed circuit board and operating system for about $40.00) should appear soon. I will be handling the orders. By the way, I'm writing this letter using TK-WRITER loaded into a SUPERCART and the Editor and Formatter programs loaded on my RAMDISK. Moving betwen programs and other functions happen in a blink of an eye...

Sincerely,
David Romer

The RAMDISK can be populated with 360k memory for DS/DD operation according to the design layout. This is a vast improvement for the TI. How about a word processor with ALL the goodies on RAMDISK, in memory without a separate formatter, saving files to RAMDISK at memory speeds and 6ms disk access...

How about an operating system to allow a full megabyte of memory?

Even stripping out the GROMs/ROMs and installing a bootstrap disk loader

---

Unconfirmed rumours: Myarc is now looking at YET ANOTHER video display system. We're told by sources that THIS has more bearing on release than anything else. Perhaps a case of new technology working against a high tech product. Fairly common occurence to get "lost" in all the 'interesting' ideas, new components, processors, bells and whistles. Oh well.
As of press time the new operating system and the 512k card are not shipping in quantity. In others words, we haven't received them for hands on comment.

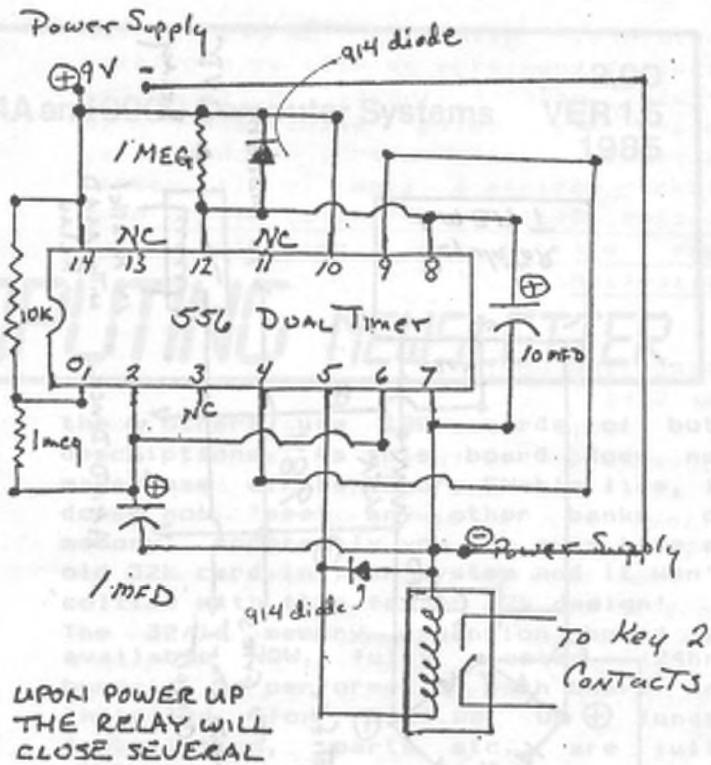
Confirmed rumours: We are told that a TMS 9995 based computer-on-a-card does exist, runs and is compatible with the PE Box & TI software. This HAS NOT been referred to in previous issues due to the fact that no mention was made at the time we talked to the developer as to whether or not this would ever go into production. We also have promised not to tell due to changes being made in the system... and the fact that THIS "9995 SYSTEM" is from a very small crew of systems techs who are NOT in business.

Ah yes, the Auto-Start Circuit... ⟹ From last issues notes, this one lets the computer "turn itself on" under certain conditions (like a simple timer or another power-up-on-a-signal approach).
The circuit turns the computer system on, enters Extended Basic which in turn looks for any file named LOAD on drive #1. Now the possibilities here are quite endless. A home control system could be brought up, initialized and operated during certain hours of the day - or, as this was originally designed for, a BBS system could be taken on-line for its "operating hours" - or, come up with a database to access remotely etc. etc.

Ron Gries sent us this one as well! Heard that he might do a hard disk card next - on my wish list is a "HARDCARD" like I saw in Byte. 10MB on a card which fit into the slots on an IBM. No reason that couldn't be done on the TI cards!

One of the things we have considered with all the circuit designs is doing PCB artwork, parts lists, instructions etc. Sound useful? Worth supporting with input, designs and subscriptions? How about a shareware concept? Kits?

Next month: An EPROM programmer design (one of two!) that works on the TI console as the host THROUGH the module port. This will let you "burn" custom modules - give your console only friends a real thrill to see the latest assembly program running on their 48k console.>>> given a bank switching affair, you can put 40k of EPROM on the port for some truly extensive programs...
Also: the BBS hardware that lets you use a dumb modem as an auto-answer auto-dial device. Nice touch! It requires 32k and an RS232 interface.
PLUS a number of items of interest for TI owners, users, technical experts, hackers (sorry, the work still carries the wizardry label in certain circles) et al. See you then. Pass the data along!



UPON POWER UP THE RELAY WILL CLOSE SEVERAL TIMES ON KEY # 2 TO ENTER XB IN PORT.

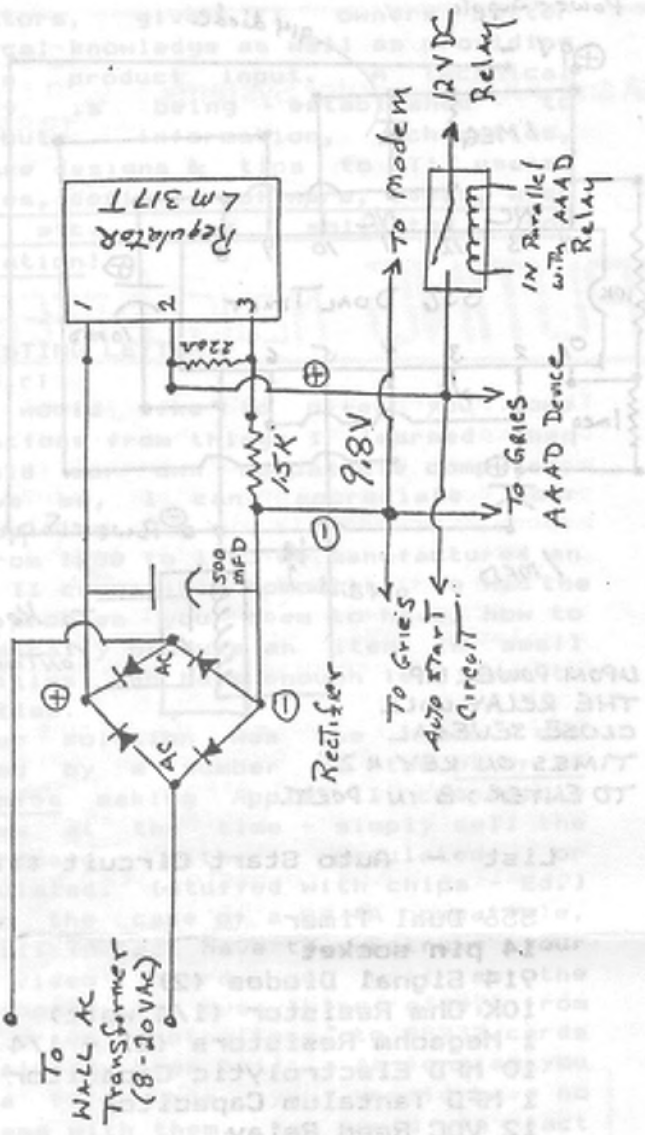
List - Auto Start Circuit ****

556 Dual Timer
14 pin socket
914 Signal Diodes (2)
10K Ohm Resistor (1/4 watt)
1 Megaohm Resistors (2) - 1/4 watt
10 MFD Electrolytic Capacitor
1 MFD Tantalum Capacitor
12 VDC Reed Relay

List - Power Supply ****

LM317T Adj. Voltage Regulator (+)
Bridge Rectifier - 1.4 A 50 PIV
470 MFD 50 V Electrolytic Capacitor
1.5K Ohm Resistor (1/2 watt)
220 Ohm Resistor (1/2 watt)
12 VDC Reed Relay (for modem power)

AC Transformer (8 to 20 VAC nominal)



R/D Computing is published monthly by Ryte Data in Haliburton, Ontario. All material contained herein is taken from sources believed to be accurate. No responsibility for errors, omissions or misprints is assumed. Articles may be reprinted with credits by users groups for publication.

Articles dealing with Texas Instruments 99/4A and 9900 based computers are published. Special attention is given to data on upgrading and modifying the 4A console & system. Information and material for consideration is solicited from owners, users groups, hardware manufacturers, software publishers etc. Please send all correspondence to Ryte Data R/D, 210 Mountain Street, Haliburton, Ont. K0M 1S0 Canada. We cannot accept responsibility for materials submitted and, unless stated otherwise, will assign all manuscripts, letters etc. for publication. ONLY Manuscripts with sufficient postage and self/addressed mailer will be returned. Subscription rate is $10.00 per year US funds. Overseas add $5.00 airmail postage. Back issues, subject to availability, are $2.00 each. Technical reprints may be published b special arrangement.

8

Ryte™ Data
BOX 210 MOUNTAIN STREET
HALIBURTON, ONTARIO K0M 1S0
CANADA

RANDY ROSSETTO
33 LADYKIRK AVE
TORONTO, ONT
M4L 3K8