Modem_Parancsok

COLLABORATORS			
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Modem_Parancsok

1.1 Modem Parancsok

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  Hayes compatible S-Registers Summary
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    MAGYAR Dokumentációk

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     Cardinal MVP288IV & MVP288XV Modems FAQ
     Hayes Modem Technical Reference
     LineLink and ProModem (Prometheus) FAQ
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     LineLink S-Registers
     Prodem modem 9600M
     Prometheus Class 2 Extended Commands
     Prometheus Example modem Setup and profile
     Supra MODEM Commands and Docs
     USRobotics 28.8k Modem
     USRobotics 28.8k Modem FAQs
     USRobotics Sportster Reference Manual
     USRobotics Sportster 14400 Fax Settings...
     USRobotics Sportster 14400 HELP and COMMANDS


Abaton Interfax 24/96 (ARA 1.0)
InitString=AT&FE0\N1
AnswerInit=AT&FE0\N1S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

Aceex Designer 9600
AT&F1X4 &C1 &D2 &R0 &Y0 %C1\J0 \N3 \Q3 W1 &K3

Aceex Designer 9600 - Auto Reliable
Aceex 96-Auto
AT&F1X4&C1&D2&R0\J0\N3\Q3W1&K3ATS7=60S11=55

Aceex Designer 9600 - MNP-4 mode
AT&F1%C0X4&C1&D2&R0\J0\N3\Q3W1&K3S7=60S11=55

Accex Designer 14400
AT&F1X4 &C1 &D2 &R0 &Y0 %C1\J0\N3\Q3W1&K3

Aceex Designer 14400 - Auto Reliable
AT&F1X4&C1&D2&R0\J0\N3\Q3W1&K3S7=60S11=55

Aceex Designer 14400 - MNP-4 mode
AT&F1%C0X4&C1&D2&R0\J0\N3\Q3W1&K3S7=60S11=55

Aceex 1496
AT&F&C1&D2%C1S7=60S11=55\J0\N3\Q3\V1W1&K3S95=46

Aceex 1496 - Auto Reliable
AT&F&C1&D2%C1\J0\N3\Q3\V1W1&K3S95=46S7=60S11=55

Aceex Designer 1496 - MNP-4 mode
AT&F&C1&D2%C1\J0\N3\Q3\V1W1&K3S95=46S7=60S11=55S48=128%C0
```

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Aceex Designer 1496 - Normal (No Error Correction)
AT&F&C1&D2%C1\J0\N0\Q3\V1W1&K3S7=60S11=55

Adtech Hi-Per 96/144
AT&F&C1&D2&K3\J0S7=60S11=60

Adtech Hi-Per 96/144 - Auto Reliable
AT&F&C1&D2&K3\J0S7=60S11=60

Adtech Hi-Per 96/144 - MNP4 mode
AT&F&C1&D2&K3%C0\J0S7=60S11=60

Adtech Hi-Per 96/96
AT&F&C1&D2&K3\J0S7=60S11=60

Adtech Hi-Per 96/96 - Auto Reliable
AT&F&C1&D2&K3\J0S7=60S11=60

Adtech Hi-Per 96/96 - MNP4 mode
AT&F&C1&D2&K3%C0\J0S7=60S11=60

Adtech Micro 2400 V.42bis
AT&F&C1&D2\N3\Q3\V1W0S7=60S11=60

Adtech Micro 2400 V.42bis - Auto Reliable
AT&F&C1&D2\N3\Q3\V1W0S7=60S11=60

Adtech Micro 2400 V.42bis - MNP-4 mode
AT&F&C1&D2\N3\Q3\V1W0%C1S7=60S11=60

Adtech Micro Systems, Other
AT E1Q0V1X4

Adtech Micro Systems, Smart Connect 14.4 ve
AT E1Q0V1X4&K3

Adtech Micro Systems, Smart Connect 14.4 vi
AT E1Q0V1X4&K3

Adtran ISU 128 (ISDN)
InitString=AT&C1&D2&R0&S2\Q3S34=15
AnswerInit=AT&C1&D2&R0&S2\Q3S34=15S0=1&W
BPSRate=115200
FlowControl=Hardware
ISDN=Yes
LongDTRDrop=Yes

Adtran ISU 128 (ISDN Sync Clear Channel)
InitString=AT
AnswerInit=AT
BPSRate=9600
FlowControl=Hardware

Adtran ISU Express (ISDN)
InitString=AT&C1&D2&R0&S2\Q3S34=15
AnswerInit=AT&C1&D2&R0&S2\Q3S34=15S0=1&W
BPSRate=115200
```

```
FlowControl=Hardware
ISDN=Yes

Advanced Micro Computer System Inc., All
AT E1Q0V1X4

Altima 4XX Internal Fax/Data
AT&F&C1 &D2 L3 W1 \G1 \K1 S7=60 S11=60

Altima 4XX Internal Fax/Data - Auto Reliable
AT&F&C1 &D2 L3 W1 \G1 \K1 S7=60 S11=60

Amber Logic Mistral 9600
InitString=AT&FW2&C1&D3&E5&K1\C5\Q0
AnswerInit=AT&FW2&C1&D3&E5&K1\C5\Q0S0=1&W
BPSRate=38400
FlowControl=Hardware

Amber Logic Mistral 14400
InitString=AT&FW2&C1&D3&E5&K1\C5\Q0
AnswerInit=AT&FW2&C1&D3&E5&K1\C5\Q0S0=1&W
BPSRate=38400
FlowControl=Hardware

Amber Logic Mistral FX 14400i
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Amberlogic, Other
AT E1Q0V1X4

American Data Technology, All
AT E1Q0V1X4

Amiga 1200RS
ATE1Q0V1X2 S7=60 S11=55 S0=0

Amstrad, Other
AT E1Q0V1X4

Amstrad, PC Modem
AT&F E1V1Q0

Amstrad SM2400 (UK)
ATZAT&C1&D2X2S7=59S11=68

Amstrad SM2400 - Auto Reliable
ATZAT&C1&D2X2S7=59S11=68

Amstrad SM2400 - V.23 mode
ATZATB23&C1&D2X2S7=59S11=68

AMT, 1442E
AT E1Q0V1X4 &C1&D2
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AMT, 1442EF
AT E1Q0V1X4 &C1&D2

AMT, 1442I
AT E1Q0V1X4 &C1&D2

AMT, 1442IF
AT E1Q0V1X4 &C1&D2

AMT, 9632E
AT E1Q0V1X4 &C1&D2

AMT, 9632I
AT E1Q0V1X4 &C1&D2

AMT, 9642E
AT E1Q0V1X4 &C1&D2

AMT, 9642I
AT E1Q0V1X4 &C1&D2

AMT, Other
AT E1Q0V1X4

AMT Star 1442
AT&F2&C1&D2\V2 S0=0&Y0

AMT Star 1442 - Auto Reliable
AT&F2\V2S0=0S7=60 S11=60

AMT Star 1442 - V.42 mode
AT&F2%C0\V2S0=0S7=60 S11=60

AMT Star 1442 - MNP-4 mode
AT&F1\V2S0=0S7=60 S11=60

AMT STAR 9600
AT&F2&C1&D2\V2 S0=0

AMT STAR 9600 - Auto Reliable
AT&F2\V2S0=0S7=60 S11=60

AMT STAR 9600 - V.42 mode
AT&F2%C0\V2S0=0S7=60 S11=60

AMT STAR 9600 - MNP-4 mode
AT&F1\V2S0=0S7=60 S11=60

Anchor Volksmodem 1200
ATE1Q0V1X1 S0=0

Anchor 2400E
ATE1Q0V1X4 &C1&D2 S7=30 S0=0

Anchor, 96E4
AT Q0 V1 X4&C1\N3\V1%C0\Q3
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Anchor, Other
AT E1Q0V1X4

Anchor 96E5
AT&F&C1&D2\N5\Q3\V2%C3S11=60S0=0

Anchor 96E5 - Auto Reliable
AT&F&C1&D2\N5\Q3\V2%C3S11=60S0=0

Anchor 96E5 - MNP-4 mode
AT&F&C1&D2\N5\Q3\V2%C0S11=60S0=0

Anderson-Jacobson 96/32 STH
AT&F&C1 &D2 *C1 *LG2 *M2 *E1

Anderson-Jacobson 96/32 STH - Auto Reliable
AT&F&C1&D2 *C1 *LG2 *M2 *E1

Andest Fax/Data Modem 14.4
AT&F&C1&D2&K3\J0\N7\V1

Andest Fax/Data Modem 14.4 - Auto Reliable
AT&F&C1&D2&K3\J0\N7\V1

Andest Fax/Data Modem 14.4 - MNP-4 mode
AT&F&C1&D2&K3&Q5%C0\J0\N7\V1

Andest Fax/Data Modem 14.4 - 2400-Compatible mode
AT&F2&C1&D2&K3\J0S37=6

Angia Communications 14.4 - TD (V.42 bis)
InitString=AT&FW1&C1&D2X4\J0\N7%C1S7=60
AnswerInit=AT&FW1&C1&D2\J0\N7%C1S7=60S0=1
BPSRate=57600
FlowControl=Hardware

Angia DataSTAR/FaxSTAR 14400
AT&F&C1 &D2 %C1 S7=60 S11=60

Angia DataStar/FaxSTAR 14400 - Auto Reliable
AT&F&C1 &D2 %C1 S7=60 S11=60

Angia DataStar/FaxSTAR 14400 - MNP-4 mode
AT&F%C0&C1 &D2 S7=60 S11=60

Angia DataStar/FaxSTAR 14400 - 2400-Direct mode
AT&F2&C1 &D2 S7=60 S11=60

Angia DataSTAR/FaxSTAR 9600
AT&F&C1 &D2 %C1 S7=60 S11=60

Angia DataStar/FaxSTAR 9600 - Auto Reliable
AT&F&C1 &D2 %C1 S7=60 S11=60

Angia DataStar/FaxSTAR 9600 - MNP-4 mode
AT&F%C0&C1 &D2 S7=60 S11=60
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Angia DataStar/FaxSTAR 9600 - 2400-Direct mode
AT&F2&C1 &D2 S7=60 S11=60

Apex Data V.32bis Fax Modem
AT&F&C1&D2%C1\J0\N7\Q3\V2S7=60S11=55

Apex Data V.32/V.32bis Data/Fax
InitString=AT&FW2&C1&D3&K3&Q5\J0\N7\Q2\V2%C1S7=60
AnswerInit=AT&FW2&C1&D3&K3&Q5\J0\N7\Q2\V2%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Apex Data V.32bis Fax Modem - Auto Reliable
AT&F&C1&D2%C1\J0\N7\Q3\V2S7=60S11=55

Apex Data V.32bis Fax Modem - MNP-10 mode
AT&F&C1&D2-C1\J0\N3\Q3\V2S7=60S11=55

Apex Data V.32bis Fax Modem - MNP-5 mode
AT&F&C1&D2%C1\J0\N3\Q3\V2S7=60S11=55

Apex Data V.32bis Fax Modem - MNP-4 mode
AT&F&C1&D2%C0\J0\N3\Q3\V2S7=60S11=55

Apex Data V.32bis Fax Modem - Direct mode
AT&F&C1&D2%C0\J0\N0\Q3\V2S7=60S11=55

Apex Data V.32 Fax Modem
AT&F&C1&D2%C1\J0\N7\Q3\V2S7=60S11=55

Apex Data V.32 Fax Modem - Auto Reliable
AT&F&C1&D2%C1\J0\N7\Q3\V2S7=60S11=55

Apex Data V.32 Fax Modem - MNP-10 mode
AT&F&C1&D2-C1\J0\N3\Q3\V2S7=60S11=55

Apex Data V.32 Fax Modem - MNP-5 mode
AT&F&C1&D2%C1\J0\N3\Q3\V2S7=60S11=55

Apex Data V.32 Fax Modem - MNP-4 mode
AT&F&C1&D2%C0\J0\N3\Q3\V2S7=60S11=55

Apex Data V.32 Fax Modem - Direct mode
AT&F&C1&D2%C0\J0\N0\Q3\V2S7=60S11=55

Apex Data Freedom V.32bis Fax Modem
AT&F&C1&D2%C1\J0&Q6&K3\V2S7=60S11=55

Apex Data Freedom V.32bis Fax Modem - Auto Reliable
AT&F&C1&D2%C1\J0&Q6&K3\V2S7=60S11=55

Apex Data Freedom V.32bis Fax Modem - MNP-4 mode
AT&F&C1&D2%C0\J0\N3&K3\V2S7=60S11=55

Apex Data Freedom V.32bis Fax Modem - Direct mode
AT&F&C1&D2%C1\J0&Q0&K3\V2S7=60S11=55
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Apex Data Freedom V.32 Fax Modem
AT&F&C1&D2%C1\J0&Q6&K3\V2S7=60S11=55

Apex Data Freedom V.32 Fax Modem - Auto Reliable
AT&F&C1&D2%C1\J0&Q6&K3\V2S7=60S11=55

Apex Data Freedom V.32 Fax Modem - MNP-4 mode
AT&F&C1&D2%C0\J0\N3&K3\V2S7=60S11=55

Apex Data Freedom V.32 Fax Modem - Direct mode
AT&F&C1&D2%C1\J0&Q0&K3\V2S7=60S11=55

Apple Modem 2400 (ARA 1.0)
InitString=AT&FE0\N1&K0
AnswerInit=AT&FE0\N1&K0S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

April Technologies Series 9600
AT&F&C1 &D2 %C1 \J0 \N9 \Q3

April Technologies Series 9600 - Auto Reliable
AT&F&C1&D2\J0\N9\Q3S7=60S11=60

April Technologies Series 9600 - MNP-4 mode
AT&F&C1&D2\J0\N9\Q3S7=60S11=60

April Technologies Series 14400
AT&F&C1 &D2 %C1 \J0 \N9 \Q3

April Technologies Series 14400 - Auto Reliable
AT&F&C1&D2\J0\N9\Q3S7=60S11=60

April Technologies Series 14400 - MNP-4 mode
AT&F&C1&D2\J0\N9\Q3S7=60S11=60

Arch Tek America Corp., All
AT E1Q0V1X4

Archtek SmartLink 14.4
AT&F&C1&D2&K3\N3S7=60S11=55

Archtek SmartLink 14.4 - Auto Reliable
AT&F&C1&D2&K3\N3S7=60S11=55

Archtek SmartLink 14.4 - MNP4 mode
AT&F&C1&D2&K3\N3-J0%C0S7=60S11=55

Archtek SmartLink 14.4 - Normal mode
AT&F&C1&D2&K3\N0S7=60S11=55

AT&T 2224 CEO
AT&F&C1&D2\C1\G0\J0\N3\Q3\V1

AT&T 2224 CEO - Auto Reliable
AT&C1&D2\G0 \J0 \N3 \Q3 \V1
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```
AT&T, 4000
AT Q0 V1 X4F1&C1

AT&T, 4024
AT Q0 V1 X1&C1

AT&T, DataPort 14.4
ATX7E1Q0V1 &C1&D2

AT&T, Other
AT E1Q0V1X4

AT&T, Paradyne 14.4
ATX7E1Q0V1 &C1&D2

AT&T Model 4000
ATE1Q0V1X1S7=60 S0=0

AT&T Paradyne Comsphere 3820
AT&F&C1 &D2 \N5 \D1 \Q3 S7=60

A&T Paradyne Comsphere 3820 - Auto Reliable
AT&F&C1&D2\D1\N5\Q3S7=60

AT&T Paradyne Comsphere 3820 - V.42 mode
AT&F&C1&D2\D1\N5\Q3S7=60

AT&T Paradyne Comsphere 3820 - MNP4 mode
AT&F%C0\N3&C1&D2\D1\Q3S7=60

AT&T Dataport 14.4/FAX
AT&F&C1&D2%C1X6\D1\N7\Q3S0=0S7=60

AT&T Dataport 14.4/FAX - Auto Reliable
AT&F&C1&D2%C1X6\D1\N7\Q3S0=0S7=60

AT&T Dataport 14.4/FAX - MNP4 mode
AT&F&C1&D2%C0X6\D1\N7\Q3S0=0S7=60

AT&T Dataport 14.4/FAX - 2400 mode
AT&F&C1&D2%B2400%C0X6\D1\N0\Q0S0=0S7=60

AT&T KeepinTouch Card Modem
AT&F&C1&D2%C1X6\D1\N7\Q3S0=0S7=60

AT&T KeepinTouch Card Modem - Auto Reliable
AT&F&C1&D2%C1X6\D1\N7\Q3S0=0S7=60

A&T KeepinTouch Card Modem - MNP4 mode
AT&F&C1&D2%C0X6\D1\N7\Q3S0=0S7=60

AT&T KeepinTouch Card Modem - 2400 mode
AT&F&C1&D2%B2400%C0X6\D1\N0\Q0S0=0S7=60

ATI Technologies Inc., 14400 ETC-E
AT&F2  Q0V1W1X4 &C1&D2&K3&U0
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```
ATI Technologies Inc., 14400 ETC-I
AT&F2  Q0V1W1X4 &C1&D2&K3&U0

ATI Technologies Inc., 14400 PCMCIA
AT&F2  Q0V1W1X4 &C1&D2&K3&U0

ATI Technologies Inc., 19200 ETC-E
AT&F2  Q0V1W1X4 &C1&D2&K3&U0

ATI Technologies Inc., 19200 ETC-I
AT&F2  Q0V1W1X4 &C1&D2&K3&U0

ATI Technologies Inc., 9600 ETC-E
AT Q0V1W1X4 &C1&D2&K3&U0

ATI Technologies Inc., 9600 ETC-I
AT Q0V1W1X4 &C1&D2&K3&U0

ATI Technologies Inc., Other
AT E1Q0V1X4

Attel, All
AT E1Q0V1X4

Attel MX24
AT&F&C1&D2\Q3\N3%C1

Attel MX24 - Auto Reliable
AT&F&C1&D2\Q3\N3%C1

Attel MX24 - MNP-4 mode
AT&F%C0&C1&D2\Q3\N3%C1

Attel MX24 - Direct mode
AT&F&C1&D2\Q0\N1

Attel MX96144
AT&F&C1&D2\Q3\N3%C1

Attel MX96144 - Auto Reliable
AT&F&C1&D2\Q3\N3%C1

Attel MX96144 - MNP-4 mode
AT&F%C0&C1&D2\Q3\N3%C1

Attel MX96144 - Direct mode
AT&F&C1&D2\Q0\N1

AT&T Comsphere 3820 Plus
InitString=AT&F0X4Z3&C1&D3\D3\G1\N5%C1S7=60
AnswerInit=AT&F0X4Z3&C1&D3\D3\G1\N5%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

AT&T ComSphere 3830
InitString=AT&FX6&C1&D2\N5\Q2%C1"H3S7=60
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```
AnswerInit=AT&FX6&C1&D2\N5\Q2%C1"H3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

AT&T Dataport 288 V.34
InitString=AT&FX4&C1&D3S7=60
AnswerInit=AT&FX4&C1&D3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

AT&T DataPort (ARA 1.0)
InitString=AT&F0&D0&C1\N0%C0
AnswerInit=AT&F0&D0&C1\N0%C0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

AT&T Paradyne 3830 (ARA 1.0)
InitString=AT&F0&D0&C1\N0%C0
AnswerInit=AT&F0&D0&C1\N0%C0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

AT&T ComSphere 3800 Series (V.42bis)
InitString=AT&FX6&C1&D2\N5\Q2%C1"H3S7=60
AnswerInit=AT&FX6&C1&D2\N5\Q2%C1"H3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

AT&T ComSphere 3810 Plus
InitString=AT&FX6&C1&D2\N5\Q2%C1"H3S7=60
AnswerInit=AT&FX6&C1&D2\N5\Q2%C1"H3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Attel MX96192
AT&F&C1&D2\Q3\N3%C1

Attel MX96192 - Auto Reliable
AT&F&C1&D2\Q3\N3%C1

Attel MX96192 - MNP-4 mode
AT&F%C0&C1&D2\Q3\N3%C1

Attel MX96192 - Direct mode
AT&F&C1&D2\Q0\N1

ATi 2400etc/i and 2400etc/e (V.42bis)
InitString=AT&FW2&B1&C1&D3&K3&Q6&U1S7=60
AnswerInit=AT&FW2&B1&C1&D3&K3&Q6&U1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

ATi 2400etc/Fax (V.42bis)
InitString=AT&FW2&B1&C1&D3&K3&Q6&U1S7=60
AnswerInit=AT&FW2&B1&C1&D3&K3&Q6&U1S7=60S0=1&W
```

```
BPSRate=9600
FlowControl=Hardware

ATi 9600etc/e (V.42bis)
InitString=AT&FW2&B1&C1&D3&K3&Q6&U1S7=60
AnswerInit=AT&FW2&B1&C1&D3&K3&Q6&U1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

ATI 2400etc
AT&F1&C1&D2W2X6S7=60S11=60

ATI 2400etc - MNP-5 mode
AT&F1&C1 &D2 X6 S7=60 S11=60

ATI 2400etc - non-MNP mode
AT&F&C1 &D2 X6 S7=60 S11=60

ATI 2400etc V.42
AT&F2&C1&D2W2X6S7=60S11=60

ATI 2400etc V.42 - V.42 mode
AT&F2&C1 &D2 X6 S7=60 S11=60

ATI 2400etc V.42 - MNP-5 mode
AT&F1&C1 &D2 X6 S7=60 S11=60

ATI 2400etc V.42 - MNP-4 mode
AT&F1 &U0 &C1 &D2 X6 S7=60 S11=60

ATI 2400etc V.42 - non-MNP mode
AT&F&C1 &D2 X6 S7=60 S11=60

ATI 9600etc
AT&F2&C1&D2X6S7=60S11=60

ATI 9600etc - V.42bis Mode
AT&F2&C1&D2X6&Q6&U1 S7=60 S11=60

ATI 9600etc - MNP4 Mode
AT&F2&C1&D2X6&Q5&U0 S7=60 S11=60

ATI 9600etc - V.42 Mode
AT&F2&C1&D2X6&Q6&U0 S7=60 S11=60

ATI 9600etc - MNP5 Mode
AT&F2&C1&D2X6&Q5&U1 S7=60 S11=60

ATT Comsphere 3800 (ARA 1.0)
InitString=AT&F0&C1&D1E0\N0M0\Q3%C0"H0
AnswerInit=AT&F0&C1&D1E0\N0M0\Q3%C0"H0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Avatech 2400E
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0
```

```
Bausch Datacom 3522
ATE1Q0V1X4&C1&D2 S0=0

Bausch Datacom 3522 V.42
AT&F\Q3 \N3 \J0 \V1 \C1

Bausch Datacom 3522 V.42 - Auto Reliable
AT&F\Q3\N3\J0\V1\C1S0=0

Bausch Datacom 3522 V.42 - MNP-4 mode
AT&F%C0\Q3\N3\J0\V1\C1S0=0

Bay Connection, All
AT E1Q0V1X4

Best Data Products Inc., All
AT E1Q0V1X4

Best D.P. 9624 FQ
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Best D.P. 2400/2400Fax
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Best D.P. Smart One 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Best D.P. Smart One 1442
AT&F&C1&D2W2S7=60S11=60

Best D.P. Smart One 1442 - Auto Reliable
AT&F&C1&D2W2 S7=60S11=60

Best D.P. Smart One 1442 - MNP-4 mode
AT&F&C1&D2W2 S7=60S11=60%C0

Best D.P. Smart One 9642
AT&F&C1 &D2 W2 S7=60 S11=55

Best D.P. Smart One 9642 - Auto Reliable
AT&F&C1&D2W2 S7=60S11=55

Best D.P. Smart One 9642 - MNP-4 mode
AT&F&C1&D2W2 S7=60S11=55%C0

BizComp 2400 Intellimodem (no MNP or V.42)
InitString=ATQ0V1X4&C1&D3S7=60
AnswerInit=ATQ0V1X4&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

Black Box 144FX/144FX-PC
AT&F&C1&D2&K3&Q5\N3S95=43S7=60S11=55

Black Box 144FX/144FX-PC - Auto Reliable
```

```
AT&F&C1&D2&K3&Q5\N3S95=43S7=60S11=55

Black Box 144FX/144FX-PC - MNP-4 mode
AT&F&C1&D2&K3&Q5\N3S95=43%C0S48=128ATS7=60S11=55

Black Box 144FX/144FX-PC - 2400 Compatible mode
AT&F&C1&D2&K3&Q6S95=43S7=60S11=55

Boca Modem 14.4K/V.32bis (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5%C1\N3S7=60S36=7S46=138S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5%C1\N3S7=60S36=7S46=138S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Boca V.Fast Class BocaModem
InitString=AT&F&C1&D3&K3&Q5\N3%C3S7=60S95=47
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C3S7=60S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Boca V.34 BocaModem
InitString=AT&FW1&C1&D3&K3\N3%C3S7=60S95=67
AnswerInit=AT&FW1&C1&D3&K3\N3%C3S7=60S95=67S0=1&W
BPSRate=57600
FlowControl=Hardware

Boca Research 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=60 S0=0

Boca Research M2400i
AT&F3&C1&D2S7=60

Boca Research 2400 V.42bis
AT&F3&C1&D2

Boca Research 2400 V.42bis - Auto Reliable
AT&F3&C1&D2 S7=60 S11=60

Boca Research 2400 V.42bis - MNP-4 mode
AT&F2&C1&D2%C0 S7=60 S11=60

Boca Research 14.4
AT&F&C1&D2&K3%C1%E1\N3S11=60S95=47S7=60

Boca Research 14.4 - Auto Reliable
AT&F&C1&D2&K3%C1%E1\N3S11=60S7=60S95=47

Boca Research 14.4 - MNP-4 mode
AT&F&C1&D2&K3%C1%E1\N3S11=60S7=60S95=47%C0

Boca Research, Other
AT E1Q0V1X4

BSM, Other
AT E1Q0V1X4

BSM, Quick Com MNP
```

```
AT E1Q0V1X4&K3

BSM Quik Com MNP
AT&F\Q3\J0\N3%C1&C1&D2S7=60S0=0

BSM Quik Com MNP - Auto Reliable
AT&F\Q3\J0\N3%C1&C1&D2 S7=60 S11=60

BT, Other
AT E1Q0V1X4

BT, V32
AT Q0 V1 E1&EO&K0

CALCOM 14400 Fax & Data Modem
InitString=AT&F&C1&D3&K3&M5\N5\Q3\V1%C1S7=60S36=7S46=138S48=7S95=47
AnswerString=AT&F&C1&D3&K3&M5\N5\Q3\V1%C1S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Calcom, Other
AT E1Q0V1X4

Calcom, PC1414MX
AT E1Q0V1X4&K3

CALPAK MXE-9600
InitString=AT&F&C1&D3S7=60S95=47
AnswerInit=AT&F&C1&D3S7=60S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

Calculus, All
AT E1Q0V1X4

Calpak Corp., All
AT E1Q0V1X4

Cambridge Telecom Inc., All
AT E1Q0V1X4

Cardinal Technologies Inc., MVP Series
AT&F E1Q0V1X4 &C1&D2

Cardinal Technologies Inc., MVP192i
AT&F E1Q0V1X4 &C1&D2

Cardinal Technologies Inc., Other
AT E1Q0V1X4

Cardinal 2450MNP (MNP 5)
InitString=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Cardinal 2400V42 (V.42bis)
```

```
InitString=AT&F&C1&D3\J0\N3\Q2\V2%C1"H3-J1S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V2%C1"H3-J1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Cardinal 9650V32 (MNP)
InitString=AT&F&B1&C1&D3&H1&I1&M6S7=60
AnswerInit=AT&F&B1&C1&D3&H1&I1&M6S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Cardinal 9600V42 (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5\N3%C1%M3S7=60S46=138S48=7S95=3
AnswerInit=AT&FW2&C1&D3&K3&Q5\N3%C1%M3S7=60S46=138S48=7S95=3S0=1&W
BPSRate=38400
FlowControl=Hardware

Cardinal 14400 (V.42bis)
InitString=AT&F&C1&D3&K3&Q5\N3%C1%M3S7=60S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C1%M3S7=60S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Cardinal MVP144DSP-C
InitString=AT&FW1&C1&D3&K3&Q5\N5%C1S7=60
AnswerInit=AT&FW1&C1&D3&K3&Q5\N5%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Cardinal MVP 28.8XP V.FC/V.34
InitString=AT&FQ1W2&D3&K3S7=60S95=47
AnswerInit=AT&FQ1W2&D3&K3S7=60S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Cardinal MB2210/MB2450
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Cardinal MB2296SR
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Cardinal 2400 V42
AT&F&C1&D2\N3\Q3\J0\C2\V2S7=60S11=60

Cardinal 2400 V42 - Auto Reliable
AT&F&C1&D2\N3\Q3\J0\C2\V2S7=60S11=60

Cardinal 2400 V42 - MNP-4 mode
AT&F&C1&D2%C0\N3\Q3\J0\C2\V2S7=60S11=60

Cardinal 2400 V42 - 2400-Compatible mode (Direct)
AT&F&C1&D2%C0\N0\Q0\J1\C2\V2S7=60S11=60

Cardinal 2450 V42
AT&F&C1&D2\N3\Q3\J0\C2\V2S7=60S11=60

Cardinal 2450 V42 - Auto Reliable
```

```
AT&F&C1&D2\N3\Q3\J0\C2\V2S7=60S11=60

Cardinal 2450 V42 - MNP-4 mode
AT&F&C1&D2%C0\N3\Q3\J0\C2\V2S7=60S11=60

Cardinal 2450 V42 - 2400-Compatible mode (Direct)
AT&F&C1&D2%C0\N0\Q0\J1\C2\V2S7=60S11=60

Cardinal 9600 V.42
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 9600 V.42 - Auto Reliable
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 9600 V.42 - MNP-4 mode
AT&F %C0 &C1&D2 S7=60 S11=60 S95=41

Cardinal 9600 V.42 - 2400-Compatible (Direct) mode
AT&F&Q0&K0&C1&D2S7=60S11=60S95=41

Cardinal 9650 V.42
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 9650 V.42 - Auto Reliable
AT&F &C1 &D2 S7=60 S11=60 S95=41

Cardinal 9650 V.42 - MNP-4 mode
AT&F %C0 &C1&D2 S7=60 S11=60 S95=41

Cardinal 9650 V.42 - 2400-Compatible (Direct) mode
AT&F&Q0&K0&C1&D2S7=60S11=60S95=41

Cardinal 14400 V32bis
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 14400 V32bis - Auto Reliable
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 14400 V32bis - MNP-4 mode
AT&F%C0 &C1&D2 S7=60 S11=60 S95=41

Cardinal 14400 V32bis - 2400-Compatible (Direct) mode
AT&F&Q0&K0&C1&D2S7=60S11=60S95=41

Cardinal 14450 V32bis
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 14450 V32bis - Auto Reliable
AT&F&C1 &D2 S7=60 S11=60 S95=41

Cardinal 14450 V32bis - MNP-4 mode
AT&F%C0 &C1&D2 S7=60 S11=60 S95=41

Cardinal 14450 V32bis - 2400-Compatible (Direct) mode
AT&F&Q0&K0&C1&D2S7=60S11=60S95=41

Cermetek 1200 Modem/1200 SPC/Security Modem
```

ATE1Q0V1X2 S7=60 S11=55 S0=0

Cermetek 2400 R/2400 SPC
ATE1Q0V1X4S7=60 S11=55 S0=0

Cermetek, Other
AT E1Q0V1X4

Cettlan Corp., All
AT E1Q0V1X4

Choice Technology Group Ltd., All
AT E1Q0V1X4

CMS, All
AT E1Q0V1X4

Companion CTS212AH
Q

COM 1 MV 213
ATE1Q0V1X4&E5 S0=0 S7=60

COM 1 MV 214
ATE1Q0V1X4&E5 &E1 S0=0 S7=60

COM 1 MV 223 / MV 224
ATE1Q0V1X4&E5 &E1 S0=0 S7=60

Compaq, All
AT E1Q0V1X4

Compaq Enhanced Internal Modem
AT&F&C1&D2X4W1S7=60S11=60&Q5S46=2&K3S36=7&Y0

Compaq Enhanced - Auto Reliable mode
AT&F&C1&D2X4S36=7 S46=2S7=60 S11=60

Compaq SpeedPAQ 144 Modem
AT&F&C1&D2W2\V1S7=60S11=60

Compaq SpeedPAQ 144 - Auto Reliable mode
AT&F&C1&D2W2\V1S7=60S11=60

Compaq SpeedPAQ 144 - MNP-4 mode
AT&F%C0&C1&D2W2\V1S7=60S11=60

Compaq SpeedPAQ 144 - 2400 mode
AT&F%C0&C1&D2W2\V1S37=6S7=60S11=60

Complete Communicator
ATE1Q0V1X4&C1&D2 S0=0

Complete Communicator V.42
AT&F&C1&D2\Q3\N3\J0\V1\C1

Complete Communicator - Auto Reliable

```
AT&F&C1&D2\Q3\N3\J0\V1 S7=60 S11=60

Complete Communicator - MNP-4 mode
AT&F&C1&D2%C0\Q3\N3\J0\V1 S7=60 S11=60

Complete Communicator GOLD
AT&F&C1&D2&K3&Q5\N3%C1S7=60S11=60

Complete Communicator GOLD - Auto Reliable
AT&F&C1&D2&K3&Q5\N3%C1S7=60 S11=60

Complete Communicator GOLD - MNP-4 mode
AT&F&C1&D2&K3&Q5\N3%C0S7=60 S11=60

Complete Communicator GOLD - 2400-Compatible mode
AT&F&C1&D2&K3\N0S7=60 S11=60

Complete FAX/9624
AT&FW1&C1&D2\J0\N3\Q3\V1S7=60S11=55

Complete FAX/9624 - Auto Reliable
AT&F3W1&C1&D2\J0\N3\Q3\V1S7=60S11=55

Complete FAX/9624 - MNP-4 mode
AT&F3W1&C1&D2\J0\N3\Q3\V1S7=60S11=55%C0

Complete FAX/9624 - 2400-Compatible mode
AT&FW1&C1&D2\J1\N0\Q0S7=60S11=55

Complete Modem Plus
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Complete PC TurboModem Plus
AT&F2&C1 &D2 \V1 S7=60 S11=60

Complete PC TurboModem Plus - Auto Reliable
AT&F2 &C1 &D2 \V1 S7=60 S11=60

Complete PC TurboModem Plus - MNP-4 mode
AT&F2%C0 &C1 &D2 \V1 S7=60 S11=60

Compuadd 9600 MNP5
AT&FX4&C1&D2%C1\J0\N3\Q3\V1S7=60S11=55

Compuadd 9600 MNP5 - Auto Reliable
AT&FX4&C1&D2%C1\J0\N3\Q3\V1S7=60S11=55

Compuadd 9600 MNP5 - MNP-4 mode
AT&FX4&C1&D2%C0\J0\N3\Q3\V1S7=60S11=55

CompuCom Speedmodem
AT&F2*H1\N3\Q3%C1&C1&D2S7=60S11=60S0=0

CompuCom Speedmodem - Auto Reliable
AT&F2&C1&D2*H1\N3\Q3%C1S7=60S11=60

CompuCom Speedmodem - CSP-EC mode
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AT&F2&C1&D2*H2\N3\Q3%C1S7=60S11=60

CompuCom Speedmodem - MNP-4 mode
AT&F2&C1&D2*H1\N3\Q3%C0S7=60S11=60

CompuCom Speedmodem - 2400 mode
AT&F2&C1&D2*H1\N0\Q3%C0S7=60S11=60

CompuCom Speedmodem STAR
AT&F2*H2 \J0 \N3 \Q3 %C1 &C1 &D2 S7=60 S11=60 S0=0

CompuCom Speedmodem STAR - Auto Reliable
AT&F2&C1&D2*H2\J0\N3\Q3%C1S7=60S11=60

CompuCom Speedmodem STAR - MNP-4 mode
AT&F2&C1&D2*H2\J0\N3\Q3%C0S7=60S11=60

CompuCom Speedmodem STAR - 2400 mode
AT&F2&C1&D2*H2\J0\N0\Q3%C0S7=60S11=60

Compudyne 9642
AT&F&C1&D2S7=60S95=44S11=60

Compudyne 9642 - Auto Reliable
AT&F&C1&D2S7=60S11=60S95=44

Compudyne 9642 - MNP-4 mode
AT&F&Q9&C1&D2S7=60S11=60S95=44

Compudyne 9642 - 2400-Compatible
AT&F&Q0&C1&D2S7=60S11=60S95=44

Computer Peripherals Inc., Other
AT E1Q0V1X4

Computer Peripherals Inc., VIVA 14.4 /FAXVC
AT&F E1Q0V1X4 &C1&D2

Computer Peripherals Inc., VIVA 14.4 Series
AT&F E1Q0V1X4 &C1&D2&K3

Computer Peripherals Inc., VIVA 9642E
AT&F E1Q0V1X4 &C1&D2&K3

ControlWare Citam (ISDN)
InitString=ATZ&C0&D1&M0&R1&S0S8=1
AnswerInit=ATZ&C0&D1&M0&R1&S0S8=1S0=1&W
BPSRate=38400
FlowControl=Hardware
ISDN=Yes

CTK Shorty 2400
ATE1Q0V1X4&C1&D2S0=0

CTK FaxManager
AT&F\Q3\N3%C1\J0
```

```
CTK FaxManager - Auto Reliable
AT&F\Q3\N3%C1\J0

CTK FaxManager - MNP-4 modus
AT&F\Q3\N3%C0\J0

CTK FaxManager - Direkt modus
AT&F\J1\N1\Q0%C0

CTK Shorty V.42bis + Fax
AT&F&K3\N3%C3\J0

CTK Shorty V.42bis + Fax - Auto Reliable
AT&F&K3\N3%C3\J0

CTK Shorty V.42bis + Fax - MNP-4 modus
AT&F&K3\N3%C0\J0

CTK Shorty V.42bis + Fax - Direkt modus
AT&F&K0\N1\J1

CTK Shorty 14400 + Fax
AT&F2\Q3\N6%C1\C1\J0

CTK Shorty 14400 + Fax - Auto Reliable
AT&F2\Q3\N6%C1\C1\J0

CTK Shorty 14400 + Fax - MNP-4 modus
AT&F2\Q3\N6%C0\C1\J0

CXR Telcom Corp, AJ Series
AT&F E1Q0V1X4 &C1&D2 *LG2*E0

CXR Telcom Corp, Other
AT E1Q0V1X4

Dacom FASTLANE V32
AT&F&C1&D2&R0*E1*F3*S1S0=0S7=60

Dacom FASTLANE V32 - Auto Reliable Mode
AT&F&C1&D2&R0*E1*F3*S1S0=0S7=60

Dacom FASTLANE V32 - Direct Mode
AT&F&C1&D2&R0*E0*F0*S1S0=0S7=60

Dallas,  Fax 14.4
AT E1Q0V1X4&K3

Dallas,  Fax 96/96
AT E1Q0V1X4&K3

Dallas, Other
AT E1Q0V1X4

Dallas Fax 96/96
AT&F&C1 &D2 W1 S95=41
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```
Dallas Fax 96/96 - Auto Reliable
AT&F&C1 &D2 W1 S7=60 S11=60 S95=41

Dallas Fax 96/96 - V.42 mode
AT&F&C1&D2%C0W1S7=60S11=60S95=41

Dallas Fax 96/96 - MNP-5 mode
AT&F&C1&D2%C1W1S7=60S11=60S95=41

Dallas Fax 96/96 - MNP-4 mode
AT&F&C1&D2%C0W1S7=60S11=60S95=41

Dallas Fax 14.4 / 14.4 Pro Plus
AT&F&C1 &D2 S95=41

Dallas Fax 14.4 - Auto Reliable
AT&F&C1 &D2 S7=60 S11=60 S95=41

Dallas Fax 14.4 - V.42 mode
AT&F&C1&D2%C0S7=60S11=60S95=41

Dallas Fax 14.4 - MNP -5 mode
AT&F&C1&D2%C1S7=60S11=60S95=41

Dallas Fax 14.4 - MNP-4 mode
AT&F&C1&D2%C0S7=60S11=60S95=41

Dataflex, Domfax II
AT Q0V1 X1 \N0 %C0 &Q0

Dataflex, Dynalink
AT Q0V1B0

Dataflex, Other
AT E1Q0V1X4

Dataflex Pocket Comfax II
AT&F3&C1&D2\G0\N3\Q3S7=60

Dataflex Pocket Comfax II - Auto Reliable
AT&F AT&C1&D2\G0\N3\Q3S7=60

Dataflex Pocket Comfax II - MNP-4 mode
AT&F&C1&D2%C0\G0\N3\Q3S7=60

Dataflex Pocket Comfax II - Direct mode
AT&F&C1&D2\G0\N1\Q0S7=60

Dataflex Pocket Quadcom II
AT&F3&C1&D2\G0&Q5\N3\Q3S7=60

Dataflex Pocket Quadcom II - Auto Reliable
AT&F&C1&D2\G0&Q5\N3\Q3S7=60

Dataflex Pocket Quadcom II - MNP-4 mode
AT&F&C1&D2%C0\G0&Q5\N3\Q3S7=60
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Dataflex Pocket Quadcom II - Direct mode
AT&F AT&C1&D2\G0&Q5\N1\Q0S7=60

Dataflex Pocket Quadsync II
AT&F3&C1&D2\G0&Q5\N3\Q3S7=60

Dataflex Pocket Quadsync II - Auto Reliable
AT&F&C1&D2\G0&Q5\N3\Q3S7=60

Dataflex Pocket Quadsync II - MNP-4 mode
AT&F&C1&D2%C0\G0&Q5\N3\Q3S7=60

Dataflex Pocket Quadsync II - Direct mode
AT&F&C1&D2\G0&Q5\N1\Q0S7=60

Dataflex Rapier 9600
AT&F&C1&D2%C1&I1\N3\Q2S7=60

Dataflex Rapier 9600 - Auto Reliable
AT&F&C1&D2%C1&I1\N3\Q2S7=60

Dataflex Rapier 9600 - MNP-4 mode
AT&F&C1&D2%C0&I1\N3\Q2S7=60

Dataflex Rapier 9600 - Direct mode
AT&F&C1&D2&I0\N1\Q0S7=60

DataRace, All
AT E1Q0V1X4

Datarace 24/96V Fax/Modem
InitString=AT&FW2&C1&D3&K3\J0\N5\Q2%C1S7=60
AnswerInit=AT&FW2&C1&D3&K3\J0\N5\Q2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Datarace RediMODEM V.32/V.32bis
InitString=AT&F&C1&D3&K3&Q6\J0\N7\Q3\V2%C1S7=60
AnswerInit=AT&F&C1&D3&K3&Q6\J0\N7\Q3\V2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Data Race Action 24
AT&F&C1&D2&K3S0=0S7=60S11=55S64=5

Data Race Action 24 - Auto Reliable
AT&F&C1&D2&K3S0=0S7=60S11=55S64=5

Data Race Action 24 - MNP-4 mode
AT&F&C1&D2&K3S0=0S7=60S11=55S64=0

Data Race Action 24 - No Error Correction
AT&F&C1&D2&K3S0=0S7=60S11=55S64=3

Data Race Action 32 / 32L
AT&F&C1&D2W1&K3S0=0S7=60S11=55S64=5
```

```
Data Race Action 32 / 32L - Auto Reliable
AT&F&C1&D2&K3S0=0S7=60S11=55S64=5

Data Race Action 32 / 32L - MNP-4 mode
AT&F&C1&D2&K3S0=0S7=60S11=55S64=0

Data Race Action 32 / 32L - No Error Correction
AT&F&C1&D2&K3S0=0S7=60S11=55S64=3

Data Race Action 1496
AT&F&C1&D2W1&K3S0=0S7=60S11=55S64=5

Data Race Action 1496 - Auto Reliable
AT&F&C1&D2&K3S0=0S7=60S11=55S64=5

Data Race Action 1496 - MNP-4 mode
AT&F&C1&D2&K3S0=0S7=60S11=55S64=0

Data Race Action 1496 - No Error Correction
AT&F&C1&D2&K3S0=0S7=60S11=55S64=3

Data Race RediMODEM 14400
AT&F&C1&D2\N7\J0\Q3\V2S7=60S11=55

Data Race RediMODEM 14400 - Auto Reliable
AT&F&C1&D2\N7\J0\Q3\V2S7=60S11=55

Data Race RediMODEM 14400 - MNP-4 mode
AT&F&C1&D2\N7\J0\Q3\V2%C0S7=60S11=55

Data Race RediMODEM 9600
AT&F&C1&D2\N7\J0\Q3\V2S7=60S11=55

Data Race RediMODEM 9600 - Auto Reliable
AT&F&C1&D2\N7\J0\Q3\V2S7=60S11=55

Data Race RediMODEM 9600 - MNP-4 mode
AT&F&C1&D2\N7\J0\Q3\V2%C0S7=60S11=55

DataTrek 624
AT&F&C1&D2\N3\Q3\V1\J1 S11=75

DataTrek 624 UK - Auto Reliable mode
AT&F&C1&D2\N3\Q3\J1\V1 S7=60 S11=75

DataTrek 624 UK
AT&F&C1&D2&P1\N3\Q3\V1\J1 S11=75

DataTrek 624 UK - Auto Reliable mode
AT&F&C1&D2\N3\Q3\J1\V1&P1 S7=60 S11=75

DataTrek 2424 (MNP)
AT&F&C1&D2&P1\N3\Q3\J1 S11=75

DataTrek 2424 - Auto Reliable mode
AT&F&C1&D2\N3\Q3\J1 S7=60 S11=60
```

```
DataTrek V.32
AT&F&C1&D2&Y0\J0\N3\Q3\V1%C2S134=5S7=60S11=55

DataTrek V.32 - Auto Reliable
AT&F&C1&D2\J0\N3\V1%C2S134=5S7=60S11=60

DataTrek V.32 - V.42 mode
AT&F&C1&D2\J0\N3\V1%C1S134=4S7=60S11=60

DataTrek V.32 - MNP-5 mode
AT&F&C1&D2\J0\N3\V1%C2S134=5S7=60S11=60

DataTrek V.32 - MNP-4 mode
AT&F&C1&D2\J0\N3\V1%C1S134=4S7=60S11=60

DataTrek Elite M/FM/SFM
AT&F&C1&D2&Y0\J0\N3\Q3\V1%C2S134=5

DataTrek Elite M/FM/SFM - Auto Reliable
AT&F&C1&D2\Q3\J0\N3\V1%C2S134=5ATS7=60S11=55

DataTrek Elite M/FM/SFM - MNP-5 mode
AT&F&C1&D2\Q3\J0\N3\V1%C2S134=5ATS7=60S11=55

DataTrek Elite M/FM/SFM - MNP-4 mode
AT&F&C1&D2\Q3\J0\N3\V1%C1S134=4ATS7=60S11=55

DataTrek 2496CFM PCMCIA
AT&F&C1&D2&Y0\J0\N3\Q3\V1%C2S134=5S7=60S11=55

DataTrek 2496CFM PCMCIA - Auto Reliable
AT&F&C1&D2\Q3\J0\N3\V1%C2S134=5S7=60S11=55

DataTrek 2496CFM PCMCIA - MNP-5 mode
AT&F&C1&D2\Q3\J0\N3\V1%C2S134=5S7=60S11=55

DataTrek 2496CFM PCMCIA - MNP-4 mode
AT&F&C1&D2\Q3\J0\N3\V1%C1S134=4S7=60S11=55

DEC DF296-DA (DECmodem V32)
AT&F&C1 &D2 %A1 %F2 $M2 $C1

DEC DF296-DA (DECmodem V32 - Auto Reliable
AT&F&C1&D2%A1%F2$M2$C1S7=60

DEC DF296-DA (DECmodem V32 - MNP-4 Mode
AT&F&C1&D2%A1%F2$M2$C0S7=60

Dell Data/Fax 24/96V
AT&F&C1 &D2 &K3\V1 S7=60 S11=60

Dell Data/Fax 24/96V - Auto Reliable
AT&F&C1&D2&K3\V1S7=60S11=60

Dell Data/Fax 96/96V
AT&F1&C1 &D2 \N7 \Q3\V2 S7=60 S11=60
```

```
Dell Data/Fax 96/96V - Auto Reliable
AT&F&C1&D2\N7\Q3\V2S7=60S11=60

Delta Gold DM 1200
ATE1Q0V1X4 S7=60 S11=55 S0=0

Delta, Other
AT E1Q0V1X4

Digicom DSI 9624LE
AT&FS7=60S0=0*F3

Digicom 9624LE - Auto Reliable
AT&FS7=60S0=0*F3

Digicom 9624LE - MNP-5 mode
AT&FS7=60S0=0*F3*E1

Digicom 9624LE - MNP-4 mode
AT&FS7=60S0=0*F3*E3

Digicom 9624LE Plus
AT&FS7=60S0=0*F3

Digicom 9624LE Plus - Auto Reliable
AT&FS7=60S0=0*F3

Digicom 9624LE Plus- V.42 mode
AT&FS7=60S0=0*F3*E7

Digicom 9624LE Plus - MNP-5 mode
AT&FS7=60S0=0*F3*E1

Digicom 9624LE Plus - MNP-4 mode
AT&FX4S7=60S0=0*F3*E3

Digicom 9624PC
AT&F&C1&D2&R0*E1*F3*M1*S0S7=60S0=0

Digicom 9624PC - Auto Reliable
AT&F&C1&D2&R0*E1*F3*M1*S0S7=60S0=0

Digicom 9624PC - MNP-4 mode
AT&F&C1&D2&R0*E3*F3*M1*S0S7=60S0=0

Digicom Connection 96+
AT&F&C1&D2&K3\N5S7=60

Digicom Connection 96+ - Auto Reliable
AT&F&C1&D2&K3\N5S7=60

Digicom Connection 96+ - MNP-4 mode
AT&F&C1&D2&K3\N3S7=60

Digicom Connection 96+ - 2400-Compatible mode
AT&F&C1&D2&K3\N1S7=60
```

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Digicom Eagle V.32
AT&F&C1&D2&R0*E9*F3*M2*N3*S1S7=60S0=0

Digicom Eagle V.32 - Auto Reliable
AT&F&C1&D2&R0*E9*F3*M2*N3*S1S7=60S0=0

Digicom Eagle V.32 - MNP-4 mode
AT&F&C1&D2&R0*E3*F3*M2*N3*S1S7=60S0=0

Digicom Eagle V.32 - 2400-Compatible mode
AT&F&C1&D2&R0*E0*F0*N1*S1S7=60S0=0

Digicom Eagle V.32+
AT&F&C1&D2&R0*E9*F3*M2*N6*S1S7=60S0=0

Digicom Eagle V.32+ - Auto Reliable
AT&F&C1&D2&R0*E9*F3*M2*N6*S1S7=60S0=0

Digicom Eagle V.32+ - MNP-4 mode
AT&F&C1&D2&R0*E3*F3*M2*N6*S1S7=60S0=0

Digicom Eagle V.32 - 2400-Compatible mode
AT&F&C1&D2&R0*E0*F0*N1*S1S7=60S0=0

Digicom Scout V.32
AT&F&C1&D2&R0*E9*F3*M2*N3*S0S7=60S0=0

Digicom Scout V.32 - Auto Reliable
AT&F&C1&D2&R0*E9*F3*M2*N3*S0S7=60S0=0

Digicom Scout V.32 - MNP-4 mode
AT&F&C1&D2&R0*E3*F3*M2*N3*S0S7=60S0=0

Digicom Scout V.32 - 2400-Compatible mode
AT&F&C1&D2&R0*E0*F0*N1*S0S7=60S0=0

Digicom Scout Plus
AT&F&C1&D2&R0*E9*F3*M2*N6*S0S7=60S0=0

Digicom Scout Plus - Auto Reliable
AT&F&C1&D2&R0*E9*F3*M2*N6*S0S7=60S0=0

Digicom Scout Plus - MNP-4 mode
AT&F&C1&D2&R0*E3*F3*M2*N6*S0S7=60S0=0

Digicom Scout Plus - 2400-Compatible mode
AT&F&C1&D2&R0*E0*F0*N1*S0S7=60S0=0

Digicom Systems (DSI) 9624LE/9624PC (MNP 5)
InitString=AT&F&C1&D3*E1*F3*S1S7=60
AnswerInit=AT&F&C1&D3*E1*F3*S1S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Digicom Systems (DSI) 9624LE+ (V.42bis)
InitString=AT&F&C1&D3*E9*F3*N6*S1S7=60
AnswerInit=AT&F&C1&D3*E9*F3*N6*S1S7=60S0=1&W
```

```
BPSRate=38400
FlowControl=Hardware

Digicom Systems Connection 14.4+FAX
InitString=AT&F&C1&D3&K3\N5%C1S48=7S7=60
AnswerInit=AT&F&C1&D3&K3\N5%C1S48=7S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Digicom Systems Inc., Connection 144+
AT E1Q0V1X4 &C1&D2&K3

Digicom Systems Inc., Connection 96+
AT E1Q0V1X4 &C1&D2&K3

Digicom Systems Inc., Eagle
AT E1Q0V1X4 &C1&D2&K3

Digicom Systems Inc., Other
AT E1Q0V1X4

Digicom Systems Inc., Scout
AT E1Q0V1X4 &C1&D2&K3

Digitan, All
AT E1Q0V1X4

Digital Scholar Plus
ENAT&F&C1 &D2 %A1 %F2

Digital Scholar Plus - Auto Reliable
ENAT&F AT&C1&D2%A1%F2

Digitan Hi-IQ (ZX1896) Fax Modem
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Digitan DS92M Fax Modem
AT&F&C1&D2\Q3\N7\V1S7=60S11=55

Digitan DS92M Fax Modem - Auto Reliable
AT&F&C1&D2\Q3\N7\V1 S7=60S11=55

DoveFax 144E
InitString=AT&F&C1&D3*E1*E5*E9*F3*M2*N6*S1S7=60
AnswerInit=AT&F&C1&D3*E1*E5*E9*F3*M2*N6*S1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Dowty, Jaquar Quartet L
AT&F  Q0V1E1

Dowty, Maze
AT&F &C1 &Q6 X4 E0

Dowty, Other
AT E1Q0V1X4
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Dowty, Quattro 96
AT E1V1

Dowty, Quattro SB2422
AT&F  Q0 V1E1X1

Dowty Mayze 96/96R
AT&FX4 &C1 &D2 &Q6 %R1 S0=0 S7=60 AT%K2 -E5 %C1

Dowty Mayze 96/96R - Auto-Reliable mode
AT&FX4&C1&D2&Q6%R1S7=60%K2-E5%C1

Dowty Mayze 96/96R - MNP-5 mode
AT&FX4&C1&D2&Q6%R1S7=60%K2-E3%C1

Dowty Mayze 96/96R - MNP-4 mode
AT&FX4&C1&D2&Q6%R1S7=60%K2-E3%C0

Dowty Quantum 96
AT&F&C1 &D2 &I1 &K2 &E1 S7=60

Dowty Quantum 96 - Auto-Reliable mode
AT&F&C1&D2&I1&K2&E1S7=60

Dowty Quantum 96 - MNP-5 mode
AT&F&E4%C1&C1&D2&I1&K2S7=60

Dowty Quantum 96 - MNP-4 mode
AT&F&E4%C0&C1&D2&I1&K2S7=60

Dowty Quattro PC Half-Card
AT&F&C1 &D2 &E1 &K2 S0=0

Dowty Quattro PC Half-Card - auto
AT&F&C1&D2&E1&K2S0=0

Dowty Quattro PC Half-Card - MNP5
AT&F&C1&D2&E4&K2S0=0%C1

Dowty Quattro PC Half-Card - MNP4
AT&F&C1&D2&E4&K2S0=0%C0

Dr. Neuhaus Fury PC Junior/Fax 2400
ATE1Q0V1X4&C1&D2S0=0

Dr. Neuhaus Fury 2400 PC/TI
ATE1Q0V1X4&C1&D2S0=0

Dr. Neuhaus Fury 2400 PC/TI + MNP
AT&F\Q3\N3\J0\V1\T0

Dr. Neuhaus Fury 2400 PC/TI + MNP - Auto Reliable
AT&F\Q3\N3\J0\V1\T0

Dr. Neuhaus Fury 2400 PC/TI + MNP - MNP-4 modus
AT&F%C0\Q3\N3\J0\V1\T0
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Dr. Neuhaus Fury 2400 PC/TI + MNP - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 2402 TI
AT&F\Q3\N3\J0\V1

Dr. Neuhaus Fury 2402 TI - Auto Reliable
AT&F\Q3\N3\J0\V1

Dr. Neuhaus Fury 2402 TI - MNP-4 modus
AT&F%C0\Q3\N3\J0\V1

Dr. Neuhaus Fury 2402 TI - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 2403 TI
AT&F3&C1&D2

Dr. Neuhaus Fury 2403 TI - Auto Reliable
AT&F3&C1&D2

Dr. Neuhaus Fury 2403 TI - MNP-4 modus
AT&F3&C1&D2%C0

Dr. Neuhaus Fury 2403 TI - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 2400 Pocket/Fax
AT&F3&C1&D2

Dr. Neuhaus Fury 2400 Pocket/Fax - Auto Reliable
AT&F3&C1&D2

Dr. Neuhaus Fury 2400 Pocket/Fax - MNP-4 modus
AT&F3&C1&D2%C0

Dr. Neuhaus Fury 2400 Pocket/Fax - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 2400 PC/Fax
AT&F3&C1&D2

Dr. Neuhaus Fury 2400 PC/Fax - Auto Reliable
AT&F3&C1&D2

Dr. Neuhaus Fury 2400 PC/Fax - MNP-4 modus
AT&F3&C1&D2%C0

Dr. Neuhaus Fury 2400 PC/Fax - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury Card 2400
AT&F3&C1&D2

Dr. Neuhaus Fury Card 2400 - Auto Reliable
AT&F3&C1&D2

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Dr. Neuhaus Fury Card 2400 - MNP-4 modus
AT&F3&C1&D2%C0

Dr. Neuhaus Fury Card 2400 - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Faxy 9600
AT&F3&C1&D2

Dr. Neuhaus Faxy 9600 - Auto Reliable
AT&F3&C1&D2

Dr. Neuhaus Faxy 9600 - MNP-4 modus
AT&F3&C1&D2%C0

Dr. Neuhaus Faxy 9600 - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 9600 TI
AT&F&C1&D2\N6\V1\Q3

Dr. Neuhaus Fury 9600 TI - Auto Reliable
AT&C1&D2\N6\V1\Q3

Dr. Neuhaus Fury 9600 TI - MNP-4 modus
AT&F%C0&C1&D2\N6\V1\Q3

Dr. Neuhaus Fury 9600 TI - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 9601 TI
AT&C1&D2\N3\V1\Q3

Dr. Neuhaus Fury 9601 TI - Auto Reliable
AT&C1&D2\N3\V1\Q3

Dr. Neuhaus Fury 9601 TI - MNP-4 modus
AT&F%C0&C1&D2\N3\V1\Q3


Dr. Neuhaus Fury 9601 TI - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 14.4 TI
AT&F&C1&D2\N6\V1\Q3

Dr. Neuhaus Fury 14.4 TI - Auto Reliable
AT&C1&D2\N6\V1\Q3

Dr. Neuhaus Fury 14.4 TI - MNP-4 modus
AT&F%C0&C1&D2\N6\V1\Q3

Dr. Neuhaus Fury 14.4 TI - Direkt modus
AT&F\Q0\N0\J1

Dr. Neuhaus Fury 14.4 TI/SL
AT&F&C1&D2\N3\V1\Q3
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Dr. Neuhaus Fury 14.4 TI/SL - Auto Reliable
A&C1&D2\N3\V1\Q3


Dr. Neuhaus Fury 14.4 TI/SL - MNP-4 modus
AT&F%C0&C1&D2\N3\V1\Q3

Dr. Neuhaus Fury 14.4 TI/SL - Direkt modus
AT&F\Q0\N0\J1

DSI 9624 LE (ARA 1.0)
InitString=AT&F&D3E0*F0*E0*S0
AnswerInit=AT&F&D3E0*F0*E0*S0S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

DSI 9624 LE Plus (ARA 1.0)
InitString=AT&F&D3E0*F0*E0*S0
AnswerInit=AT&F&D3E0*F0*E0*S0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

DTronix, All
AT E1Q0V1X4

Dynalink 1414VH
AT&F&C1&D2\N3%C1&K3&Q9S7=60S11=55S95=43

Dynalink 1414VH - Auto Reliable
AT&F&C1&D2\N3%C1&K3&Q9S7=60S11=55S95=43

Dynalink 1414VH - MNP-4 mode
AT&F&C1&D2\N3%C0&K3&Q9S7=60S11=55S95=43

Dynalink 1414VH - Direct mode
AT&F&C1&D2\N0%C0&K3S7=60S11=55S95=43

Dynalink 9696VH
AT&F&C1&D2\N3%C1&K3&Q9S7=60S11=55S95=43

Dynalink 9696VH - Auto Reliable
AT&F&C1&D2\N3%C1&K3&Q9S7=60S11=55S95=43

Dynalink 9696VH - MNP-4 mode
AT&F&C1&D2\N3%C0&K3&Q9S7=60S11=55S95=43

Dynalink 9696VH - Direct mode
AT&F&C1&D2\N0%C0&K3S7=60S11=55S95=43

E-Tech Research In., 14.4/19.2 Series
AT&FS7=60 E1Q0V1X4 &C1&D2$F4$C0

E-Tech Research In., 1414UX
AT&FS7=60 E1Q0V1X4 &M5&K3%C0
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E-Tech Research In., 9600 Series
AT&F E1Q0V1X4 &C1&D2$F4$C0

E-Tech Research In., Other
AT E1Q0V1X4

ECS 400
InitString=AT&F&C1&D3&K3&Q5\N3%C3S7=60
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Elsa MicroLink 14.4 Series
AT&FX4&C1&D2\Q3\N3%C3S7=60

Elsa MicroLink 14.4 Series - Auto Reliable
AT&FX4&C1&D2\Q3\N3%C3S7=60

Elsa MicroLink 14.4 Series - MNP-4 mode
AT&FX4&C1&D2\Q3\N3%C0S7=60

Elsa MicroLink 14.4 Series - Direct mode
AT&FX4&C1&D2\Q0\N0S7=60

Elsa MicroLink 2440T/2440TR
AT&FX4&C1&D2\Q3\N3%C3S7=60

Elsa MicroLink 2440T/2440TR - Auto Reliable
AT&FX4&C1&D2\Q3\N3%C3S7=60

Elsa MicroLink 2440T/2440TR - MNP-4 mode
AT&FX4&C1&D2\Q3\N3%C0S7=60

Elsa MicroLink 2440T/2440TR - Direct mode
AT&FX4&C1&D2\Q0\N0S7=60

Elsa MicroLink ISDN/PC
AT&FX4&C1&D2\Q3

Elsa MicroLink ISDN/PC - Auto Reliable
AT&FX4&C1&D2\Q3

Elsa MicroLink ISDN/PC - Direct mode
AT&FX4&C1&D2\Q3

Elsa MicroLink ISDN/TL
AT&FX4&C1&D2\Q3

Elsa MicroLink ISDN/PC - Auto Reliable
AT&FX4&C1&D2\Q3

Elsa MicroLink ISDN/PC - Direct mode
AT&FX4&C1&D2\Q3

Elsa MicroLink 9624T2VX
AT&FX4&C1&D2S0=0&R6&E4$BA0$MB9600
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Elsa MicroLink 9624T2VX - Auto Reliable mode
AT&FX4&C1&D2S0=0&R6&E4$BA0$MB9600

Elsa MicroLink 9624T2VX - MNP-4 mode
AT&FX4&C1&D2S0=0&R6&E4$BA0$MB9600

Elsa MicroLink 2400T2VX
AT&FX4&C1&D2S0=0&R6&E4$BA0$MB9600

Elsa MicroLink 2400T2VX - Auto Reliable mode
AT&FX4&C1&D2S0=0&R6&E4$BA0

Elsa MicroLink 2400T2VX - MNP-4 mode
AT&FX4&C1&D2S0=0&R6&E2$BA0

Elsa MicroLink 2410 w/MNP-5
AT&FX4&C1&D2S0=0&R6&E1$BA0$SB9600

Elsa MicroLink 2410 w/MNP-5 - Auto Reliable mode
AT&FX4&C1&D2S0=0&R6&E1$BA0$SB9600

Elsa MicroLink 2410 w/MNP-5 - MNP-4 mode
AT&FX4&C1&D2S0=0&R6&E2$BA0$SB9600

Elsa MicroLink 2410 w/MNP-5 - Direct mode
AT&FX4&C1&D2S0=0&R5&E0$BA1$SB2400

Elsa MicroLink 2410 w/V.42bis
AT&FX4&C1&D2S0=0&R6&E1$BA0$SB9600

Elsa MicroLink 2410 w/V.42bis - Auto Reliable mode
AT&FX4&C1&D2S0=0&R6&E1$BA0$SB9600

Elsa MicroLink 2410 w/V.42bis - MNP-4 mode
AT&FX4&C1&D2S0=0&R6&E2$BA0$SB9600

Elsa MicroLink 2410 w/V.42bis - Direct mode
AT&FX4&C1&D2S0=0&R5&E0$BA1$SB2400

Elsa MicroLink 2410 (no MNP)
ATE1Q0V1X4 &C1&D2

ETech Bullet PC2400MH
AT&F&C1&D2$E1$F4

ETech Bullet PC2400MH - Auto Reliable
AT&F&C1&D2 $E1 $F4

ETech Bullet E2400M
AT&C1&D2$E3$F4$V5$S1

ETech Bullet E2400M - Auto Reliable
AT&F &C1 &D2 $E3 $F4 $V5 $S1

ETech Bullet E9696M
AT&C1&D2$E3$F4$X4$S0
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ETech Bullet E9696M - Auto Reliable
AT&F &C1 &D2 $E3 $F4 $X4 $S0 S7=60

ETech Bullet PC9696M
AT&F&C1&D2$E1$F4$S1

ETech Bullet PC9696M - Auto Reliable
AT&F &C1 &D2 $E1 $F4 $S1 S0=0 S7=60

ETech P1496MX Pocket Modem
AT&F&C1&D2$E3$F4$S0

ETech P1496MX Pocket Modem - Auto Reliable
AT&F&C1&D2$E3$F4$S0S0=0S7=60

ETech P1496MX Pocket Modem - MNP-4 mode
AT&F&C1&D2$E1$F4$S0$C0S0=0S7=60

Everex Evercom 12e
ATE1Q0V1X1 S7=60 S11=55 S0=0

Everex Evercom 24e
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Everex II-24
ATE1Q0V1X4&C1&D2 S7=60 S11=60

Everex EV941
AT&FE1V1Q0X4&C1&D2

Everex EV941 - Auto Reliable
AT&F &C1 &D2 &I1 S7=60 S11=60

Everex 24e+
AT&F &C1 &D2 %C1 \Q3 \C1 \N3 \J0 \V1

Everex 24e+ - Auto Reliable
AT&F&C1&D2\Q3\C1\N3\J0\V1%C1S7=60S11=60

Everex 24e+ - MNP-4 mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C0S7=60S11=60

Everex Carrier 24
AT&F &C1 &D2 %C1 \Q3 \C1 \N3 \J0 \V1

Everex Carrier 24 - Auto Reliable
AT&F&C1&D2\Q3\C1\N3\J0\V1%C1S7=60S11=60

Everex Carrier 24 - MNP-4 mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C0S7=60S11=60

Everex 24/96
AT&F &C1 &D2 %C1 \Q3 \C1 \N3 \J0 \V1

Everex 24/96 - Auto Reliable mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C1S7=60S11=60
```

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Everex 24/96 - MNP-4 mode
AT&&C1&D2\Q3\C1\N3\J0\V1%C0S7=60S11=60

Everex EverFax 24/96E
AT&F &C1 &D2 %C1 \Q3 \C1 \N3 \J0 \V1

Everex Everfax 24/96E - Auto Reliable mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C1S7=60S11=60

Everex Everfax 24/96E - MNP-4 mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C0S7=60S11=60

Everex 96E+
AT&F1&C1&D2W1S7=60S11=55

Everex 96E+ - Auto Reliable
AT&F1&C1&D2 W1 S7=60 S11=60

Everex 96E+- V.42 mode
AT&F1 %C0 &C1&D2 W1 S7=60 S11=60

Everex 96E+ - MNP-4 mode
AT&F1 %C0 &C1&D2 W1 S7=60 S11=60

Everex Evercom 24 and 24E (no MNP or V.42)
InitString=AT&F&C1&D3!S1S7=60
AnswerInit=AT&F&C1&D3!S1S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

Everex Evercom 24+ and 24E+ (MNP 5)
InitString=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Everex EverFax 24/96 and 24/96E (MNP 5)
InitString=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Everex Evercom 96+ and 96E+ (V.42bis)
InitString=AT&FW2&C1&D3\J0\N3\Q2\V2%C1S7=60
AnswerInit=AT&FW2&C1&D3\J0\N3\Q2\V2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

EXP 14400 Data/Fax
InitString=AT&FW2X4&C1&D3&K3%C3\N3S7=60
AnswerInit=AT&FW2X4&C1&D3&K3%C3\N3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Exxel, 1496-B
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AT E1Q0V1X4&K3

Exxel, Other
AT E1Q0V1X4

Exxel, U1496E
AT E1Q0V1X4&K3

Falcom, FDX4642T
AT&F  Q0V1X6

Falcom, Other
AT E1Q0V1X4

Farallon Remote V.32 (ARA 1.0)
InitString=AT&F&Q1X4E0$BA1&D3&E0&E3&B1
AnswerInit=AT&F&Q1X4E0$BA1&D3&E0&E3&B1S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Fastcomm 9696
AT&F&C1&D2S0=0&H1&I1&M6S7=60S11=6S10=2

Fastcomm 9696 - Auto Reliable
AT&F &C1 &D2 &H1 &I1 S0=0 AT S7=60 S10=2 S11=60

FastComm Communications Corp, 9696
AT E1Q0V1X4 &C1&D2&H1&I1&M0

FastComm Communications Corp, Other
AT E1Q0V1X4

Focus 14.4 (ARA 1.0)
InitString=AT&F&D2E0V1B0&H1&M0X4&A0
AnswerInit=AT&F&D2E0V1B0&H1&M0X4&A0S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Forval IM14400
AT&F&C1&D2&Y0\J0\N3\Q3\V2S7=60S11=55

Forval IM14400 - Auto Reliable
AT&F &C1 &D2 \J0\N3\Q3\V2 S7=60 S11=60

Forval IM14400 - V.42 mode
AT&F&C1&D2\J0\N3\Q3\V2 HS7=60S11=60

Forval IM14400 - MNP-5 mode
AT&F&C1&D2\J0\N3\Q3\V2%C1S7=60S11=60

Forval IM14400 - MNP-4 mode
AT&F&C1&D2\J0\N3\Q3\V2%C0S7=60S11=60

Frecom Winfast 14400
AT&F &C1 &D2 *LG2 *M2 *V1 *E1
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Frecom Winfast 14400 - Auto Reliable mode
AT&F &C1 &D2 *LG2 *M2 *V1 *E1

Frecom Winfast 14400 - MNP-4 mode
AT&F &C1 &D2 *LG2 *M2 *V1 *E0

Frecom Winfast 9600
AT&F &C1 &D2 *LG2 *M2 *V1 *E1

Frecom Winfast 9600 - Auto Reliable mode
AT&F &C1 &D2 *LG2 *M2 *V1 *E1

Frecom Winfast 9600 - MNP-4 mode
AT&F &C1 &D2 *LG2 *M2 *V1 *E0

Freedom Series V.32bis Data/FAX Modem
InitString=AT&F&C1&D3&K3&Q6\J0\N7\Q3\V2%C1S7=60
AnswerInit=AT&F&C1&D3&K3&Q6\J0\N7\Q3\V2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Galaxy, Other
AT E1Q0V1X4

Galaxy, Pioneer V.22/42
ATQ0V1X4&C1%C0&K3\N3&Q5W0

Garvin Super 14.4
AT&F &C1&D2S11=60

Garvin Super 14.4 - Auto Reliable
AT&F&C1&D2S11=60

Garvin Super 14.4 - V.42 mode
AT&F&C1&D2S11=60 H0

Gateway, Other
AT E1Q0V1X4

Gateway, Telepath
AT&F E1Q0V1X4 &C1&D2&Q0%C0%M0

Gateway, Telepath 5500
AT&F E1Q0V1X4 &A1&B1&C1&D2&H1&K1&R2

Gateway, Telepath II
AT&F E1Q0V1X4 &A1&B1&C1&D2&H1&K1&R2

Gateway 2000 Telepath
AT&F&C1&D2W2S7=60S11=60

Gateway 2000 Telepath - Auto Reliable mode
AT&F&C1&D2W2S7=60S11=60

Gateway 2000 Telepath - MNP-4 mode
AT&F&C1&D2W2%C0S7=60S11=60
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Gateway 2000 Telepath 550
AT&FX4&B1&C1&D2&H1&K1&R2S7=60S11=55

Gateway 2000 Telepath 550 - Auto Reliable Mode
AT&FX4&B1&C1&D2&H1&K1&R2S7=60S11=55

Gateway 2000 Telepath 550 - MNP-4 Mode
AT&FX4&B1&C1&D2&H1&K3&R2S7=60S11=55

Gateway 2000 Telepath 550 - 2400 Compatible Mode
AT&FX4&B1&C1&D2&H1&M0&R2S7=60S11=55

General Datacomm 596
AT&F &C1&D2S7=60S11=60

General Datacomm 596 - Auto Reliable
AT&F&C1&D2 S7=60 S11=60

General Datacomm 596 V.42
AT&F \Q3 &C1&D2 W1 \V2 S7=60 S11=60

General Datacomm 596 V.42 - Auto Reliable
AT&F &C1 &D2 \Q3 W1 \V2 S7=60 S11=60

General Datacomm 596 V.42 - V.42 mode
AT&F &C1 &D2 %C0 W1 \V2 S7=60 S11=60

General Datacomm 596 V.42 - MNP-5 mode
AT&F &C1 &D2 %C1 S7=60 S11=60

General Datacomm 596 V.42 - MNP-4 mode
AT&F &C1 &D2 %C0 S7=60 S11=60

General DataComm FastPro V.FC/V.34
InitString=AT&F0&C1%C1&D3&H0&U1\V1
AnswerInit=AT&F0&C1%C1&D3&H0&U1\V1S0=1&W
BPSRate=57600
FlowControl=Hardware

Global Village, All
AT E1Q0V1X4

Global Village TelePort Silver
InitString=AT&FW2&D3\J0\Q3\N3%C1
AnswerInit=AT&FW2&D3\J0\Q3\N3%C1S0=1&W
BPSRate=38400
FlowControl=Hardware

Global Village TelePort Silver (ARA 1.0)
InitString=AT&F&D3&K3\J0W2\Q2S7=60S0=0E0\N0
AnswerInit=AT&F&D3&K3\J0W2\Q2S7=60S0=0E0\N0S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Global Village TelePort Gold
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InitString=AT&FW2&D3\J0\Q3\N3%C1
AnswerInit=AT&FW2&D3\J0\Q3\N3%C1S0=1&W
BPSRate=38400
FlowControl=Hardware

Global Village TelePort Gold (ARA 1.0)
InitString=AT&F&D3&K3\J0W2\Q2S7=60S0=0E0\N0
AnswerInit=AT&F&D3&K3\J0W2\Q2S7=60S0=0E0\N0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Global Village TelePort Mercury
InitString=AT&FW2&D3\J0\Q3\N3%C1
AnswerInit=AT&FW2&D3\J0\Q3\N3%C1S0=1&W
BPSRate=38400
FlowControl=Hardware

Global Village TelePort Mercury (ARA 1.0)
InitString=AT&F&C1&D3&K3\J0W2\Q2S7=60E0\N0
AnswerInit=AT&F&C1&D3&K3\J0W2\Q2S7=60E0\N0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Global Village TelePort Platinum
InitString=AT&F1W2&C1&D3&K3&Q5\N3%C3S7=60
AnswerInit=AT&F1W2&C1&D3&K3&Q5\N3%C3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

GRID 14.4 Fax Modem
AT&F&C1&D2\N7%C1\Q3\J0\V2S7=60S11=55

GRID 14.4 Fax Modem - Auto Reliable
AT&F&C1&D2\N7%C1\Q3\J0\V2S7=60S11=55

GRID 14.4 Fax Modem - MNP-4 mode
AT&F&C1&D2\N3%C0\Q3\J0\V2S7=60S11=55

GRID 14.4 Fax Modem - Direct mode
AT&F&C1&D2\N0\Q3\J0\V2S7=60S11=55

GVC Technologies Inc., 9600
AT&F E1Q0V1X4 &C1&D2

GVC Technologies Inc., FM144/FM9696
AT&F E1Q0V1X4 &C1&D2

GVC Technologies Inc., Other
AT E1Q0V1X4

GVC Technologies Inc., Super 9600 V.32/V.42
AT&F E1Q0V1X4 &C1&D2

GVC Technologies Inc., V.32 bis
AT&F E1Q0V1X4 &C1&D2
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GVC Super Modem 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

GVC Super Modem 2400 MNP-5
AT&F&C1&D2\V1%C1\J0\N3\Q3

GVC Super Modem 2400 MNP-5 - Auto Reliable
AT&F&C1&D2\V1%C1\J0\N3\Q3 S7=60 S11=60

GVC Super Modem 2400 MNP-5 - MNP-4 mode
AT&F&C1&D2\V1%C0\J0\N3\Q3 S7=60 S11=60

GVC Super Modem 9600 V.32/V.42
AT&F2%C1\J0\N6\Q3\V1S0=0

GVC Super Modem 9600 V.32 - Auto Reliable
AT&F2%C1\J0\N6\Q3\V1S0=0S7=60 S11=60

GVC Super Modem 9600 V.32- V.42 mode
AT&F2%C0\J0\N6\Q3\V1S0=0S7=60 S11=60

GVC Super Modem 9600 V.32 - MNP-4 mode
AT&F2%C0\J0\N6\Q3\V1S0=0S7=60 S11=60

GVC 14400 Fax
AT&F2&C1&D2\V1S0=0

GVC 14400 Fax - Auto Reliable
AT&F2&C1&D2\V1S0=0S7=60 S11=60

GVC 14400 Fax - V.42 mode
AT&F2%C0&C1&D2\V1S0=0S7=60 S11=60

GVC 14400 Fax - MNP-4 mode
AT&F2%C0&C1&D2\V1S0=0S7=60 S11=60

GVC SM-96V (V.42bis)
InitString=AT&F&C1&D3%C1\J0\N6\Q2\V1S7=60
AnswerInit=AT&F&C1&D3%C1\J0\N6\Q2\V1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

GVC SM-144V (V.42bis)
InitString=AT&F&C1&D3%C1\J0\N6\Q2\V1S7=60
AnswerInit=AT&F&C1&D3%C1\J0\N6\Q2\V1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

GVC FM-288
InitString=AT&F&C1&D3%C1\J0\N6\Q3\V1S7=60
AnswerInit=AT&F&C1&D3%C1\J0\N6\Q3\V1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes, Accura 144 + FAX144
AT E1Q0V1X4&K3
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Hayes, Accura 144B + FAX144
AT E1Q0V1X4&K3

Hayes, Accura 288 + FAX
AT E1Q0V1X4&K3

Hayes, Accura 96 + FAX96
AT E1Q0V1X4&K3

Hayes, Accura 96B + FAX96
AT E1Q0V1X4&K3

Hayes, Optima 144 + FAX144
AT&F E1Q0V1X4 &C1&D2&K3

Hayes, Optima 144B + FAX144
AT&F E1Q0V1X4 &C1&D2&K3

Hayes, Optima 288 V.FC + FAX
AT&F E1Q0V1X4 &C1&D2&K3

Hayes, Optima 96 + FAX96
AT&F E1Q0V1X4 &C1&D2&K3

Hayes, Optima 96B + FAX96
AT&F E1Q0V1X4 &C1&D2&K3

Hayes, Other
AT E1Q0V1X4

Hayes, Ultra 144
AT&FS30=0 E1Q0V1X4 &C1&D2&K3

Hayes, Ultra 96
AT&FS30=0 E1Q0V1X4 &C1&D2&K3

Hayes Accura 144
AT&F&C1&D2&Q5&K3S38=0S95=42S7=60S11=60

Hayes Accura 144 - Auto Reliable
AT&F&C1&D2&Q5&K3S38=0S95=42S7=60S11=60

Hayes Accura 144 - MNP-4 mode
AT&F&C1&D2&Q9&K3S38=0S95=42S7=60S11=60

Hayes Accura 96
AT&F&C1&D2&Q5&K3S38=0S95=42S7=60S11=60

Hayes Accura 96 - Auto Reliable
AT&F&C1&D2&Q5&K3S38=0S95=42S7=60S11=60

Hayes Accura 96 - MNP-4 mode
AT&F&C1&D2&Q9&K3S38=0S95=42S7=60S11=60

Hayes Accura 24 EC
AT&F&C1&D2&Q5&K3S38=0S95=42S7=60S11=60
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Hayes Accura 24 EC - Auto Reliable
AT&F&C1&D2&Q5&K3S38=0S95=42S7=60S11=60

Hayes Accura 24 EC - MNP-4 mode
AT&F&C1&D2&Q9&K3S38=0S95=42S7=60S11=60

Hayes-Compatible 1200 Baud Modem
ATE1Q0V1X1 S7=60 S11=55 S0=0

Hayes-Compatible 2400 Baud Modem
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Hayes Personal Modem 1200
ATE1Q0V1X4&C1&D2 S0=0

Hayes Personal Modem 2400
ATE1Q0V1X4&C1&D2 S0=0

Hayes Smartmodem 1200/1200B
ATE1Q0V1X1 S7=60 S11=55 S0=0

Hayes Smartmodem 2400/2400B
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Hayes Smartmodem V Series 2400
AT&F&C1&D2S7=60W1S11=55

Hayes Smartmodem V Series 2400 - Auto Reliable
AT&F &C1 &D2 W1 S7=60 S11=60

Hayes V-Series 9600
AT&F&C1&D2W1S7=60S11=55

Hayes V-Series 9600 - Auto Reliable mode
AT&F &C1 &D2 W1 S7=60 S11=60

Hayes V-Series 9600 V.32
AT&F&C1&D2W1S7=60S11=55

Hayes V-Series 9600 V.32 - Auto Reliable mode
AT&F &C1 &D2 W1 S7=60 S11=60

Hayes Optima 2400
AT&F&C1&D2&K3W1S95=42

Hayes Optima 2400 - Auto Reliable
AT&F &C1 &D2 W1 S7=60 S11=60

Hayes Optima 9600
AT&F&C1&D2&Q5&K3W1S38=0S95=42

Hayes Optima 9600 - Auto Reliable
AT&F AT &C1 &D2 W1 S7=60 S11=60

Hayes Optima 14400 Fax
AT&F &C1 &D2 &Q9 &K3 W2 S37=0 S38=0 S95=46
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Hayes Optima 14400 - Auto Reliable
AT&F&C1&D2W2&Q9&K3S37=0S38=0S95=46S7=60S11=60

Hayes Optima 288 V.FC + Fax
AT&F&C1&D2&K3&Q9W2S37=0S38=0S95=46S7=60S11=55

Hayes Optima 288 V.FC + Fax - Auto Reliable
AT&F&C1&D2W2&Q9&K3S37=0S38=0S95=46S7=60S11=55

Hayes Optima 288 V.FC + Fax - 2400-Compatible
AT&F&C1&D2W2&Q6&K3S37=6S38=0S95=46S7=60S11=55

Hayes Ultra 9600
AT&F&C1&D2

Hayes Ultra 9600 - Auto Reliable
AT&F &C1 &D2 S7=60 S11=60

Hayes Ultra 14400
AT&F &C1 &D2 W1 S38=0 S7=60 S11=60

Hayes Ultra 14400 - Auto Reliable
AT&F &C1 &D2 W1 S7=60 S11=60

Hayes V Series 2400 V.42
AT&F&C1&D2&K3S36=7S7=60S11=60

Hayes V Series 2400 V.42 - Auto Reliable
AT&F &C1 &D2 &K3 S36=7 S7=60 S11=60

Hayes V Series 9600 V.42
AT&F&C1&D2&K3S36=7S7=60S11=55

Hayes V Series 9600 V.42 - Auto Reliable
AT&F &C1 &D2 &K3 S36=7 S7=60 S11=60

Hayes ISDN Terminal Adaptor
AT&F&C1&D2&K3S7=60S11=55

Hayes ISDN Terminal Adaptor - X.25 mode
AT&F&C1&D2X6S7=60S11=60W1 %A1=1 %A3=14 %A0=2

Hayes ISDN Terminal Adaptor - CSD mode
AT&F&C1&D2X6S7=60S11=60 W1 %A1=0 %A2=2 %A0=2

Hayes Smartmodem 1200/1200B (and compatibles)
InitString=ATX4V1Q0S7=30
AnswerInit=ATX4V1Q0S7=30S0=1&W
BPSRate=1200
FlowControl=Hardware
LockBPS=No

Hayes Smartmodem 2400 (and compatibles)
InitString=AT&F&C1&D3S7=30
AnswerInit=AT&F&C1&D3S7=30S0=1&W
BPSRate=2400
```

```
FlowControl=None
LockBPS=No

Hayes SmartModem 2400 (ARA 1.0)
InitString=AT&F&C1E0&D0
AnswerInit=AT&F&C1E0&D0S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

Hayes Pocket Edition 2400 (no MNP or V.42)
InitString=AT&F&C1&D3S7=30
AnswerInit=AT&F&C1&D3S7=30S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

Hayes Smartmodem Optima 9600 (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5S7=60S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S46=138S48=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

Hayes Smartmodem Optima 14400 (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5S7=60S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes Optima 14400 (ARA 1.0)
InitString=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0
AnswerInit=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Hayes Smartmodem Optima 144 Pocket Edition
InitString=AT&FW2&C1&D2&K3&Q9S7=60S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D2&K3&Q9S7=60S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes Smartmodem Optima 288 V.FC
InitString=AT&FW2&C1&D3&K3&Q9S7=60S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q9S7=60S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes Smartmodem Optima 288 V.34
InitString=AT&FW2&C1&D3&K3&Q9S7=60S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q9S7=60S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes Optima 28800 (ARA 1.0)
InitString=AT&F&C1&D3S7=90E0&K3&Q6W2L1S37=15
AnswerInit=AT&F&C1&D3S7=90E0&K3&Q6W2L1S37=15S0=1&W
```

```
BPSRate=38400
FlowControl=Hardware
ARAv1=1

Hayes V-series Smartmodem 9600/9600B (V.42)
InitString=AT&F&C1&D3&K3&Q5S7=60
AnswerInit=AT&F&C1&D3&K3&Q5S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Hayes V-series ULTRA Smartmodem 9600 (V.42bis)
InitString=AT&F&C1&D3&K3&Q5S7=60S46=2S48=7S95=63
AnswerInit=AT&F&C1&D3&K3&Q5S7=60S46=2S48=7S95=63S0=1&W
BPSRate=38400
FlowControl=Hardware

Hayes Ultra 96 (ARA 1.0)
InitString=AT&F&C1E0&K0&D3&Q0
AnswerInit=AT&F&C1E0&K0&D3&Q0S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Hayes V-series ULTRA Smartmodem 14400 (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5S7=60S38=10S46=2S48=7S95=63
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S38=10S46=2S48=7S95=63S0=1&W
BPSRate=38400
FlowControl=Hardware

Hayes Ultra 14400 (ARA 1.0)
InitString=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0
AnswerInit=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Hayes ACCURA 24 EC (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=19200
FlowControl=Hardware

Hayes ACCURA 96 EC (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

Hayes ACCURA 144 EC (V.42bis)
InitString=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes ACCURA 288 V.FC + FAX
InitString=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47S0=1&W
```

```
BPSRate=57600
FlowControl=Hardware

Hayes ACCURA 288 V.34 + FAX
InitString=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Hayes ISDN TA 2.0 (ISDN 56k)
InitString=AT&F%A1=0%A2=2%A4=1%A0=2W1&D2&K3
AnswerInit=AT&F%A1=0%A2=2%A4=1%A0=2W1&D2&K3S0=1&W
BPSRate=57600
FlowControl=Hardware
ISDN=Yes

Hayes ISDN TA 2.0 (ISDN 64k)
InitString=AT&F%A1=0%A2=2%A4=0%A0=2W1&D2&K3
AnswerInit=AT&F%A1=0%A2=2%A4=0%A0=2W1&D2&K3S0=1&W
BPSRate=57600
FlowControl=Hardware
ISDN=Yes

Hidem 14400FAX
AT&FW2S0=0\N6

Hidem 14400FAX Auto-Reliable mode
AT&FW2\N6S0=0

Hidem 14400FAX - V.42 mode
AT&F%C\N6W2S0=0

Hidem 14400FAX - Direct mode
AT&F\N1W2S0=0

Hidem 14400P/FAX
AT&FW2\N6S0=0

Hidem 14400P/FAX Auto-Reliable mode
AT&FW2\N6S0=0

Hidem 14400P/FAX - V.42 mode
AT&F%C\N6W2S0=0

Hidem 14400P/FAX - Direct mode
AT&F\N1W2S0=0

Hidem 14400DLX
AT&FW2\N6S0=0

Hidem 14400DLX - Auto-Reliable mode
AT&FW2\N6S0=0

Hidem 14400DLX - V.42 mode
AT&F%C\N6W2S0=0

Hidem 14400DLX - Direct mode
```

```
AT&F\N1W2S0=0

Hidem 9600
AT&FW2\N6S0=0

Hidem 9600 - Auto-Reliable mode
AT&FW2\N6S0=0

Hidem 9600 - V.42 mode
AT&FW2\N6%C0S0=0

Hidem 9600 - Direct mode
AT&F\N1W2S0=0

Hidem 2442 models
AT&FS0=0\N7

Hidem 2442 - Auto-Reliable mode
AT&FS0=0\N7

Hidem 2442 - V42 mode
AT&FTS0=0%C0\N7

Hidem 2442 - Direct mode
AT&FS0=0\N1\Q0

Hidem 2400
AT&FS0=0

Modem Hidem 1200
AT&FS0=0

IBM, 7855 Model 10
AT E1Q0V1X4&K3

IBM, Other
AT E1Q0V1X4

IBM, PCMCIA Laptop 14.4
AT E1Q0V1X4&K3

IBM 7851 14.4Kbps External Data/Fax Modem
InitString=AT&FW2&C1&D3&K3&Q5%C3\N3S7=60S36=7S46=138S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5%C3\N3S7=60S36=7S46=138S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

IBM 7855 Modem Model 10 (MNP)
InitString=AT&F&C1&D2\N3\Q2\V1%C1S7=60
AnswerInit=AT&F&C1&D2\N3\Q2\V1%C1S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

IBM WaveRunner with Async-to-Sync driver
InitString=AT&FV1X4Y0&D3%C1
AnswerInit=AT&FV1X4Y0&D3%C1S0=1&W
BPSRate=115200
```

```
FlowControl=Hardware
LockBPS=Yes
ISDNSync=Yes
ISDN=Yes
DTRHangup=No

IBM WaveRunner with V.120 driver
InitString=AT&FV1X4Y0&D3%C1
AnswerInit=AT&FV1X4Y0&D3%C1S0=1&W
BPSRate=115200
FlowControl=Hardware
LockBPS=Yes
ISDN=Yes
DTRHangup=No

IBM Modem 1200 (5841)
ATE1Q0V1X1 S7=60 S11=55 S0=0

IBM DataFax Highspeed 14.4
AT&F&C1&D2\J0\N3&K3&Q5%C3W1S7=60S11=55

IBM DataFax Highspeed 14.4 - Auto Reliable mode
AT&F&C1&D2\J0\N3&K3&Q5%C3W1S7=60S11=55

IBM DataFax Highspeed 14.4 - MNP-4 mode
AT&F&C1&D2\J0\N3&K3&Q5%C2W1S7=60S11=55

IBM Mwave WindSurfer (V.32)
AT&F&C1&D2\N3\V1%C1S7=60S11=55

IBM Mwave WindSurfer (V.32) - Auto Reliable mode
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM Mwave WindSurfer (V.32) - MNP-4 mode
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM N51 Laptop 14400
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM N51 Laptop 14400 - Auto Reliable mode
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM N51 Laptop 14400 - MNP-4 mode
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM N51 Laptop 9600
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM N51 Laptop 9600 - Auto Reliable mode
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM N51 Laptop 9600 - MNP-4 mode
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

IBM PC 2400 bps Modem
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0
```

```
IBM PS/2 Data/Fax Modem
AT&F &C1 &D2 %C1 \Q3 \C1 \N3 \J0 \V1

IBM PS/2 Data/Fax Modem - Auto Reliable mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C1S7=60S11=60

IBM PS/2 Data/Fax Modem - MNP-4 mode
AT&F&C1&D2\Q3\C1\N3\J0\V1%C0S7=60S11=60

IBM 7855 Model 10
AT&F&C1&D2&AL8&B8N1&I0&M0\D0\R2%H0%L2S0=0\M14

IBM 7855 Model 10 - Auto Reliable
AT&F&C1&D2&AL8&B8N1&I0&M0\D0\R2%H0 %L2 S0=0
\M14

Identity Systems Technology Inc., All
AT E1Q0V1X4

Identity ID9600
AT&F2\N6&C1&D2\J0S7=60S11=55

Identity ID9600 Auto-Reliable mode
AT&F2 \N6 &C1 &D2 \J0 S11=60 S7=60

Identity ID9600 - V.42 mode
AT&F2%C0\N6&C1&D2\J0S11=60S7=60

Identity ID9600 - MNP-4 mode
AT&F2%C0\N6&C1&D2\J0S11=60S7=60

Identity 14400
AT&F2\N6&C1&D2\J0S7=60S11=55

Identity 14400 - Auto-Reliable mode
AT&F2\N6&C1&D2\J0S11=55S7=60

Identity 14400 - V.42 mode
AT&F2%C0\N6&C1&D2\J0S11=55S7=60

Identity 14400 - MNP-4 mode
AT&F2%C0\N6&C1&D2\J0S11=55S7=60

Identity ID9632E
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware
LockBPS=No

Identity FM144BR
InitString=AT&F&C1&D3Q0V1B8S7=60
AnswerInit=AT&F&C1&D3Q0V1B8S7=60
BPSRate=57600
FlowControl=Hardware

Image Twincom 96/42i
```

```
AT&F&C1&D2W1S95=41S11=60S7=60

Image Twincom 96/42i Auto-Reliable mode
AT&F W1 S95=41 S11=60 S7=60

Image Twincom 96/42i - V.42 mode
AT&F %C0 W1 S95=41 S11=60 S7=60

Image Twincom 96/42i - MNP-4 mode
AT&F %C0 W1 S95=41 S11=60 S7=60

Image Twincom 144/DF
AT&F&C1&D2&Q5W2S95=46S11=60S7=60

Image Twincom 144/DF Auto-Reliable mode
AT&F&C1&D2&Q5S95=46S11=60S7=60

Image Twincom 144/DF - V.42 mode
AT&F&C1&D2&Q5S46=136S95=46S11=60S7=60

Image Twincom 144/DF - MNP-4 mode
AT&F&C1&D2&Q5%C0S95=46S11=60S7=60

Image Twincom 144/DF - 2400-compatible mode
AT&F&C1&D2&Q6%C0S95=46S7=60S11=60S36=3 S48=128

Incomm 2405
AT&F &C1 &D2 \J0 \N3 \Q3 \V1

Incomm 2405 - Auto Reliable
AT&F &C1 &D2 \J0 \N3 \Q3 \V1 S7=60

Incomm 2405 - MNP-4 mode
AT&F %C0 &C1 &D2 \J0 \N3 \Q3 \V1 S7=60

Incomm 9600/9605
AT&F &C1 &D2 \J0 \N3 \Q3 \V1

Incomm 9600/9605 - Auto Reliable
AT&F &C1 &D2 \J0 \N3 \Q3 \V1 S7=60

Incomm 9600/9605 - MNP-4 mode
AT&F %C0 &C1 &D2 \J0 \N3 \Q3 \V1 S7=60

InfoMate 212A/PC
XYNP 60

InfoMate 212X/PC
ATE1Q0V1X1 S7=60 S11=55 S0=0

InfoMate,  212A/PC
AT E1Q0V1X4&K3

InfoMate,  212X/PC
AT E1Q0V1X4&K3

InfoMate, Other
```

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AT E1Q0V1X4

Info Runner, Other
AT E1Q0V1X4

InfoRunner 2496 Fax Modem
AT&F &C1 &D2 &R0 \N7 %C1 \V1 \J0 \Q3 &K3 S7=54 S11=60

InfoRunner 2496 - Auto Reliable
AT&F&C1&D2&R0\N7%C1\V1\J0\Q3&K3 ATS7=54S11=60

InfoRunner 2496 - MNP-4 mode
AT&F&C1&D2&R0\N7%C0\V1\J0\Q3&K3S7=54S11=60

InfoRunner 2496 - 2400 mode
AT&F&C1&D2&R0\N0%C0\V1\J0\Q3&K3S7=54S11=60

Infotel 14.4
AT&F&C1&D2W1S95=41S11=60S7=60

Infotel 14.4 Auto-Reliable mode
AT&F &C1 &D2 W1 S95=41 S11=60 S7=60

Infotel 14.4 - V.42 mode
AT&F&C1&D2S46=136W1S95=41S11=60S7=60

Infotel 14.4 - MNP-4 mode
AT&F&C1&D2%C0W1S95=41S11=60S7=60

Infotel 14.4 - 2400-compatible mode
AT&F&C1&D2%C0W1S95=41S7=60S11=60

Infotel 9600
AT&F2&C1&D2 S0=0 S11=60 S7=60

Infotel 9600 - Auto-Reliable mode
AT&F2&C1&D2S0=0S11=60S7=60

Infotel 9600 - V.42 mode
AT&F2&C1&D2S0=0S11=60S7=60

Infotel 9600 - MNP-4 mode
AT&F2&C1&D2%C0S0=0S11=60S7=60

Infotel V.42X (V.42bis)
InitString=AT&F&C1&D3S7=30S36=7
AnswerInit=AT&F&C1&D3S7=30S36=7S0=1&W
BPSRate=9600
FlowControl=Hardware

Infotel V.32 turbo (V.42bis)
InitString=AT&FW1&C1&D3&K3&Q5S7=60
AnswerInit=AT&FW1&C1&D3&K3&Q5S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Infotel 144I (V.42bis)
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```
InitString=AT&F&C1&D3&K3&Q5\N3%C1S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C1S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

Infotel 1414QVE (V.32bis)
InitString=AT&F&D3&K3&Q5\J0\N3%C3S7=60S36=7
AnswerInit=AT&F&D3&K3&Q5\J0\N3%C3S7=60S36=7S0=1&W
BPSRate=38400
FlowControl=Hardware

Infotel V.34
InitString=AT&FQ0W2&C1&D3/N3S7=60S95=43
AnswerInit=AT&FQ0W2&C1&D3/N3S7=60S95=43S0=1&W
BPSRate=57600
FlowControl=Hardware

Intecom PDI-1000/S
AT&F &C1 &D2 &K3 X4 S7=60 S11=60

Intecom PDI-1000/S - Auto-Reliable Mode
AT&F&C1&D2X4&K3 S7=60 S11=60

Intel 2400 MNP
AT&F\Q3\N3\J0\V1\C1

Intel 2400 MNP - Auto Reliable
AT&F\Q3\N3\J0\V1\C1 S7=60 S11=60

Intel 2400 MNP - MNP-4 mode
AT&F%C0\Q3\N3\J0\V1\C1 S7=60 S11=60

Intel 2400EX MNP
AT&F\Q3\N3\J0\V1\C1

Intel 2400EX MNP - Auto Reliable
AT&F\Q3\N3\J0\V1\C1 S7=60 S11=60

Intel 2400EX MNP - MNP-4 mode
AT&F%C0\Q3\N3\J0\V1\C1 S7=60 S11=60

Intel 9600EX
AT&F&C1&D2\J0\Q3\V1\N3S7=60S11=55

Intel 9600EX Auto-Reliable mode
AT&F\J0\Q3\V1\N3S7=60S11=55

Intel 9600EX V.42 mode
AT&F%C0\J0\Q3\V1\N3S7=60S11=55

Intel 9600EX MNP-4 mode
AT&F%C0\J0\Q3\V1\N3S7=60S11=55

Intel 14.4EX
AT&F&T5S7=60S11=55

Intel 14.4EX - Auto Reliable
```

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AT&F&T5S7=60S11=55

Intel 14.4EX - V.42 mode
AT&F&T5S7=60S11=55 H0

Intel 14.4EX - MNP4 mode
AT&F&T5S7=60S11=55%C0

Intel 14.4/14.4 Fax
AT&F&C1&D2\J0\N3\Q3\V2S7=60S11=55

Intel 14.4/14.4 Fax - Auto Reliable
AT&F&C1&D2\J0\N3\Q3\V2S7=60S11=55

Intel 14.4/14.4 Fax - MNP4 mode
AT&F&C1&D2\J0\N3\Q3\V2-J0%CS7=60S11=55

Intel 14.4/14.4 Fax - No Error Correction
AT&F&C1&D2\J0\N0\Q3\V2S7=60S11=55

Intel SatisFAXtion 400
AT&F&T5S7=60S11=55

Intel SatisFAXtion 400 - Auto Reliable
AT&F&T5S7=60S11=55

Intel SatisFAXtion 400 - V.42 mode
AT&F&T5S7=60S11=55 H0

Intel SatisFAXtion 400 - MNP4 mode
AT&F&T5S7=60S11=55%C0

Intel SatisFAXtion 200
AT&F&C1&D2\J0\Q3\V1\N3S7=60S11=55

Intel SatisFAXtion 200 - Auto-Reliable mode
AT&F\J0\Q3\V1\N3S7=60S11=55

Intel SatisFAXtion 200 - V.42 mode
AT&F%C0\J0\Q3\V1\N3S7=60S11=55

Intel SatisFAXtion 200 - MNP-4 mode
AT&F%C0\J0\Q3\V1\N3S7=60S11=55

Intel SatisFAXtion 100
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Modem Intel SatisFAXtion Board
AT&F\Q3\N3\J0\V1\C1

Intel SatisFAXtion Board - Auto Reliable
AT&F\Q3\N3\J0\V1\C1 S7=60 S11=60

Intel SatisFAXtion Board - MNP-4 mode
AT&F%C0\Q3\N3\J0\V1\C1 S7=60 S11=60

Intel 2400 EX (no MNP or V.42)
```

```
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

Intel 2400 EX (MNP 5)
InitString=AT&F&C1&D3\N3%C1\J0\Q2S7=60
AnswerInit=AT&F&C1&D3\N3%C1\J0\Q2S7=60S0=1&W
BPSRate=4800
FlowControl=Hardware

Intel 9600 EX (V.42bis)
InitString=AT&F&C1&D3\J0\N3\Q2\V2%C1"H3S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V2%C1"H3S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Intel 144/144E Data/Fax
InitString=AT&F&D2E0\N3\V2\Q2\G0\J0M0S7=60
AnswerInit=AT&F&D2E0\N3\V2\Q2\G0\J0M0S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Intel 14400 EX (V.42bis)
InitString=AT&F&C1&D3\J0\N3\Q2\V2%C1"H3S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V2%C1"H3S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Intel 14400 EX (ARA 1.0)
InitString=AT&FX4&D3%C0'H0
AnswerInit=AT&FX4&D3%C0'H0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Intel 144/144e FaxModem (ARA 1.0)
InitString=AT&FE0\Q2\G0\N0&D3%C0M0S7=60
AnswerInit=AT&FE0\Q2\G0\N0&D3%C0M0S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Intel SatisFAXtion Modem/400 and 400e (V.42bis)
InitString=AT&F&C1&D3\J0\N3\Q1\V2%C1"H3S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q1\V2%C1"H3S7=60S0=1&W
BPSRate=57600
FlowControl=Software

Intel Corp., 14.4EX with v.32BIS
ATV1Q0X4&C1&D2

Intel Corp., 144/144e
AT E1Q0V1X4 &C1&D2&Q0

Intel Corp., 144/144i
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```
AT E1Q0V1X4 &C1&D2&Q0

Intel Corp., 9600EX
ATV1Q0X4&C1&D2

Intel Corp., Other
AT E1Q0V1X4

Intel Corp., PCMCIA 14.4/14.4
AT E1Q0V1X4&K3

Intel Corp., PCMCIA 96/96
AT E1Q0V1X4&K3

Intel Corp., SatisFAXtion Modem/300
AT E1Q0V1X4 &C1&D2&M0&Q0

Intel Corp., SatisFAXtion Modem/350
AT E1Q0V1X4 &C1&D2&M0&Q0

Intel Corp., SatisFAXtion Modem/400
AT E1Q0V1X4 &C1&D2&M0&Q0

Intel Corp., SatisFAXtion Modem/400e
AT E1Q0V1X4 &C1&D2&M0&Q0

Intelligent Modem Series 9600
AT&F &C1 &D2 %C1 \J0 \N3 \Q3 \V1

Intelligent Modem Series 9600 - Auto Reliable
AT&F&C1&D2%C1\J0\N3\Q3\V1S7=60 S11=60

Intelligent Modem Series 9600 - V.42 mode
AT&F&C1&D2\J0\N9\Q3\V1S7=60 S11=60

Intelligent Modem Series 9600 - MNP-4 mode
AT&F&C1&D2%C0\J0\N3\Q3\V1S7=60 S11=60

Intertex Data/Fax 2400
AT&F&C1&D2&K3\J0\N3

Intertex Data/Fax 2400 - Auto-Reliable mode
AT&F&C1&D2&K3\J0\N3

Intertex Data/Fax 2400 - MNP-4 mode
AT&F%C0&C1&D2&K3\J0\N3

Intertex Data/Fax 2400 - V.23 mode
AT&F\N0F3&C1&D2&K3\J0

Intertex Data/Fax 14400
AT&F&C1&D2&K3\J0\N3

Intertex Data/Fax 14400 - Auto-Reliable mode
AT&F&C1&D2&K3\J0\N3

Intertex Data/Fax 14400 - MNP-4 mode
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AT&F%C0&C1&D2&K3\J0\N3

Intertex Data/Fax 14400 - V.23 mode
AT&F\N0F3&C1&D2&K3\J0

Inwave Hurricane 14400 Fax
AT&F&C1&D2&K3&Q5\N3%C1S7=60S11=60

Inwave Hurricane 14400 Fax - Auto Reliable
AT&F&C1&D2&K3&Q5\N3%C1S7=60S11=60

Inwave Hurricane 14400 Fax - MNP-4 mode
AT&F&C1&D2&K3&Q5\N3%C0S7=60S11=60

Kortex, All
AT E1Q0V1X4

Lasat unique 24/96 Fax
AT&F&C1&D2S38=0S7=60S95=2W0

Lasat unique 24/96 Fax - Auto Reliable
AT&F&C1&D2S38=0S7=60S95=2W0

Lasat unique 24/96 Fax - MNP-4 mode
AT&F\N5%C0&C1&D2S38=0S7=60S95=2W0

Lasat unique 24/96 Fax - Normal mode
AT&F\N0&C1&D2S38=0S7=60S95=2W0

Lasat Credit 144
AT&F&C1&D2S38=0S7=60S95=2W0

Lasat Credit 144 - Auto Reliable
AT&F&C1&D2S38=0S7=60S95=2W0

Lasat Credit 144 - MNP-4 mode
AT&F\N5%C0&C1&D2S38=0S7=60S95=2W0

Lasat Credit 144 - Normal mode
AT&F\N0&C1&D2S38=0S7=60S95=2W0

Lasat 144 Series
AT&F&C1&D2S38=0S7=60S95=2W0

Lasat 144 Series - Auto Reliable
AT&F&C1&D2S38=0S7=60S95=2W0

Lasat 144 Series - MNP-4 mode
AT&F\N5%C0&C1&D2S38=0S7=60S95=2W0

Lasat 144 Series - Normal mode
AT&F\N0&C1&D2S38=0S7=60S95=2W0

Lasat ISDN Terminal Adaptor
AT&F&C1&D2&K3

Lasat ISDN Terminal Adaptor - X.25 mode
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AT&F&C1&D2&K3\N2\J10%R10

Lasat ISDN Terminal Adaptor - V.110 mode
AT&F\N0%R7

Lasat ISDN Terminal Adaptor - X.75 mode
AT&F\N3\J10%R10

Lasat ISDN Terminal Adaptor - HDLC mode
AT&F\N1\J10%R10

LCE-123 Series
ATE1Q0V1X4&C1&D2 S7=60 S0=0

LCE-124 Series
ATE1Q0V1X4&C1&D2 S7=60 S0=0

LCE-125 Series
AT&F1E1V1X4&C1&D2&K3\N6S7=60S11=65

LCE-125 - Auto-Reliable mode
AT&F1TE1V1X4&C1&D2&K3\N6S7=60S11=65

LCE-125 Series - MNP-4 mode
AT&F1%C0E1V1X4&C1&D2&K3\N6S7=60S11=65

LCE 132P, All
AT E1Q0V1X4

LCE-132 Series
AT&F1E1V1X4&C1&D2&K3&Q5\N6S7=60S11=65

LCE-132 - Auto-Reliable mode
AT&F1E1V1X4&C1&D2&K3&Q5\N6S7=60S11=65

LCE-132 Series - MNP-4 mode
AT&F1%C0E1V1X4&C1&D2&K3&Q5\N6S7=60S11=65

LightCom, 14.4F
AT&F E1Q0V1X4 &C1&D2

LightCom, Other
AT E1Q0V1X4

Lightning LightCom 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Lightning Lightcom 9600
AT&F&C1&D2S7=60S11=55S36=7W2

Lightning 9600 - Auto Reliable Mode
AT&F&C1&D2S7=60S11=55W2

Lightning 9600 - MNP-4 Mode
AT&F&C1&D2S7=60S11=55W2%C0

Lightning 144F, 144/550
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AT&F&C1&D2S7=60S11=55W2

Lightning 144F, 144/550 - Auto Reliable Mode
AT&F&C1&D2S7=60S11=55W2

Lightning 144F, 144/550 - MNP-4 Mode
AT&F&C1&D2S7=60S11=55W2%C0

Logicode Quicktel 2400X
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel M2400X
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel 2400H
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel 9624LH
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel 9624LX
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel M9624LX
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel 9624LP
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel M9624LP
ATE1Q0V1X4&C1&D2S7=60S11=55

Logicode Quicktel 2400 V.42bis
AT&F&C1&D2%C1&K3\N3S7=60S11=55

Logicode Quicktel 2400 V.42bis - Auto Reliable Mode
AT&F&C1&D2%C1&K3\N3S7=60S11=55

Logicode Quicktel 2400 V.42bis - MNP-4 Mode
AT&F&C1&D2%C0&K3\N3S7=60S11=55

Logicode Quicktel 96HV
AT&F&C1&D2&K3\N3S37=0

Logicode Quicktel 96HV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 96HV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 96XV
AT&F&C1&D2&K3\N3S37=0

Logicode Quicktel 96XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 96XV - MNP-4 Mode
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AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M96XV
AT&F&C1&D2&K3\N3S37=0

Logicode Quicktel M96XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M96XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 9696HV
AT&F&C1&D2&K3\N3S37=0

Logicode Quicktel 9696HV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 9696HV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 9696XV
AT&F&C1&D2&K3\N3S37=0

Logicode Quicktel 9696XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 9696XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M9696XV
AT&F&C1&D2&K3\N3S37=0

Logicode Quicktel M9696XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M9696XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 14.4HV
AT&F&C1&D2\N3&K3S37=0

Logicode Quicktel 14.4HV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 14.4HV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 14.4XV
AT&F&C1&D2\N3&K3S37=0

Logicode Quicktel 14.4XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 14.4XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M14.4XV
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AT&F&C1&D2\N3&K3S37=0

Logicode Quicktel M14.4XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M14.4XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 1414HV
AT&F&C1&D2\N3&K3S37=0

Logicode Quicktel 1414HV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 1414HV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 1414XV
AT&F&C1&D2\N3&K3S37=0

Logicode Quicktel 1414XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel 1414XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M1414XV
AT&F&C1&D2\N3&K3S37=0

Logicode Quicktel M1414XV - Auto Reliable Mode
AT&F&C1&D2\N3&K3S7=60S11=55S37=0

Logicode Quicktel M1414XV - MNP-4 Mode
AT&F%C0&C1&D2\N3&K3S7=60S11=55S37=0

Logicode QuickTel 288
InitString=AT&F&C1&D3&K3&M0&Q5\N3%C3S7=60
AnswerInit=AT&F&C1&D3&K3&M0&Q5\N3%C3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Logicode QuickTel (ARA 1.0)
InitString=AT&F&C1&D3&K3&M0\N0&Q6%C0S7=60
AnswerInit=AT&F&C1&D3&K3&M0\N0&Q6%C0S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Logicode Technologies Inc., Other
AT E1Q0V1X4

Logicode Technologies Inc., Quicktel Series
AT&F E1L1Q0V1X4 &C1&D2&K3

Macronix Inc., MaxFax Series
AT
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Macronix Inc., Other
AT E1Q0V1X4

Macronix MaxFax 9624LT-S
InitString=AT&F&C1&D3&K3&Q9\J0\N3\Q3%C1S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q9\J0\N3\Q3%C1S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=9600
FlowControl=Hardware

Macronix MX-14.4
AT&FW2&C1&D2\N3&K3&Q5S7=60S11=60S95=46

Macronix MX-14.4 - Auto Reliable Mode
AT&FW2&C1&D2\N3&K3&Q5S7=60S11=60S95=46

Macronix MX-14.4 - MNP-4 Mode
AT&F%C0W2&C1&D2\N3&K3S7=60S11=60S95=46

Magnavox, Codex 3260
AT E1Q0V1X4&K3

Magnavox, Other
AT E1Q0V1X4

Matra Com 814 V14e 57600 (ISDN)
InitString=ATZ
AnswerInit=AUT O
BPSRate=57600
FlowControl=Hardware
ISDN=Yes

Maxtech 14.4
InitString=AT&FX4&C1&D3%C1\N3\Q3S7=60
AnswerInit=AT&FX4&C1&D3%C1\N3\Q3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Maxwell, Other
AT E1Q0V1X4

Maxwell Modem 300PC/300V
ATE1Q0V1S0=0

Maxwell Modem 1200PC/1200V
ATE1Q0V1X1S0=0

Maxwell Modem 1200VP
ATE1Q0V1X4&C1&D2 S7=60 S0=0

Maxwell Modem 2400PC
ATE1Q0V1X1 S7=30 S0=0

Mayze 96/96R
InitString=AT&F&Q13&S2%R0-E3%K3"U17
AnswerInit=AT&F&Q13&S2%R0-E3%K3"U17S0=1&W
BPSRate=19200
FlowControl=Software
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MegaHertz AR196FM
AT&F&C1&D2\J0\N3\Q3\V1S7=60S11=60

MegaHertz AR196FM - Auto Reliable
AT&F&C1&D2\J0\N3\Q3\V1S7=60S11=60

MegaHertz AR196FM - MNP-4 mode
AT&F&C1&D2\J0\N3\Q3\V1%C0S7=60S11=60

MegaHertz AR196FM - 2400 mode
AT&F&C1&D2\J0\N0\Q0\V1S7=60S11=60

Megahertz CC3144
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz CC3144 - Auto Reliable
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz CC3144 - MNP-4 mode
AT&F&C1&D2\N3&Q5&K3%C2S7=60S11=60

MegaHertz EasyTalk 1200
ATE1Q0V1X1 S7=60 S11=55 S0=0

Megahertz EasyTalk 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Megahertz T396FM
AT&F1&C1&D2\Q3%C1&S1S7=60S11=60

Megahertz T396FM - Auto Reliable
AT&F1&C1&D2\Q3&S1S7=60 S11=60

Megahertz T396FM - MNP-4 mode
AT&F1&C1&D2\Q3%C0&S1S7=60 S11=60

Megahertz T3144
AT&F&C1&D2W2\J0\N7\Q3%C1\V2%B14400S7=60S11=60

Megahertz T3144 - Auto Reliable
AT&F&C1&D2\J0\N7\Q3%C1\V2%B14400S7=60 S11=60

Megahertz T3144 - MNP-4 mode
AT&F&C1&D2\J0\N7\Q3%C0\V2%B14400S7=60 S11=60

Megahertz T3144 - 2400-Compatible mode
AT&F&C1&D2\J0\N0\Q00%B2400S7=60S11=60

Megahertz P224FMV
AT&F&C1&D2&Q5&K3S95=42S7=60S11=55

Megahertz P224FMV - Auto Reliable
AT&F&C1&D2&Q5&K3S95=42S7=60S11=55

Megahertz P224FMV - MNP-4 mode
AT&F&C1&D2%C0&K3S95=42S7=60S11=55
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Megahertz P224FMV - Direct mode
AT&F&C1&D2&Q0&K3S95=42S7=60S11=55

Megahertz C524FM
AT&F3&C1&D2\J0\N3\Q3S7=60S11=55

Megahertz C524FM - Auto Reliable
AT&F&C1&D2\J0\N3\Q3S7=60S11=55

Megahertz C524FM - MNP-4 mode
AT&F%C0&C1&D2\J0\N3\Q3S7=60S11=55

Megahertz C524FM - Direct mode
AT&F&C1&D2\J1\N0\Q0\V0S7=60S11=55

Megahertz P296FMV (AA Battery Version)
AT&F&C1&D2\N3\J0\Q3%C1

Megahertz P296FMV (AA Battery Version) - Auto Reliable
AT&F%C1&C1&D2\N3\J0\Q3S7=60 S11=60

Megahertz P296FMV (AA Battery Version) - MNP-4 mode
AT&F%C0&C1&D2\N3\J0\Q3S7=60 S11=60

Megahertz P296FMV (9-Volt Battery Version)
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz P296FMV (9-Volt Battery Version) - Auto Reliable
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz P296FM (9-Volt Battery Version) - MNP-4 mode
AT&F&C1&D2\N3&Q5&K3%C2S7=60S11=60

Megahertz P2144 (AA Battery Version)
AT&F1&C1&D2\Q3W2\V2%B14400%C1

Megahertz P2144 (AA Battery Version) - Auto Reliable mode
AT&F1&C1&D2\Q3W2\V2%B14400%C1S7=60S11=60

Megahertz P2144 (AA Battery Version) - MNP-4 mode
AT&F1&C1&D2\Q3W2\V2%B14400%C0S7=60S11=60

Megahertz P2144 (AA Battery Version) - 2400-compatible mode
AT&F1&C1&D2\Q0\N0W2\V2%B2400S7=60S11=60

Megahertz P2144 (9-Volt Battery Version)
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz P2144 (9-Volt Battery Version) - Auto Reliable
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz P2144 (9-Volt Battery Version) - MNP-4 mode
AT&F&C1&D2\N3&Q5&K3%C2S7=60S11=60

Megahertz P2144 (9-Volt Battery Version) - 2400-compatible mode
AT&F&C1&D2&Q0&K3S7=60S11=60
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Megahertz C5144 Fax/Modem
AT&F1&C1&D2W2&R2\C1\Q3%C1\V2S7=60S11=60

Megahertz C5144 Fax/Modem - Auto Reliable
AT&F1&C1&D2W2&R2\C1\Q3%C1\V2S7=60S11=60

Megahertz C5144 Fax/Modem - MNP-4 mode
AT&F1&C1&D2W2&R2\C1\Q3%C1\V2S7=60S11=60

Megahertz C5144 Fax/Modem - 2400-Compatible mode
AT&F&C1&D2W2&R2\C0\Q3\N0S7=60S11=60

Megahertz C596FM
AT&F&C1&D2W2\J0\N7\Q3%C1\V2%B9600S7=60S11=60

Megahertz C596FM - Auto Reliable
AT&F&C1&D2\J0\N7\Q3%C1\V2%B9600S7=60 S11=60

Megahertz C596FM - MNP-4 mode
AT&F&C1&D2\J0\N7\Q3%C0\V2%B9600S7=60 S11=60

Megahertz C596FM - 2400-Compatible mode
AT&F&C1&D2\J0\N0\Q00%B2400S7=60S11=60

Megahertz XJ124FM
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz XJ124FM - Auto Reliable
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz XJ124FM - MNP-4 mode
AT&F&C1&D2\N3&Q5&K3%C2S7=60S11=60

Megahertz XJ1144
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz XJ1144 - Auto Reliable
AT&F&C1&D2\N3&Q5&K3%C3S7=60S11=60

Megahertz XJ1144 - MNP-4 mode
AT&F&C1&D2\N3&Q5&K3%C2S7=60S11=60

Megahertz Corp, A2144
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, C5144 Compaq Internal
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, C596FM Compaq Internal
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, CC3144 PCMCIA
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, CC396FM PCMCIA
AT E1Q0V1W0X4 &C1&D2&K3
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Megahertz Corp, CC4144 Cellular Modem
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, CC4144-MIT
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, CC4144-NEC
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, IC196FM
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, Other
AT E1Q0V1X4

Megahertz Corp, P2144
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, P2144 Pocket Modem
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, P296FMV
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, P296FMV
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, T3144
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, T396FM
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, XJ1144 PCMCIA
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, XJ196FM PCMCIA
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, XJ2144
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, XJ2144 PCMCIA
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, Z3144
AT E1Q0V1W0X4 &C1&D2&K3

Megahertz Corp, Z396FM
AT E1Q0V1W0X4 &C1&D2&K3

Mercury Technologies, 9600/14400
AT&F E1Q0V1X4 &C1&D2&K3

Mercury Technologies, Other
AT E1Q0V1X4
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Micc 4824 V.42
AT&F&C1&D2\Q3S7=60S11=60

Micc 4824 V.42 - Auto Reliable
AT&F&C1&D2\Q3S7=60 S11=60

Micc 4824 V.42 - MNP-4 mode
AT&F AT%C0&C1&D2\Q3 S7=60 S11=60

Microcom AX/2400 MNP4
AT&F &C1 &D2 \J0 \Q3 \N3 S7=54

Microcom AX/2400 MNP4 - Auto Reliable
AT&F \J0 \Q3 \N3 &C1 &D2 S7=54

Microcom AX/2400c MNP5
AT&F &C1 &D2 \J0 \Q3 \N3 S7=54

Microcom AX/2400c MNP5 - Auto Reliable
AT&F \J0 \Q3 \N3 &C1 &D2 S7=54

Microcom AX/9600
AT&F &C1 &D2 \J0 \Q3 \N3 S7=54

Microcom AX/9600 - Auto Reliable
AT&F \J0 \Q3 \N3 &C1 &D2 S7=54

Microcom AX/9612c
AT&F &C1 &D2 \J0 \Q3 \N3 S7=54

Microcom AX/9612c - Auto Reliable
AT&F \J0 \Q3 \N3 &C1 &D2 S7=54

Microcom AX/9624c
AT&F &C1 &D2 \J0 \Q3 \N3 S7=54

Microcom AX/9624c - Auto Reliable
AT&F \J0 \Q3 \N3 &C1 &D2 S7=54

Microcom QX/V.32c
AT&F&C1&D2\J0\Q3\N3%C3-Q2S7=60S0=0

Microcom QX/V.32c - Auto Reliable
AT&F&C1&D2\J0\Q3\N3%C3-Q2S7=60S0=0

Microcom QX/2400t
AT&F&C1&D2\J0\Q3\N3%C3-Q2S7=60S0=0\V1

Microcom QX/2400t - Auto Reliable
AT&F&C1&D2\J0\Q3\N3\V1%C3-Q2S7=60S0=0

Microcom QX/2400t - MNP-7
AT&F&C1&D2\J0\Q3\N3\V1%C2-Q2S7=60S0=0

Microcom QX/2400t - MNP-5
AT&F&C1&D2\J0\Q3\N3\V1%C1-Q2S7=60S0=0
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Microcom QX/2400t - MNP-4
AT&F&C1&D2\J0\Q3\N3\V1%C0-Q2S7=60S0=0

Microcom QX/4232hs
AT&F&C1&D2\J0\Q3\N3%C3-Q2S7=60S0=0

Microcom QX/4232hs - Auto Reliable mode
AT&F&C1&D2\J0\Q3\N3\V1%C3-Q2S7=60S0=0%G0

Microcom QX/4232hs - V.42bis mode
AT&F&C1&D2\J0\Q3\N3\V1%C2-Q2S7=60S0=0%G0

Microcom QX/4232hs - MNP-5
AT&F&C1&D2\J0\Q3\N3\V1%C1-Q2S7=60S0=0%G0

Microcom QX/4232hs - MNP-4
AT&F&C1&D2\J0\Q3\N3\V1%C0-Q2S7=60S0=0%G0

Microcom QX/4232bis+
AT&F&C1&D2\J0\Q3\N3%C3-Q2S7=60S0=0

Microcom QX/4232bis+ - Auto Reliable mode
AT&F&C1&D2\J0\Q3\N3\V1%C3-Q2S7=60S0=0%G0

Microcom QX/4232bis+ - V.42bis mode
AT&F&C1&D2\J0\Q3\N3\V1%C2-Q2S7=60S0=0%G0

Microcom QX/4232bis+ - MNP-5
AT&F&C1&D2\J0\Q3\N3\V1%C1-Q2S7=60S0=0%G0

Microcom QX/4232bis+ - MNP-4
AT&F&C1&D2\J0\Q3\N3\V1%C0-Q2S7=60S0=0%G0

Microcom DeskPorte FAST
AT&F&C1&D2\J0\Q3\N3%C3S0=0S11=55\V1

Microcom DeskPorte FAST - Auto Reliable mode
AT&F&C1&D2\J0\Q3\N3\V1%C3S0=0S11=55

Microcom DeskPorte FAST - MNP-5
AT&F&C1&D2\J0\Q3\N3\V1%C1S0=0S11=55

Microcom DeskPorte FAST - MNP-4
AT&F&C1&D2\J0\Q3\N3\V1%C0S0=0S11=55

Microcom DeskPorte FAST - V.23 (75bps transmit)
AT&F&C1&D2\J0\Q3\N3\V1%F1S0=0S11=55

Microcom DeskPorte FAST - V.23 (1200bps transmit)
AT&F&C1&D2\J0\Q3\N3\V1%F2S0=0S11=55

Micro Direct 28.8
InitString=AT&FW2X4&C1&D3&Q5\N3S7=60
AnswerInit=AT&FW2X4&C1&D3&Q5\N3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware
```

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Microcom AX/1200 and AX/2400 (MNP 4)
InitString=AT&F&C1&D3\J0\N3\Q2S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Microcom AX/1200c and AX/2400c (MNP 5)
InitString=AT&F&C1&D3\J0\N3\Q2%C1S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2%C1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Microcom AX/9624c (MNP 5)
InitString=AT&F&C1&D3\G0\J0\N3\Q2%C1S7=60
AnswerInit=AT&F&C1&D3\G0\J0\N3\Q2%C1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Microcom AX/9600 Plus (MNP 5)
InitString=AT&F&C1&D3\J0\N3\Q2S7=60
AnswerInit=AT&F&C1&D3\J0%C3\N3\Q2S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Microcom MacModem V.32 (ARA 1.0)
InitString=AT&FE0\Q0\G0\N1&D3
AnswerInit=AT&FE0\Q0\G0\N1&D3S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Microcom QX/V.32c (MNP 5)
InitString=AT&F&C1&D3\J0%C3\N3\Q2S7=60
AnswerInit=AT&F&C1&D3\J0%C3\N3\Q2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Microcom QX/4232hs (V.42bis)
InitString=AT&F&C1&D3\J0%C3\N3\Q2-K0\V2S7=60
AnswerInit=AT&F&C1&D3\J0%C3\N3\Q2-K0\V2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Microcom QX/4232bis (V.42bis)
InitString=AT&F&C1&D3\J0%C3\N3\Q2-K0\V2W2S7=60
AnswerInit=AT&F&C1&D3\J0%C3\N3\Q2-K0\V2W2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Microcom QX/4232bis (ARA 1.0)
InitString=AT&F&D1\K0\J0W2\Q2S7=120S0=0E0\N3%C0
AnswerInit=AT&F&D1\K0\J0W2\Q2S7=120S0=0E0\N3%C0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1
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Microcom MicroPorte 542 (V.42bis)
InitString=AT&F&C1&D3&Q5S7=60S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&Q5S7=60S46=138S48=7S95=47S0=1&W
BPSRate=9600
FlowControl=Hardware

Microcom MicroPorte 1042 (V.42bis)
InitString=AT&F&C1&D3%C3\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F&C1&D3%C3\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Microcom MicroPorte 4232bis (V.42bis)
InitString=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Microcom DeskPorte V.32bis
InitString=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Microcom DeskPorte FAST
InitString=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Microcom DeskPorte FAST (57600 BPS)
InitString=AT&F$B57600&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F$B57600&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Microcom DeskPorte FAST (115200 BPS)
InitString=AT&F$B115200&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F$B115200&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=115200
FlowControl=Hardware

Microcom DeskPorte FAST ES 28.8
InitString=AT&FW2&C1&D3&K3&Q5%C3\N3S7=60S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5%C3\N3S7=60S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Microcom TravelPorte FAST
InitString=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60
AnswerInit=AT&F&C1&D3%C3%G0\J0-M0\N6\Q2\V2S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Microcom DeskPorte FAST Rack Mount
InitString=AT&F$B115200&C1&D3%C3%G0\J0-M0\N3\Q3\V2S7=60
AnswerInit=AT&F$B115200&C1&D3%C3%G0\J0-M0\N3\Q3\V2S7=60S0=1&W
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BPSRate=115200
FlowControl=Hardware

Micro Integrated Communications Corp., All
AT E1Q0V1X4

Microcom, DeskPorte FAST ES 28.8
AT E1Q0V1X4 &C1&D2&K3%C0

Microcom, DeskPorte Series
AT E1Q0V1X4 &C1&D2&K3%C0

Microcom, Other
AT E1Q0V1X4

Microcom, QX4232hs
AT E1Q0V1X4 &K3&M0

Microcomputer Research Mr. Modem MR-144
AT&F2&C1&D2S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-144 - Auto Reliable mode
AT&F2&C1&D2S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-144 - MNP-4
AT&F2&C1&D2\N3%C0S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-144 - 2400 Direct
AT&F2&C1&D2B6\N0S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-96
AT&F2&C1&D2S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-96 - Auto Reliable mode
AT&F2&C1&D2S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-96 - MNP-4
AT&F2&C1&D2\N3%C0S11=55S7=60S0=0

Microcomputer Research Mr. Modem MR-96 - 2400 Direct
AT&F2&C1&D2B6\N0S11=55S7=60S0=0

Microtest LANMODEM
AT

Miracom, Courier HST
AT Q0 V1 S7=58 X6&B1&H1&R2

Miracom, Keycard 3000
AT Q0 V1 S7=58 X6&B1&H1&R2

Miracom, Other
AT E1Q0V1X4

Miracom, WS4000/PC
AT Q0 V1 S7=58 X6&B1&H1&R2
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Miracom Keycard 2400
ATE1V1X4 &C1&D2 S7=60

Miracom Keycard 3000
ATE1V1X1 &C1&D2 S7=59 S23=1

Miracom WS4000/PC
ATE1V1X1 S7=59 S23=1

Miracom Sportster 9600/PC
AT&FX4&B1 &C1 &D2 &H1 &K1 &R2 S7=60 S11=55

Miracom Sportster 9600/PC - Auto Reliable Mode
AT&F&B1&C1&D2&H1&K1&R2S7=60S11=55

Miracom Sportster 9600/PC - MNP-4 Mode
AT&F&B1&C1&D2&H1&K3&R2S7=60S11=55

Miracom Sportster 14.4
AT&FX4&B1 &C1 &D2 &H1 &K1 &R2 S7=60 S11=55

Miracom Sportster 14.4 - Auto Reliable Mode
AT&F&B1&C1&D2&H1&K1&R2S7=60S11=55

Miracom Sportster 14.4 - MNP-4 Mode
AT&F&B1&C1&D2&H1&K3&R2S7=60S11=55

Miracom Courier 2400e/ 2400e/ps
AT&FX6&B6&H1&R2S7=60S11=55

Miracom 2400e/ 2400e/ps - Auto Reliable
AT&F&C1&D2X6&B6&H1&R2 S7=60 S11=60

Modem Miracom Courier 2400PC
AT&FX6&B7&H1&R2S7=60S11=55

Miracom Courier 2400PC - Auto Reliable
AT&FX6&B7&H1&R2 S7=60 S11=60

Miracom Courier HST
AT&FX6&B1H1&R2S7=60S11=55

Miracom Courier HST - Auto Reliable
AT&FX6&B1 &H1 &R2 S7=60 S11=60

Miracom Courier HST V.42
AT&FX6&B1&H1&R2&M4&A3S7=60S11=55

Miracom Courier HST V.42 - Auto Reliable
AT&FX6&B1&H1&R2&M4&A3 S7=60 S11=60

Miracom Courier HST-ASL
AT&F&H1&R2&K3&B1&A3X7 S7=60S11=60

Miracom Courier HST-ASL - Auto Reliable
AT&F&H1&R2&K3&B1&A3 X7 S7=60 S11=60
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Miracom V.32
AT&FX6&H1&R2&B1 S7=60S0=0

Miracom V.32 - Auto Reliable
AT&FX6 &H1 &R2 &B1 S7=60 S11=60

Miracom V.32bis-ASL
AT&FT&H1&R2&K3&B1&A3X7 S7=60S11=60

Miracom V.32bis-ASL - Auto Reliable
AT&FX7 &H1&R2&K3&B1&A3 S7=60 S11=60

Miracom Dual Standard
AT&FX6&B1&H1&R2S7=60S11=55

Miracom Dual Standard - Auto Reliable
AT&FX6&B1&H1&R2 S7=60 S11=60

Miracom Dual Standard V.32bis-ASL
AT&F&H1&R2&K3&B1&A3X7 S7=60S11=60

Miracom Dual Standard V.32bis-ASL - Auto Reliable
AT&FX7&H1&R2&K3&B1&A3S7=60S11=60

Miracom Dual Standard V.32bis-ASL - HST mode
AT&FB1X7&H1&R2&K3&B1&A3S7=60S11=60

Miracom Dual Standard V.32bis-ASL - MNP-5 mode
AT&FX7&H1&R2&K1&B1&A3S7=60S11=60

Motorola-Codex 2260
AT&F&C1&D2*DL0&R0

Motorola-Codex 2264
AT&F&C1&D2*FL3*XC1*PT0&R0

Motorola-Codex 2264 - Auto Reliable
AT&F&C1&D2*FL3*XC1*PT0&R0

Motorola-Codex 3220
AT&F&C1&D2*XC0*RS0*FL3*MD0*SM0*MF0L3S7=60 S10=5

Motorola/Codex 3220 (MNP)
InitString=AT&F&C1&D3*DC1*FL3*MF0*SM3*XC2S7=60
AnswerInit=AT&F&C1&D3*DC1*FL3*MF0*SM3*XC2S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Motorola/Codex 3220 Plus (V.42bis)
InitString=AT&F&C1&D3*DC1*EC0*MF0*SM3*XC2S7=60
AnswerInit=AT&F&C1&D3*DC1*EC0*MF0*SM3*XC2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Motorola/Codex 326X Series (V.42bis)
InitString=AT&F&C1&D3*FL3*MF0*SM3*TT2*XC2S7=60
AnswerInit=AT&F&C1&D3*FL3*MF0*SM3*TT2*XC2S7=60S0=1&W
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BPSRate=38400
FlowControl=Hardware

Motorola/Codex 2264
InitString=AT&F&C1&D3*FL3*ML0*SM3*XC1
AnswerInit=AT&F&C1&D3*FL3*ML0*SM3*XC1S0=1&W
BPSRate=19200
FlowControl=Hardware

Motorola Codex, 2264
AT Q0 V1 *DC0

Motorola Codex, 3220
AT Q0 V1 *DC0

Motorola Codex, Codex 3260
AT Q0 V1 *DC0

Motorola Codex, Other
AT E1Q0V1X4

Motorola V.34R
InitString=AT&FW2&C1&D3\N7\Q3\V1%C1S7=60
AnswerInit=AT&FW2&C1&D3\N7\Q3\V1%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Motorola Lifestyle 28.8
InitString=AT&F&C1&D3\Q3%R3\V2S7=60
AnswerInit=AT&F&C1&D3\Q3%R3\V2S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Motorola Power 28.8
InitString=AT&F&C1&D3\Q3%R3\V2S7=60
AnswerInit=AT&F&C1&D3\Q3%R3\V2S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Motorola TA 210 (ISDN)
InitString=AT&FW1&M&C1
AnswerInit=AT&FW1&M&C1S0=1&W
BPSRate=57600
FlowControl=Hardware
ISDN=Yes

Motorola UDS FastTalk II
InitString=AT&F&C1&D3E1V1X4Q0\J0\N6\Q3%C1S7=60
AnswerInit=AT&F&C1&D3E1V1X4Q0\J0\N6\Q3%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Motorola UDS FastTalk II (ARA 1.0)
InitString=AT&FE0V1X4&C1&D3%C\N3\Q3S7=60
AnswerInit=AT&FE0V1X4&C1&D3%C\N3\Q3S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware
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ARAv1=1

Motorola UDS V.3400
InitString=AT&FX4W2&C1&D3&M0\J0\N7\Q3%C1
AnswerInit=AT&FX4W2&C1&D3&M0\J0\N7\Q3%C1S0=1&W
BPSRate=57600
FlowControl=Hardware

Motorola UDS UTA 220K (ISDN)
InitString=AT&F&C1&D2&K3&M1@P2=13S0=1%A2=0&W
AnswerInit=AT&F&C1&D2&K3&M1@P2=13S0=1%A2=0&W
BPSRate=38400
FlowControl=Hardware
ISDN=Yes

Motorola 925 DHM V.34
InitString=AT&FW2X4&C1&D3&R\Q3S7=60S80=18
AnswerInit=AT&FW2X4&C1&D3&R\Q3S7=60S80=18S0=1&W
BPSRate=115200
FlowControl=Hardware

Motorola UDS UTA 220 (ISDN Sync Clear Channel)
InitString=AT&F&C1&D2&K3&M1%A2=0@P2=13
AnswerInit=AT&F&C1&D2&K3&M1%A2=0@P2=13S0=1&W
BPSRate=38400
FlowControl=Hardware

Motorola UDS UTA 220 (ISDN V.120)
InitString=AT&F&C1&D2&K3&M0%A2=2@P2=13
AnswerInit=AT&F&C1&D2&K3&M0%A2=2@P2=13S0=1&W
BPSRate=38400
FlowControl=Hardware

M. Codex 3220 Auto-Reliable mode
AT*XC0 *RS0 *FL3 *MD0 S7=60

M. Codex 3220 MNP-5 mode
AT*XC0 *RS0 *FL3 *MD0 S7=60AT *SM3 *DC1 *MH0 *FL3 *XC2

M. Codex 3220 MNP-4 mode
AT*XC0 *RS0 *FL3 *MD0 S7=60AT *SM3 *DC0 *MH0 *FL3 *XC2

Motorola-Codex 3260 Series
AT&F&C1&D2*RS0*FL3*MF0S7=60 S10=5

Motorola-Codex 3260 Auto-Reliable mode
AT&F&C1&D2*RS0*FL3*MF0S7=60S10=5

Motorola-Codex 3260 MNP-5 mode
AT&F&C1&D2*RS0*FL3*MF0S7=60S10=5*EC2

Motorola-Codex 3260 MNP-4 mode
AT&F&C1&D2*RS0*FL3*MF0S7=60S10=5EC2*DC0

Modem Motorola-Codex 326XFAST
AT&F&C1&D2*XC1 *CD3 *AA5 *RS0*FL3*XC2*MF0S7=60S10=5 *DE21
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Motorola-Codex 326XFAST Auto-Reliable mode
AT*DE21&C1&D2*XC2*RS0*FL3*MF0S7=60S10=5

Motorola-Codex 326XFAST MNP-5 mode
AT*DE21&C1&D2*XC2*RS0*FL3*MF0S7=60S10=5*EC2

Motorola-Codex 326XFAST MNP-4 mode
AT*DE21&C1&D2*XC2*RS0*FL3*MF0S7=60S10=5EC2*DC0

Multi-Tech, 932EA
AT E1Q0V1X4  &C1&D2&E4&E14

Multi-Tech, 932EA/25
AT E1Q0V1X4  &C1&D2&E4&E14

Multi-Tech, 932EAB
AT E1Q0V1X4  &C1&D2&E4&E14

Multi-Tech, MultiModem II MT932BA
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1432BA
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1432BC
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1432ES
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1432ES
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1432MU
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1432ZDX
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1932BL
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT1932ZDX
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, MultiModem MT932BC
AT E1Q0V1X4 F1&E4&E14

Multi-Tech, Other
AT E1Q0V1X4

MultiTech MultiModem 224/224PC
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

MultiTech MultiModem 224E/224EC
AT&F&C1&D2S0=0&E1&E4&E7&E13X4$BA0$A1S11=55
$SB9600
```

```
MultiTech MultiModem 224E/224EC - Auto Reliable

AT&FS0=0&E1&E4&E7&E13$BA0$A1$MB2400$SB9600&C1&D2S
6S11=60

MultiTech MultiModem II MT224
AT&F&C1&D2&RF1&E4 X4S7=60S11=55S0=0

MultiTech MultiModem 224 (no MNP or V.42)
InitString=AT&FX2&C1&D3&R1S7=60
AnswerInit=AT&FX2&C1&D3&R1S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

MultiTech MultiModem 224E (MNP 5)
InitString=AT&F&C1&D3&R0&E1&E4&E12&E15$BA0S7=60
AnswerInit=AT&F&C1&D3&R0&E1&E4&E12&E15$BA0S7=60S0=1&W
BPSRate=4800
FlowControl=Hardware

Multitech MultiModem 9600 (ARA 1.0)
InitString=AT&F&Q1X4E0$BA1&D3&E0&E3&B1
AnswerInit=AT&F&Q1X4E0$BA1&D3&E0&E3&B1S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

MultiTech MultiModem V32EC (V.42bis)
InitString=AT&FX4&C1&D3$BA0&E1&E4&E15#L0S7=60
AnswerInit=AT&FX4&C1&D3$BA0&E1&E4&E15#L0S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

MultiTech MultiModem V32 (no MNP or V.42)
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

MultiTech MultiModem 696E (MNP)
InitString=AT&F&C1&D3$BA0&E1&E4&E15S7=60
AnswerInit=AT&F&C1&D3$BA0&E1&E4&E15S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

MultiTech MultiModem II MT932 (V.42bis)
InitString=AT&FX4&C1&D3$BA0&E1&E4&E15#L0S7=60
AnswerInit=AT&FX4&C1&D3$BA0&E1&E4&E15#L0S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

MultiTech MultiModem II MT1432 (V.42bis)
InitString=AT&FX4&C1&D3#A0$BA0&E1&E4&E15#L0S7=60
AnswerInit=AT&FX4&C1&D3#A0$BA0&E1&E4&E15#L0S7=60S0=1&W
BPSRate=57600
```

```
FlowControl=Hardware

MultiTech MultiModem II MT1432 (ARA 1.0)
InitString=AT&F&Q1X4E0$BA1&D3&E0&E4&B1S7=60
AnswerInit=AT&F&Q1X4E0$BA1&D3&E0&E4&B1S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

MultiTech MultiModem II MT2834BA
InitString=AT&F&C1&D3#A0$BA0E1&E1&E15#L0V1X4S7=60
AnswerInit=AT&F&C1&D3#A0$BA0E1&E1&E15#L0V1X4S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

MultiTech MultiModem II MT2834BR
InitString=AT&FX4&C1&D3#A0$BA0&E1&E4&E15#L0V1S7=60
AnswerInit=AT&FX4&C1&D3#A0$BA0&E1&E4&E15#L0V1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

MultiTech MultiModem II MT2834ZDX V.34
InitString=AT&F&D3#T0X4S7=60
AnswerInit=AT&F&D3#T0X4S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

MultiModem II MT224 - Auto Reliable
AT&F&C1&D2&RF1&E4X4S7=60S11=55S0=0

MultiModem II MT224 - V.42 mode
AT&F&C1&D2&RF1&E4X4S7=60S11=55&E14S0=0

MultiModem II MT224 - MNP5 mode
AT&F&C1&D2&RF1&E4X4S7=60S11=55S0=0#L1

MultiModem II MT224 - MNP4 mode
AT&F&C1&D2&RF1X4S7=60S11=55S0=0#L1&E14

MultiTech MultiModem 224E7 V.42bis
AT&F &C1 &D2 X4 S0=0 &E1 &E4 &E7 &E13 $BA0 $A1
S11=55 $SB19200$MB2400

MultiTech MultiModem 224E7 V.42bis - Auto Reliable

AT&F&C1&D2S0=0&E1&E4&E7&E13$BA0$A1$MB2400$SB19200
=0S11=60

MultiTech MultiModem V.32
AT&F X4 &C1 &D2 S0=0 &E1 &E4 &E7 &E13 $BA0 $A1
S7=60 S11=60 $SB19200

MultiTech MultiModem V.32 - Auto Reliable

AT&F&C1&D2S0=0&E1&E4&E7&E13$BA0$A1$MB9600$SB19200
=0S11=60
```

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MultiTech MultiModem V.32 EAB V.42bis
AT&F X4 &C1 &D2 S0=0 &E1 &E4 &E7 &E13 $BA0 $A1
S7=60 S11=60 $SB19200

MultiTech MultiModem V.32 EAB V.42bis
AT&F&C1&D2S0=0&E1&E4&E7&E13$BA0$A1$MB9600$SB19200
=0S11=60

MultiTech MultiModem II MT932BA
AT&F&C1&D2&RF1 X4 S7=60 S11=60 S0=0

MultiTech II MT932 - Auto Reliable
AT&F&C1&D2&RF1 X4 S7=60 S11=60 S0=0

MultiTech II MT932 - V.42 mode
AT&F &C1&D2 &RF1 X4 S7=60 S11=60 S0=0 &E14

MultiTech II MT932 - MNP5 mode
AT&F &C1&D2&RF1 X4 S7=60 S11=60 #L1 S0=0

MultiTech II MT932 - MNP4 mode
AT&F &C1&D2&RF1 X4 S7=60 S11=60 #L1 &E14 S0=0

MultiTech MultiModem II MT1432
AT&F&C1&D2&RF1X4 S7=60 S11=55 S0=0

MultiTech MultiModem II MT1432 - Auto Reliable
AT&F&C1&D2&RF1X4 S7=60 S11=55 S0=0

MultiTech MultiModem II MT1432 - V.42 mode
AT&F&C1&D2&RF1X4 S7=60 S11=55 S0=0 &E14

MultiTech MultiModem II MT1432 - MNP5 mode
AT&F&C1&D2&RF1X4 S7=60 S11=55 S0=0 #L1

MultiTech MultiModem II MT1432 - MNP4 mode
AT&F&C1&D2&RF1X4 S7=60 S11=55 S0=0 #L1&E14

MultiTech MultiModem 696E
AT&F X4 &C1 &D2 S0=0 &E1 &E4 &E7 &E13 $BA0 $A1
S7=60 S11=60 $SB19200

MultiTech MultiModem 696E

AT&F&C1&D2&R0S0=0&E1&E4&E7&E13$BA0$A1$MB9600$
1200S7=60S11=60

National Semiconductor TYIN 2000
AT&F&C1&D2&K3\V1S7=60 S11=55AT+FCLASS=0

National Semiconductor TYIN 2000 - Auto Reliable
AT&F&C1&D2&K3\V1S7=60S11=55AT+FCLASS=0

National Semiconductor TYIN 2000 - MNP-4 mode
AT&F&C1&D2&K3\V1S7=60S11=55%C0AT+FCLASS=0

NCR Enhanced 14400 Fax Modem
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AT&F &C1 &D2 \J0 \N7 \Q3 \V2 S7=60 S11=60

NCR Enhanced 14400 Fax Modem - Auto Reliable
AT&F&C1&D2\N7\Q3\V2S7=60S11=60

NCR Enhanced 14400 Fax Modem - MNP-4 mode
AT&F%C0&C1&D2\N7\Q3\V2S7=60S11=60

NEC America Inc., 2431C
AT E1Q0V1X4 &C1&D2&K3&M0&Q0

NEC America Inc., DataComm
AT E1Q0V1X4 &C1&D2&K3&M0&Q0

NEC America Inc., Laptop
AT Q0 V1

NEC America Inc., N2431
AT Q0 V1

NEC America Inc., Other
AT E1Q0V1X4

NEC N2431/2431C
AT&F &C1 &D2 &E0 S7=60 S11=55

NEC N2435
AT&F&C1&D2&R0\Q3\N6\J0\V1

NEC N2435 - Auto Reliable
AT&F\Q3\N3\J0\V1\C1 S7=60 S11=60

NEC N2435 - MNP-4 mode
AT&F%C0\Q3\N3\J0\V1\C1 S7=60 S11=60

NEC 9631
AT&F &C1 &D2 &R0 \N3 \Q3 \V1 S7=60 S11=60

NEC 9631 - Auto Reliable
AT&F &C1&D2&R0\N3\Q3\V1S7=60S11=60

NEC 9631 - MNP-4 mode
AT&F%C0&C1&D2&R0\N3\Q3\V1S7=60S11=60

NEC PC-20-66 14.4 Data/Fax
AT&F&C1&D2&K3\J0\N7\Q3\V2%C1S7=60 S11=60

NEC PC-20-66 14.4 Data/Fax - Auto Reliable
AT&F&C1&D2\J0\N7\Q3\V2%C1S7=60S11=60

NEC PC-20-66 14.4 Data/Fax - MNP-4 mode
AT&F&C1&D2\J0\N7\Q3\V2%C0S7=60S11=60

NEC 14.4 Kbps Data/Fax Modem
AT&F&C1&D2X6\D1\N7\Q3S85=1S7=60 S11=55S0=0

NEC 14.4 Kbps Data/Fax Modem - Auto Reliable
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AT&F&C1&D2X6\D1\N7\Q3S85=1S7=60S11=55S0=0

NEC 14.4 Kbps Data/Fax Modem - MNP-4 mode
AT&F&C1&D2X6\D1\N3\Q3S85=1S7=60S11=55S0=0

NEC 14.4 Kbps Data/Fax Modem - No Error Control
AT&F&C1&D2X6\D1\N0\Q3S85=1S7=60S11=55S0=0

NetComm M11F 28.8
InitString=AT&FQ0V1X5&C1&D2&E2&K3&R0\J0\N3%C3%T0S7=60
AnswerInit=AT&FQ0V1X5&C1&D2&E2&K3&R0\J0\N3%C3%T0S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

NetComm E7 14.4 (ARA 1.0)
InitString=AT&F\N0&D0&K3%C0X3\I3
AnswerInit=AT&F\N0&D0&K3%C0X3\I3S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

NetComm M11F 14.4 (ARA 1.0)
InitString=AT&F\N0&D0&K3%C0X3\I3
AnswerInit=AT&F\N0&D0&K3%C0X3\I3S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

NetComm M11F 28.8 (ARA 1.0)
InitString=AT&F\N0&D0&K3%C0X3\I3
AnswerInit=AT&F\N0&D0&K3%C0X3\I3S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

New Media Corp., All
AT E1Q0V1X4

Novation, Other
AT E1Q0V1X4

Novation Professional 2400
ATE1Q0V1X3YC0YF1YT0 S7=45 S0=0

Novation Smart-Cat 103/212
%N N NS2 NC0

Nuvotel 96424IFX
AT&F&C1&D2&Q5\N3&K3S7=60S11=55

Nuvotel 96424IFX - Auto Reliable
AT&F&C1&D2&Q5\N3&K3S7=60S11=55

Nuvotel 96424IFX - MNP-4 mode
AT&F%C0&C1&D2&Q5\N3&K3S7=60S11=55

Nuvotel 14400I
```

```
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel 14400I - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel 14400I - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel 14400IFX
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel 14400IFX - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel 14400IFX - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel 9600I
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel 9600I - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel 9600I - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel 9600IFX
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel 9600IFX - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel 9600IFX - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel Pegasus 14400E
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel Pegasus 14400E - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel Pegasus 14400E - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel Pegasus 14400EFX
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel Pegasus 14400EFX - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel Pegasus 14400EFX - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel Pegasus 9600E
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel Pegasus 9600E - Auto Reliable
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AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel Pegasus 9600E - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Nuvotel Pegasus 9600EFX
AT&F&C1&D2&K3&Q5S7=60S11=55S95=41

Nuvotel Pegasus 9600EFX - Auto Reliable
AT&F&C1&D2&Q5&K3S7=60S11=55S95=41

Nuvotel Pegasus 9600EFX - MNP-4 mode
AT&F&C1&D2%C0&Q5&K3S7=60S11=60S95=41

Octocom OSI 8324A
AT&F &C1 &D2 &I1 *E1 &E1 &K2 S0=0 S7=60

Octocom OSI 8324A - Auto Reliable
AT&F&C1&D2&I1*E1&E1&K2S7=60S0=0

Octocom OSI 8324A - MNP-4 mode
AT&F%C0&C1&D2&I1*E0&E1&K2S7=60S0=0

Octocom OSI 8396A
AT&F &C1 &D2 &I1 *E1 &E1 &K2 AT S0=0 S7=60

Octocom OSI 8396A - Auto Reliable
AT&F&C1&D2&I1*E1&E1&K2S7=60S0=0

Octocom OSI 8396A - MNP-4 mode
AT&F%C0&C1&D2&I1*E0&E1&K2S7=60S0=0

Octocom OSI 8196A
AT&F &C1 &D2 &I1 *E1 &E1 &K2 S0=0 S7=60

Octocom OSI 8196A - Auto Reliable
AT&F&C1&D2&I1*E1&E1&K2S7=60S0=0

Octocom OSI 8196A - MNP-4 Mode
AT&F&C1&D2&I1*E0&E1&K2S7=60S0=0

Okidata, CLP 296
AT Q0 V1 X4&B0&K0

Okidata, Okitel 9600
AT Q0 V1 X4&B0&K0

Okidata, Other
AT E1Q0V1X4

Okidata CLP 296
AT&F&C1&D2\V1\Q3\J0\C1S7=60

Okidata CLP 296 - Auto Reliable
AT&F&C1 &D2\V1\Q3\J0\C1 S7=60

Okidata Okitel 2400 Plus
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AT&F&C1&D2\V1\Q3\J0S7=60

Okidata Okitel 2400 Plus - Auto Reliable mode
AT&F&C1 &D2\V1\Q3\J0\C1 S7=60

Okidata Okitel 2400 Plus - MNP-4 mode
AT&F %C0&C1 &D2\V1\Q3\J0\C1 S7=60

Okidata Okitel 1200/1200B
ATE1Q0V1X1 S7=60 S11=55 S0=0

Okidata Okitel 2400/2400B
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Okidata Okitel 9600
AT&C1&D2\J0\Q3&K3\N3S7=60

Okidata Okitel 9600 - Auto Reliable
AT&F &C1&D2\J0\Q3&K3\N3 S7=60

Okidata Okitel 9600 - MNP-4 mode
AT&F %C0 &C1 &D2 X6 S7=60 S11=60

Omnitel, All
AT E1Q0V1X4

Omron Office Automation Products Inc., All
AT E1Q0V1X4

Omron Impala 14.4K
AT&F&C1&D2\J0\Q3\V2&M5S7=60

Omron Impala 14.4K - Auto Reliable
AT&F&C1&D2\J0\Q3\V2&M5S7=60

Omron Impala 14.4K - MNP-4 mode
AT&F&C1&D2%C0\J0\Q3\V2&M5S7=60

Omron Impala 14.4K - Direct mode
AT&F&C1&D2&M0\V0S7=60

Omron Impala 24/96 Fax
AT&F&C1&D2\J0\Q3\N3S7=60S11=55

Omron Impala 24/96 Fax - Auto Reliable
AT&F&C1&D2\J0\Q3\N3S7=60S11=55

Omron Impala 24/96 Fax - MNP-4 mode
AT&F&C1&D2%C0\J0\Q3\N3S7=60S11=55

Omron Impala 24/96 Fax - Direct mode
AT&F&C1&D2\J0\Q0\N0S11=55S7=60

Pace, Eurolink
AT Q0 V1 E1

Pace, Linnet V32 Quad
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AT Q0V1 &K3

Pace, Other
AT E1Q0V1X4

Pace, Series Four
AT Q0 V1 E1

Pace, Ultralink 32
AT Q0 V1 E1

Pace, V32
AT&F &C1 &D2 &K2

Pace Linnet PC Card (300 baud)
AT&F

Pace Linnet 1200
AT&F

Pace Linnet 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=70

Pace MicroLin Fx
AT&F&C1&D2\N3%C3&K3S7=58S95=41

Pace MicroLin Fx - Auto Reliable
AT&F&C1&D2\N3%C3&K3S7=58S95=41

Pace MicroLin Fx - MNP-4 mode
AT&F&C1&D2\N3%C2&K3S7=58S95=41

Pace MicroLin Fx - Direct mode
AT&F&C1&D2\N02&K0S7=58S95=41

Pace MicroLin Quad Fax PC Card
AT&F&C1&D2\N3%C3&K3S7=58S95=41

Pace MicroLin Quad Fax PC Card - Auto Reliable
AT&F AT&C1&D2\N3%C3&K3S7=58S95=41

Pace MicroLin Quad Fax PC Card - MNP-4 mode
AT&F&C1&D2\N3%C2&K3S7=58S95=41

Pace MicroLin Quad Fax PC Card - Direct mode
AT&F&C1&D2\N02&K0S7=58S95=41

Pace MicroLin fx 32 Plus
InitString=AT&F&C1&D3&K3\J0\N3%C3S7=60S36=7S95=47
AnswerInit=AT&F&C1&D3&K3\J0\N3%C3S7=60S36=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Pace Series Four
AT&F

Pace Ultralink Quad
```

```
AT&F&A1&E2&I1&K1\C4\N0\P1\Q0S7=60

Pace Ultralink Quad - Auto Reliable
AT&F&A1&E2&I1&K1\C4\N0\P1\Q0S7=60

Pace Ultralink 32
AT&F&A1&E2&I1&K1\C4\N0\P1\Q0S7=60

Pace Ultralink 32 - Auto Reliable
AT&F&A1&E2&I1&K1\C4\N0\P1\Q0S7=60

Pace Linnet Quad 32
AT&F&C1&D2&A1&I1&K1\C5\N0\P2\Q0S7=60S11=75

Pace Linnet Quad 32 - Auto Reliable mode
AT&F&C1&D2&A1&I1&K1\C5\N0\P2\Q0S7=60S11=75

Pace Linnet Quad 32 - MNP-4 mode
AT&F&C1&D2&A1&I1&K1\C4\N0\P2\Q0S7=60S11=75

Packard Bell, All
AT E1Q0V1X4

PC Logic 19200/Fax
AT&F&C1&D2\J0&K3\N3%C1\V1S7=60S11=55

PC Logic 19200/Fax - Auto Reliable mode
AT&F&C1&D2\J0&K3\N3%C1\V1S7=60S11=55

PC Logic 19200/Fax - MNP-4 mode
AT&F&C1&D2\J0&K3\N3%C1\V1S7=60S11=55

PC Logic 14400/Fax
AT&F &C1 &D2 &K3 &Q9 \N3 %C1 S7=60 S11=55 S95=34

PC Logic 14400/Fax - Auto Reliable mode
AT&F &C1&D2&K3&Q9\N3%C1S7=60 S11=55S95=34

PC Logic 14400/Fax - MNP-4 mode
AT&F &C1&D2&K3&Q9\N3%C0S7=60 S11=55S95=34

PC Logic 96I
AT&F&C1&D2&K3&Q5\N3%C1S7=60S11=55S95=34

PC Logic 96I - Auto Reliable mode
AT&F&C1&D2&K3&Q5\N3%C1S7=60S11=55S95=34

PC Logic 96I - MNP-4 mode
AT&F&C1&D2&K3&Q5\N3%C0S7=60S11=55S95=34

Penril DataComm, Datalink 1200
AT E1Q0V1X4 &C1&D2&Q0&R0&S0

Penril DataComm, DX144
AT E1Q0V1X4 &C1&D2&Q0&R0&S0

Penril DataComm, Other
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AT E1Q0V1X4

Penril Datalink 1200
ATE1V1X1Q0 S7=60

Penril Datalink 2400
ATE1V1X4Q0 S7=60

Penril DLX V.32M
AT&F&C1&D2\Q1\V1S0=0S7=60

Penril DLX V.32M - Auto Reliable
AT&F&C1&D2\Q1\V1S0=0S7=60

Penril DLX V.32M - V.23 mode
AT&F&C1&D2F3\Q1\V1S0=0S7=60

Penril DLX 14.4K
AT&F&C1&D2\Q1\V1S0=0S7=60

Penril DLX 14.4K - Auto Reliable
AT&F&C1&D2\Q1\V1S0=0S7=60

Penril DLX 14.4K - V.23 mode
AT&F&C1&D2F3\Q1\V1S0=0S7=60

PerfectData 14400
AT&F &C1 &D2 \N3 %C1 \V2 \Q3 S11=60

PerfectData 14400 - Auto Reliable
AT&F&C1&D2\N3%C1\V2\Q3S11=60

PerfectData 9600
AT&F &C1 &D2 \N3 %C1 \V2 \Q3 S11=60

PerfectData 9600 - Auto Reliable
AT&F AT&C1&D2\N3%C1\V2\Q3S11=60

PerfectData Corp., All
AT E1Q0V1X4

Penril Alliance V.32 Series
AT&F\D1\C4S7=60S11=60

Penril Alliance V.32 Series - Auto Reliable
AT&F AT \D1 \C4 S7=60 S11=60

Piiceon Dispatcher 9696
AT&F1 &C1 &D2 \N7 W2 \V2 %C1 \Q3 \J0 S7=60 S11=60

Piiceon Dispatcher 9696 - Auto Reliable
AT&F1&C1&D2\N7W2\V2%C1\Q3\J0S7=60S11=60

Piiceon Dispatcher 9696 - MNP-4 mode
AT&F1&C1&D2\N7W2\V2%C0\Q3\J0S7=60S11=60

Piiceon Dispatcher 9696 - 2400 mode
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AT&F1&C1&D2\N0W2\V2%C0\Q3\J0S7=60S11=60

Piiceon Dispatcher 14400
AT&F1 &C1 &D2 \N7 W2 \V2 %C1 \Q3 \J0 S7=60 S11=60

Piiceon Dispatcher 14400 - Auto Reliable
AT&F1&C1&D2\N7W2\V2%C1\Q3\J0S7=60S11=60

Piiceon Dispatcher 14400 - MNP-4 mode
AT&F1&C1&D2\N7W2\V2%C0\Q3\J0S7=60S11=60

Piiceon Dispatcher 14400 - 2400 mode
AT&F1&C1&D2\N0W2\V2%C0\Q3\J0S7=60S11=60

Piiceon Dispatcher (V.42bis)
InitString=AT&F&C1&D3&K3&Q5%C3\J0\N3S7=60S36=7S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5%C3\J0\N3S7=60S36=7S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

PNB, All
AT E1Q0V1X4

Pocket, All
AT E1Q0V1X4

Practical Peripherals, Other
AT E1Q0V1X4

Practical Peripherals, PC-HSSP
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC144HC
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC144LCD
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC144MT
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC288HC V.FC
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC288LCD V.FC
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC288MT V.FC
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PC288SA V.FC
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals, PM14400FX PS/2
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM14400FXPMT
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AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM14400FXSA V.32bis
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM144HC II
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM144MT II
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM288 PKT II V.FC
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM288 PKT V.FC
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM288HC II V.FC
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM9600HC II
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, PM9600MT II
AT&F E1Q0V1X4 &C1&D2&K3

Practical Peripherals, Practicard 144
AT E1Q0V1X4 S46=0 &C1&D2&K3

Practical Peripherals Practical 1200
ATE1Q0V1X1 S7=60 S11=55 S0=0

Practical Peripherals Practical 2400
ATE1Q0V1X4&C1&D2 S11=55 S0=0 S7=60

Practical Peripherals 2400SA
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Practical Peripherals 2400 Pocket Modem
AT&C1&D2 S11=60 S7=60 S0=0

Practical Peripherals 2400SA MNP
AT&F X4&C1&D2\Q3\N3\J0\V1

Practical Peripherals 2400SA MNP - Auto Reliable
AT&FX4&C1&D2\Q3\N3\J0\V1S7=60S11=60

Practical Peripherals 2400SA MNP - MNP-4 mode
AT&F%C0X4&C1&D2\Q3\N3\J0\V1S7=60S11=60

Practical Peripherals 2400SA V.42bis
AT&F&C1&D2S7=60S11=60

Practical Peripherals 2400SA V.42bis - Auto Reliable
AT&F&C1&D2S7=60S11=60

Practical Peripherals 2400SA V.42bis - MNP-4 mode
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AT&F%C0&C1&D2 S7=60S11=60

Practical Peripherals PM9600SA V.32/V.42bis
AT&F&C1&D2S7=60S95=45S11=60

Practical Peripherals PM9600SA V.32 - Auto Reliable
AT&F &C1 &D2 S7=60 S11=60 S95=41

Practical Peripherals PM14400FXSA
AT&F&C1&D2W1S7=60S95=41S11=60

Practical Peripherals PM14400FXSA - Auto Reliable
AT&F&C1&D2W1S7=60S11=60S95=41

Practical Peripherals PM14400FXSA - MNP-4 Mode
AT&F&Q9&C1&D2W1S7=60S11=60S95=41

Practical Peripherals PM9600FXMT
AT&F&C1&D2&Q5&K3S7=60S95=45S11=60

Practical Peripherals PM9600FXMT - Auto Reliable
AT&F&C1&D2&K3&Q5S7=60S11=60S95=45

Practical Peripherals PM9600FXMT - MNP-4 mode
AT&F&C1&D2&K3&Q8&Q9S7=60S11=60S95=45

Practical Peripherals PM9600FXMT - Direct mode
AT&F&C1&D2&K3&Q0S7=60S11=60S95=45

Practical Peripherals PM14400FXMT
AT&F&C1&D2&K3&Q5W2S7=60S95=41S11=60

Practical Peripherals PM14400FXMT - Auto Reliable
AT&F&C1&D2&K3&Q5W2S7=60S95=41S11=60

Practical Peripherals PM14400FXMT - MNP-4 Mode
AT&F&C1&D2&K3&Q9W2S7=60S95=41S11=60

Practical Peripherals PM2400SA (no MNP or V.42)
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

Practical Peripherals 2400 SA (ARA 1.0)
InitString=AT&FE0&C1&D3
AnswerInit=AT&FE0&C1&D3S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

Practical Peripherals PM2400SA (V.42bis)
InitString=AT&F&C1&D3&K3&Q5S7=60
AnswerInit=AT&F&C1&D3&K3&Q5S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware
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Practical Peripherals PM2400PPM (no MNP or V.42)
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

Practical Peripherals PM9600SA (V.42bis)
InitString=AT&F&C1&D3&K3&Q5S46=138S48=7S7=60
AnswerInit=AT&F&C1&D3&K3&Q5S46=138S48=7S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Practical Peripherals 9600 SA (ARA 1.0)
InitString=AT&FE0&K0&C1&D3&Q0
AnswerInit=AT&FE0&K0&C1&D3&Q0S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Practical Peripherals PM144MT II MiniTower
InitString=AT&FW2X4&Q5&C1&D3S7=60S95=47
AnswerInit=AT&FW2X4&Q5&C1&D3S7=60S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals PM14400FX (V.42bis)
InitString=AT&F&C1&D3&K3&Q5S7=60S36=7S46=2S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5S7=60S36=7S46=2S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals PM14400FXMT (ARA 1.0)
InitString=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0
AnswerInit=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Practical Peripherals PM14400FXSA (ARA 1.0)
InitString=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0
AnswerInit=AT&F&C1&D3E0W1&Q6Y1S7=60S46=0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Practical Peripherals PM144HC II
InitString=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=2S48=7S95=47
AnswerInit=AT&FW2&C1&D3&K3&Q5S7=60S36=7S46=2S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals PM14400SA (V.42bis)
InitString=AT&F&C1&D3&K3&Q5S7=60S36=7S46=2S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5S7=60S36=7S46=2S48=7S95=47S0=1&W
BPSRate=57600
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FlowControl=Hardware

Practical Peripherals ProClass 28800 V.FC
InitString=AT&F&C1&D3E1Q0X4&K3S7=60
AnswerInit=AT&F&C1&D3E1Q0X4&K3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals ProClass 28800 V.34
InitString=AT&F&C1&D3E1Q0X4&K3S7=60
AnswerInit=AT&F&C1&D3E1Q0X4&K3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals MC288MT II V.34
InitString=AT&FW2&C1&D3&K3S7=60
AnswerInit=AT&FW2&C1&D3&K3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals PM288MT II V.34
InitString=AT&F0W2&C1&D3S7=60
AnswerInit=AT&F0W2&C1&D3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Practical Peripherals PM288MTII (ARA 1.0)
InitString=AT&FW2&C1&D3E1Q0X4&K3S7=60
AnswerInit=AT&FW2&C1&D3E1Q0X4&K3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware
ARAv1=1

Premier Innovations P2400 / P2400E
AT&FS7=60

Prometheus, Home Office 144i
AT Q0V1

Prometheus, Home Office Fax Modem
AT Q0V1

Prometheus, Other
AT E1Q0V1X4

Prometheus, ProModem 144e
AT&F0V1&Q6&C1&D2Q0E1X4&K3

Prometheus, ProModem 144i
AT&F0V1&Q6&C1&D2Q0E1X4&K3

Prometheus, Ultima 9600
AT E1Q0V1

Prometheus, Ultima Home Office
AT Q0V1
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Prometheus LineLink (ARA 1.0)
InitString=AT&FW2&C1&D3&Q6&R0%C0\NOW1
AnswerInit=AT&FW2&C1&D3&Q6&R0%C0\NOW1SO=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Prometheus LineLink
InitString=AT&F&C1&D3&R0\Q3\V1W1
AnswerInit=AT&F&C1&D3&R0\Q3\V1W1S0=1&W
BPSRate=38400
FlowControl=Hardware

Prometheus ProModem 2400MNP/2400BMNP (MNP 5)
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=4800
FlowControl=Hardware

Prometheus ProModem 2400 (ARA 1.0)
InitString=AT&FE0&D3
AnswerInit=AT&FE0&D3S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

Prometheus ProModem 9600 Plus (V.42)
InitString=AT&F&C1&D3*E7*F3S7=60
AnswerInit=AT&F&C1&D3*E7*F3S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Prometheus ProModem 9600 (ARA 1.0)
InitString=AT&F&C1E0\Q0\J1&D3\N0\34H0%C0-J0
AnswerInit=AT&F&C1E0\Q0\J1&D3\N0\34H0%C0-J0S0=1&W
BPSRate=9600
FlowControl=Hardware
ARAv1=1

Prometheus ProModem 144e
InitString=AT&FW2&C1&D3&K3&Q5\N6\Q3\V1%C1S7=60
AnswerInit=AT&FW2&C1&D3&K3&Q5\N6\Q3\V1%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Prometheus ProModem 144e
AT&FE0L0Q0V1X4&C1&D3\N6S7=60

Prometheus ProModem Ultima (V.42bis)
InitString=AT&F&C1&D3*E9*F3*S1S7=60
AnswerInit=AT&F&C1&D3*E9*F3*S1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Prometheus ProModem Ultima (ARA 1.0)
InitString=AT&F&C1&D3E0*F3*E0*S0
AnswerInit=AT&F&C1&D3E0*F3*E0*S0S0=1&W
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BPSRate=19200
FlowControl=Hardware
ARAv1=1

Prometheus ProModem Ultima
AT&FS7=60S0=0*F3

Prometheus ProModem Ultima - Auto Reliable
AT&FS7=60S0=0*F3

Prometheus ProModem Ultima - V.42 mode
AT&F ATS7=60S0=0*F3*E7

Prometheus ProModem Ultima - MNP-5 mode
AT&FS7=60S0=0*F3*E1

Prometheus ProModem Ultima - MNP-4 mode
AT&FX4S7=60S0=0*F3*E3

Prometheus Ultima Home Office
AT&F&C1&D2\Q3\J0\N3\V1%C1S7=60 S11=60 S0=0

Prometheus Ultima Home Office - Auto Reliable
AT&F&C1&D2\Q3\J0\N3\V1%C1 AT S7=60S0=0S11=60

Prometheus Ultima Home Office - MNP-4 mode
AT&F&C1&D2\Q3\J0\N3\V1%C0 ATS7=60S0=0S11=60

Prometheus Pro Modem 1200
ATE1Q0V1X1 S7=60 S11=55 S0=0

Prometheus 2400 MCT-24I Half-card
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Prometheus 9600 Plus
AT&F*F3

Prometheus 9600 Plus - Auto Reliable
AT&F*F3

PSI Comstation
AT&C1&D2X3

Psion Dacom Gold PC3
AT&FF3X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC3 - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC3 - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC3 - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC4
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1
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Psion Dacom Gold PC4 - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom Gold PC4 - MNP-4 mode
AT&FF3%C0X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC4 - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC4 - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC4 Fax
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom Gold PC4 Fax - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom Gold PC4 Fax - MNP-4 mode
AT&FF3%C0X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC4 Fax - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom Gold PC4 Fax - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 3
AT&FF3X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 3 - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 3 - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 3 - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 4
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM 4 - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM 4 - MNP-4 mode
AT&FF3%C0X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 4 - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 4 - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 4 Fax
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1
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Psion Dacom PDM 4 Fax - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM 4 Fax- MNP-4 mode
AT&FF3%C0X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 4 Fax - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM 4 Fax - V.23 mode
AT&F ATF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM30
AT&FF3X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM30 - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM30 - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM30 - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM40
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM40 - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM40 - MNP-4 mode
AT&FF3%C0X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM40 - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM40 - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM40F
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM40F - Auto Reliable
AT&FF3X4&C1&D2&I1&J2&K2&R0%C1

Psion Dacom PDM40F - MNP-4 mode
AT&FF3%C0X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM40F - V.21 mode
AT&FF1X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM40F - V.23 mode
AT&FF4X4&C1&D2&I1&J2&K2&R0

Psion Dacom PDM50F
AT&FF8X4&C1&D2&Q5&K3&R0\N3%C3W2
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Psion Dacom PDM50F - Auto Reliable
AT&FF8X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion Dacom PDM50F - MNP-4 mode
AT&FF8X4&C1&D2&Q5&K3&R0\N3%C2W2

Psion Dacom PDM50F - V.21 mode
AT&FF1X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion Dacom PDM50F - V.23 mode
AT&FF3X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion Dacom PDM60F
AT&FF8X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion Dacom PDM60F - Auto Reliable
AT&FF8X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion Dacom PDM60F - MNP-4 mode
AT&FF8X4&C1&D2&Q5&K3&R0\N3%C2W2

Psion Dacom PDM60F - V.21 mode
AT&FF1X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion Dacom PDM60F - V.23 mode
AT&FF3X4&C1&D2&Q5&K3&R0\N3%C3W2

Psion, Dacom Quad
ATB0 F3 &K1 V1E1Q0

Psion, Other
AT E1Q0V1X4

PureData PDMCIA 2400
AT&F\V2 S7=60 S11=60

PureData PDMCIA 2400 - Auto Reliable
AT&F\V2 S7=60 S11=60

PureData PDMCIA 2400 - MNP-4 mode
AT&F\V2 S7=60 S11=60

QuickComm 14.4
AT&FS7=60S0=0*F3

QuickComm 14.4 - Auto Reliable
AT&FS7=60S0=0*F3

QuickComm 14.4 - V.42 mode
AT&FS7=60S0=0*F3*E7

QuickComm 14.4 - MNP-5 mode
AT&FS7=60S0=0*F3*E1

QuickComm 14.4 - MNP-4 mode
AT&FX4S7=60S0=0*F3*E3
```

```
QuickComm Spirit II
AT&F &C1 &D2 X4 *E9 *F3 *N6 S7=60 S0=0

QuickComm Spirit II - Auto Reliable
AT&F&C1&D2X4*E9*F3*N6S7=60S0=0

QuickComm Spirit II - V.42 mode
AT&F&C1&D2X4*E7*F3*N6S7=60S0=0

QuickComm Spirit II - MNP-5 mode
AT&F&C1&D2X4*E1*F3*N6S7=60S0=0

QuickComm Spirit II - MNP-4 mode
AT&F&C1&D2X4*E3*F3*N6S7=60S0=0

Quickcom, Other
AT E1Q0V1X4

Quickcom, V.32
AT E1Q0V1 *E0*F1

Quicktel, 28.8
AT E1Q0V1X4&K3

Quicktel, Other
AT E1Q0V1X4

QVC 14.4
AT&F2&C1&D2%C1\J0\N6\Q3S0=0S7=60S11=60\V1

QVC 14.4 - Auto Reliable Mode
AT&F2&C1&D2%C1\J0\N6\Q3S0=0S7=60S11=60\V1

QVC 14.4 - MNP-4 Mode
AT&F2&C1&D2%C0\J0\N6\Q3S0=0S7=60S11=60\V1

Racal Datacom ALM 3223 (V.42bis)
InitString=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60
AnswerInit=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Racal Datacom ALM 3226
InitString=AT&F&C1&D3\N3W1S7=60S24=0S95=1
AnswerInit=AT&F&C1&D3\N3W1S7=60S24=0S95=1S0=1&W
BPSRate=57600
FlowControl=Hardware

Racal Datacom ALM 3239
InitString=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60
AnswerInit=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Racal Datacom RMD 3264
InitString=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60
```

```
AnswerInit=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Racal Datacom ALM 3268
InitString=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60
AnswerInit=AT&F&C1&D3\M0\N3\P2\Q1\V1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Racal Datacom Excalibur Dual Modec
InitString=AT
AnswerInit=AT
BPSRate=115200
FlowControl=Hardware

Racal-Datacom RMD 2412
AT&F&C1&D2X4*C1*D1*E1*L1S0=0S7=60S11=60

Racal-Datacom RMD 2412 - Auto Reliable
AT&F&C1&D2X4*C1*D1*E1*L1S0=0S11=60S7=60

Racal-Datacom RMD 2412 - MNP-4 mode
AT&F&C1&D2X4*C1*D0*E1*L1S0=0S11=60S7=60

Racal-Datacom RMD 2412 - 2400-compatible mode
AT&F&C1&D2X4*C0*D0*E0*L1S0=0S11=60S7=60

Racal-Datacom RMD 2412/2
AT&F&C1&D2X4*C1*D1*E1S0=0S7=60S11=60

Racal-Datacom RMD 2412/2 - Auto Reliable
AT&F&C1&D2X4*C1*D1*E1S0=0S11=60S7=60

Racal-Datacom RMD 2412/2 - MNP-4 mode
AT&F&C1&D2X4*C1*D0*E1S0=0S11=60S7=60

Racal-Datacom RMD 2412/2 - 2400-compatible mode
AT&F&C1&D2X4*C0*E0S0=0S11=60S7=60

Racal-Datacom RMD 3221
AT&FX9&C1&D2*F2S7=60S11=60S0=0

Racal-Datacom RMD 3221 - Auto-Reliable mode
AT&FX9&C1&D2*F2S0=0S7=60S11=60

Racal-Datacom RMD 3222
AT&FX4&C1&D2\N3\Q1\B1S7=60S11=60S0=0

Racal-Datacom RMD 3222 - Auto-Reliable mode
AT&FX4&C1&D2\N3\Q1\B1S0=0S7=60S11=60

Racal-Datacom ALM 3223
AT&F &C1 &D2 \Q1 L1 S7=60 S11=55

Racal-Datacom ALM 3223 - Auto Reliable
AT&F&C1&D2\Q1L1S7=60S11=55
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Racal-Datacom ALM 3223 - MNP-5 mode
AT&F&C1&D2\C5\P1\Q1L1S7=60S11=55

Racal-Datacom ALM 3223 - MNP-4 mode
AT&F&C1&D2\C4\P1\Q1L1S7=60S11=55

Racal-Datacom ALM 3226
AT&F&C1&D2W2L2S0=0S7=60

Racal-Datacom ALM 3226 - Auto Reliable
AT&F&C1&D2W2L2S0=0S7=60

Racal-Datacom ALM 3226 - MNP-4 mode
AT&F&C1&D2%C2W2L2S0=0S7=60

Racal-Datacom ALM 3226 - 2400-Compatible mode
AT&F&C1&D2\N0&K0W2L2S0=0S7=60

Racal-Datacom RMD 3264
AT&F &C1 &D2 \Q1 L1 S7=60 S11=55

Racal-Datacom RMD 3264 - Auto Reliable
AT&F&C1&D2\Q1L1S7=60S11=55

Racal-Datacom RMD 3264 - MNP-5 mode
AT&F&C1&D2\C5\P1\Q1L1S7=60S11=55

Racal-Datacom RMD 3264 - MNP-4 mode
AT&F&C1&D2\C4\P1\Q1L1S7=60S11=55

Racal-Datacom Inc., All
AT E1Q0V1X4

Racal-Milgo,  RMD 3221
AT E1Q0V1X4&K3

Racal-Milgo,  RMD 3222
AT E1Q0V1X4&K3

Racal-Milgo, Other
AT E1Q0V1X4

Racal-Vadic,  9600VP
AT E1Q0V1X4&K3

Racal-Vadic,  9632PA
AT E1Q0V1X4&K3

Racal-Vadic,  VA212
AT E1Q0V1X4&K3

Racal-Vadic,  VA3451
AT E1Q0V1X4&K3

Racal-Vadic, Other
AT E1Q0V1X4
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Racal-Vadic 1200PA
AT&F&C1&D2

Racal-Vadic 2400/PS
AT&F*F2&C1&D2*E1&Y0

Racal-Vadic 2400/PS - Auto Reliable
AT&F*F2&C1&D2 *E1 S7=60 S11=60

Racal-Vadic 2400/LC
AT&F*F2&C1&D2*P1*E1S7=60S11=60 &Y0

Racal-Vadic 2400/LC - Auto Reliable
AT&F*F2&C1&D2 *P1 *E1 S7=60 S11=60

Racal-Vadic LC2400PC
ATZATS7=60S11=55

Racal-Vadic 2400PA
E O1142

Racal-Vadic 2400PA Model 2
AT&FX4*F2&C1&D2*P1*L1*Q1*E1S7=60S11=60&Y0

Racal-Vadic 2400PA Model 2 - Auto Reliable
AT&FX4*F2&C1&D2*P1*L1*Q1*E1S7=60S11=60

Racal-Vadic 2400VP
AT&FX4*F2&C1&D2*P1*Q1*E1S7=60S11=60&Y0

Racal-Vadic 2400VP - Auto Reliable
AT&FX4*F2&C1&D2*P1*Q1*E1S7=60S11=60

Racal-Vadic 9600VP
AT&F&C1*C1&D2*F2Y1*Q1

Racal-Vadic 9600VP - Auto Reliable
AT&F&C1&D2*F2Y1*Q1S7=60

Racal-Vadic 9632PA
AT&F&C1&D2S7=60

Racal-Vadic 9632PA - Auto Reliable
AT&F &C1 &D2 S7=60

Racal-Vadic VA212
E O 1 3 1 2 16 2 17 2 19 9 E

Racal-Vadic VA3451
E

Rockwell RPI-based 2400
ATE1Q0V1X4&C1&D2S7=60S11=55S0=0+H1

ROLMphone 244PC
ATE1Q0V1X1%P0%C1S0=0
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SAI Systems & Laboratories, All
AT E1Q0V1X4

Sanyo Modem MBCNB
InitString=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

S.A.T. 3202S V110 38400 (ISDN)
InitString=AT&FC2E1Q0V1X1&R0&C1S0=2
AnswerInit=AT&FC2E1Q0V1X1&R0&C1S0=2&W
InitBPSRate=38400
BPSRate=38400
FlowControl=None
ISDN=Yes

S.A.T. 3202S V14e 57600 (ISDN)
InitString=AT&FC2E1Q0V1X1&R0&C1S0=2
AnswerInit=AT&FC2E1Q0V1X1&R0&C1S0=2&W
InitBPSRate=57600
BPSRate=57600
FlowControl=None
ISDN=Yes

Seda, 28.8
AT E1Q0V1X4&K3

Seda, Other
AT E1Q0V1X4

Shiva,  NetModem/E
AT E1Q0V1X4&K3

Shiva, Other
AT E1Q0V1X4

Shiva V.32bis Modem Module
InitString=AT&FW1&C1&D3&K3&Q5&S1%C3\N3S95=255S0=1
AnswerInit=AT&FW1&C1&D3&K3&Q5&S1%C3\N3S95=255S0=1&W
BPSRate=115200
FlowControl=Hardware

Shiva V.34 Modem Module
InitString=AT&FW1&C1&D3&K3&Q5&S1%C3\N3S95=47S0=1
AnswerInit=AT&FW1&C1&D3&K3&Q5&S1%C3\N3S95=47S0=1&W
BPSRate=115200
FlowControl=Hardware

Shiva V.32bis Modem Module (ARA 1.0)
InitString=AT&FW1&C1&D3&K3&Q0&S1S95=47S0=1
AnswerInit=AT&FW1&C1&D3&K3&Q0&S1S95=47S0=1&W
BPSRate=115200
FlowControl=Hardware
ARAv1=1
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Shiva V.34 Modem Module (ARA 1.0)
InitString=AT&FW1&C1&D3&K3&Q0&S1S95=47S0=1
AnswerInit=AT&FW1&C1&D3&K3&Q0&S1S95=47S0=1&W
BPSRate=115200
FlowControl=Hardware
ARAv1=1

Shiva NetModem/E
AT&FS7=60S11=55S12=1

Shiva NetModem/E - Auto Reliable
AT&FS7=60S11=55S12=1I68

Shiva NetModem/E - V.42bis mode
AT&FS7=60S11=55S12=1S46=138I68

Shiva NetModem/E - V.42 mode
AT&FS7=60S11=55S12=1S46=136I68

SIIG, Other
AT E1Q0V1X4

SIIG, SI-1414i
AT E1Q0V1X4&K3

Starlit Designer 9600
AT&F1 X4 &C1 &D2 &R0 &Y0 &M5 %C1 \J0 \N3 \Q3 W1
&K3

Starlit Designer 9600 - Auto Reliable
AT&F1X4&C1&D2&R0&M5\J0\N3\Q3W1&K3 S7=60S11=55

Starlit Designer 9600 - MNP-4 mode
AT&F1%C0X4&C1&D2&R0&M5\J0\N3\Q3W1&K3 S7=60S11=55

SmartLink 9600UM
AT&FX4 &C1 &D2 &R0 &Y0 &M5 %C1 \J0 \N5 \Q3

SmartLink 9600UM - Auto Reliable
AT&FX4&C1&D2&R0&M5\J0\N5\Q3 S7=60S11=55

SmartLink 9600UM - MNP-4 mode
AT&F%C0X4&C1&D2&R0&M5\J0\N5\Q3 S7=60S11=55

Spartan 14.4 Turbo
AT&F2&C1&D2S11=55S7=60S0=0

Spartan 14.4 Turbo - Auto Reliable mode
AT&F2&C1&D2S11=55S7=60S0=0

Spartan 14.4 Turbo - MNP-4
AT&F2&C1&D2\N3%C0S11=55S7=60S0=0

Spartan 14.4 Turbo - 2400 Direct
AT&F2&C1&D2B6\N0S11=55S7=60S0=0

Supra Corp., Other
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AT E1Q0V1X4

Supra Corp., SupraExpress 144i
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 14.4i
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 14.4ilc
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 144PB
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 28.8i
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 288
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 288PB
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem 9600
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem Plus
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem V.32
AT&F E1Q0V1X4

Supra Corp., SupraFAXModem V.32bis
AT&F E1Q0V1X4

Supra SupraModem 2400
InitString=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=30
AnswerInit=AT&F&C1&D3\J0\N3\Q2\V1%C1S7=30S0=1&W
BPSRate=9600
FlowControl=Hardware
LockBPS=No

Supra SupraModem 2400 (ARA 1.0)
InitString=AT&F&C1E0\N1&D3
AnswerInit=AT&F&C1E0\N1&D3S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

Supra SupraModem 2400 MNP (MNP 5)
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=Hardware

Supra SupraModem 2400 Plus (V.42bis)
InitString=AT&F&C1&D3\J0\N3\Q2\V2-J1%C1"H3S7=60
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AnswerInit=AT&F&C1&D3\J0\N3\Q2\V2-J1%C1"H3S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

SupraFaxPlus 2400 (ARA 1.0)
InitString=AT&FE0&K3S23=61W1X4&Q5\NS46=136
AnswerInit=AT&FE0&K3S23=61W1X4&Q5\NS46=136S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1

Supra FAXModem V.32bis (V.42bis)
InitString=AT&F2N1W2&C1&D3&K3&Q5%C1S7=60
AnswerInit=AT&F2N1W2&C1&D3&K3&Q5%C1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Supra FAXModem 144 LC
InitString=AT&FN1W2&C1&D1&K3&Q5\N3%C1S7=60S36=7S48=7S95=45
AnswerInit=AT&FN1W2&C1&D1&K3&Q5\N3%C1S7=60S36=7S48=7S95=45S0=1&W
BPSRate=57600
FlowControl=Hardware

SupraFax 14400 (ARA 1.0)
InitString=AT&F&C1&D3E0&K3S23=61N1W1X4&Q5&D0\N
AnswerInit=AT&F&C1&D3E0&K3S23=61N1W1X4&Q5&D0\NS0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Supra FAXModem 28.8
InitString=AT&FN1W2&C1&D1&K3&Q5\N3%C1S7=60S36=7S48=7S95=45
AnswerInit=AT&FN1W2&C1&D1&K3&Q5\N3%C1S7=60S36=7S48=7S95=45S0=1&W
BPSRate=57600
FlowControl=Hardware

SupraFax 28800 (ARA 1.0)
InitString=AT&F&Q6&D3%C0\NOW1X4S7=60
AnswerInit=AT&F&Q6&D3%C0\NOW1X4S7=60S)=1&W
BPSRate=57600
FlowControl=Hardware
ARAv1=1

Supra Modem 2400
ATE1Q0V1X4 &C1&D2 S7=60 S11=55 S0=0

Supra 2400 MNP
AT&F2&C1&D2

Supra 2400 MNP - Auto Reliable
AT&F2 &C1 &D2 S7=60 S11=60

Supra 2400 MNP - MNP-4 mode
AT&F2 %C0 &C1&D2 S7=60 S11=60

Supra 2400 Plus (V.42bis)
AT&F2 \V2&C1&D2
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Supra 2400 Plus - Auto Reliable
AT&F2 \V2 &C1 &D2 S7=60 S11=60

Supra 2400 Plus - MNP-4 mode
AT&F2%C0 \V2 &C1&D2 S7=60 S11=60

Supra 9600
AT&F&C1&D2\J0\Q3\V1\N3S11=60

Supra 9600 - Auto-Reliable mode
AT&F AT\J0\Q3\V1\N3 S11=60

Supra 9600 - V.42 mode
AT&F %C0 \J0 \Q3 \V1 \N3 S11=60

Supra 9600 - MNP-4 mode
AT&F%C0 \J0 \Q3 \V1 \N3 S11=60

Supra FaxModem 14.4
AT&F2W1S7=60S11=55S95=41

Supra FaxModem 14.4 - Auto Reliable
AT &F2 W1 S95=41 S7=60 S11=55

Supra FaxModem 14.4 - V.42 mode
AT &F2 W1 S95=41 S7=60 S11=55 %C0

Supra FaxModem 14.4 - MNP-10 mode
AT &F2 -K1 W1 S95=41 S7=60 S11=55

Supra FaxModem 14.4 - MNP-5 mode
AT &F2 \N3 %C1 W1 S95=41 S7=60 S11=55

Supra FaxModem 14.4 - MNP-4 mode
AT &F2 \N3 %C0 W2 S95=41 S7=60 S11=55

Supra FaxModem 14.4 - 2400 mode
AT &F \N1 &K0 W1 S95=41 S7=60 S11=55

Swan, Other
AT E1Q0V1X4

Synappsys 14.4
AT&F2&C1&D2%C1\J0\N6\Q3S0=0S7=60S11=60\V1

Synappsys 14.4 - Auto Reliable Mode
AT&F2&C1&D2%C1\J0\N6\Q3S0=0S7=60S11=60\V1

Synappsys 14.4 - MNP-4 Mode
AT&F2&C1&D2%C0\J0\N6\Q3S0=0S7=60S11=60\V1

Sysdyne MDM24H
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Sysdyne, Other
AT E1Q0V1X4
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Tandata, Other
AT E1Q0V1X4

Tandata, TM500
ATZ &C1&D2 E1V1Q0X1

Tandy, Other
AT E1Q0V1X4

Tandy 1200-bps Half Card
ATE1Q0V1X1 S7=60 S11=55 S0=0

Telebit Corp., Other
AT E1Q0V1X4

Telebit Corp., QBlazer
AT&F E1Q0V1X4 S50=254 S58=2 S68=255 S61=0 S63=0 &C1&D2

Telebit Corp., QBlazer Plus
AT&F E1Q0V1X4 S50=254 S58=2 S68=255 S61=0 S63=0 &C1&D2

Telebit Corp., T1000
AT E1Q0V1 S50=0S52=2S53=1S58=2S66=1S68=255S131=1

Telebit Corp., T1600
AT E1X4Q0V1 S50=254S51=252S52=2S58=2S61=0S68=255S180=0

Telebit Corp., T2000
AT E1Q0V1 S50=0 S52=2 S53=1 S58=2 S66=1 S68=255

Telebit Corp., T2500 High Speed
AT&F0  E1Q0V1X14 S52=2S58=2S93=8S95=0S131=1

Telebit Corp., T3000
AT&F0  E1X4Q0V1 &C1&D2 S58=2 S50=254 S51=252 S61=0 S63=0 S68=255 S93=8

Telebit Corp., TrailBlazer
AT&F0 E1Q0V1X4 S52=2S58=2S93=8S95=0S131=1

Telebit Corp., TrailBlazer Plus
AT&F0 E1Q0V1X4 S52=2S58=2S93=8S95=0S131=1

Telebit Corp., Worldblazer
AT&F0  E1X4Q0V1 &C1&D2 S58=2 S50=254 S51=252 S61=0 S63=0 S68=255 S93=8

Telebit T1600 (V.42bis)
InitString=AT&FX2&C1&D3&R3S7=60S51=6S58=0S59=15S68=2S180=2S190=1
AnswerInit=AT&FX2&C1&D3&R3S7=60S51=6S58=0S59=15S68=2S180=2S190=1S0=1&W
BPSRate=38400
FlowControl=Hardware

Telebit T1600 (ARA 1.0)
InitString=AT&F0&C1E0S58=0&D3X2S180=0S181=0
AnswerInit=AT&F0&C1E0S58=0&D3X2S180=0S181=0S0=1&W
BPSRate=9600
FlowControl=Hardware
```

```
ARAv1=1

Telebit T2500 (V.42bis)
InitString=AT~&FX2S7=60S51=5S52=2S66=1S68=2S97=1S98=3S106=1S131=1
AnswerInit=AT~&FX2S7=60S51=5S52=2S66=1S68=2S97=1S98=3S106=1S131=1S0=1&W
BPSRate=19200
FlowControl=Hardware

Telebit T3000 (V.42bis)
InitString=AT&FX2&C1&D3S51=6S58=2S59=7S68=2S7=60
AnswerInit=AT&FX2&C1&D3S51=6S58=2S59=7S68=2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Telebit T3000 (ARA 1.0)
InitString=AT&F&D3E0Q0X2S50=254S51=5S58=2S59=3S111=0S180=0S190=0
AnswerInit=AT&F&D3E0Q0X2S50=254S51=5S58=2S59=3S111=0S180=0S190=0S0=1&W
BPSRate=19200
FlowControl=Hardware<BR>
ARAv1=1

Telebit FastBlazer 8840/8840R
InitString=AT&F&C1&D3&E1&K3S7=60
AnswerInit=AT&F&C1&D3&E1&K3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Telebit QBlazer (V.42bis)
InitString=AT&FX2&C1&D3S59=7S68=2S7=60
AnswerInit=AT&FX2&C1&D3S59=7S68=2S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Telebit QBlazer Plus
InitString=AT&FX2&C1&D3S7=60S59=7S68=2S180=2S190=1
AnswerInit=AT&FX2&C1&D3S7=60S59=7S68=2S180=2S190=1S0=1&W<BR>
BPSRate=57600
FlowControl=Hardware

Telebit WorldBlazer (ARA 1.0)
InitString=AT&F&D3E0Q0X2S50=254S51=5S58=2S59=3S111=0S180=0S190=0
AnswerInit=AT&F&D3E0Q0X2S50=254S51=5S58=2S59=3S111=0S180=0S190=0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Telebit Internal PC Card w/ MNP
AT&FS11=60S51=5S58=2S66=1S95=2

Telebit Internal PC Card w/ MNP - PEP-Only mode
AT&FS7=60S11=60S50=255S51=5S58=2S66=1 S95=2

Telebit Internal PC Card w/ MNP - PEP-Last mode
AT&F S7=60S11=60S92=1S51=5S58=2S66=1 S95=2

Telebit T1000
ATS11=60S51=252S52=1S54=2S66=1S95=2S58=2S131=1
```

```
Telebit T1000 - Auto-Reliable mode
ATS11=60S51=252S52=1S54=2S66=1S95=2 ATS58=2S131=1

Telebit T1000 - PEP-mode
AT S11=60 S51=252 S52=1 S54=2S66=1S95=2 ATS50=255S58=2S131=1

Telebit T1000 - PEP-Last mode
AT S11=60 S51=252 S52=1 S54=2S66=1S95=2 ATS92=1S58=2S131=1

Telebit T1500
AT S11=60 S50=6 S51=254 S131=1S66=1 S97=1 S106=1 S95=2S58=2 S59=15

Telebit T1500 - Auto-Reliable mode
ATS11=60S50=6S51=254S131=1 ATS66=1S95=2S97=1S106=1

Telebit T1500 - V.42bis mode
ATS11=60S50=6S51=254S131=1 ATS66=1S97=1S106=1S98=3

Telebit T1500 - MNP-5 mode
ATS11=60S50=6S51=254S131=1 ATS66=1S95=2 S96=1 S97=0 S106=1

Telebit T1500 - MNP-4 mode
ATS11=60S50=6S51=254S131=1 ATS66=1S95=2S96=0S97=0S106=1

Telebit T1600
AT&F&C1&D2X12S11=60S51=253S58=2S59=15

Telebit T1600 - Auto-Reliable mode
AT&C1&D2X12S11=60S51=253S58=2S59=15

Telebit T1600 - V.42bis mode
AT&C1&D2X12S11=60S51=253S58=2S59=15S180=2 S190=1

Telebit T1600 - MNP-5 mode
AT&C1&D2X12S11=60S51=253S58=2S59=15S180=3 S190=1

Telebit T1600 - MNP-4 mode
AT&C1&D2X12S11=60S51=253S58=2S59=15S180=3 S190=0

Telebit T2000
AT&FS11=60S52=1S53=1S51=5S58=2S66=1S68=2S95=2S111=255

Telebit T2000 - Auto-Reliable mode
ATS11=60S51=252S52=1S53=1S58=2S66=1S68=2S95=2S111=255

Telebit T2000 - PEP-Only mode
ATS11=60S51=252S52=1S53=1S58=2S66=1S68=2S95=2S111=255S50=255

Telebit T2000 - PEP-Last mode
ATS11=60S51=252S52=1S53=1S58=2S66=1S68=2S95=2S111=255S92=1

Telebit T2500
ATS11=60S50=0S51=254S131=1S66=1S97=1S106=1S58=2S59=15

Telebit T2500 - Auto-Reliable mode
ATS11=60S50=0S51=254S131=1S66=1S97=1S106=1
```

```
Telebit T2500 - V.42bis mode
ATS11=60S50=0S51=254S131=1S66=1S97=1S106=1S98=3

Telebit T2500 - MNP-5 mode
ATS11=60S50=0S51=254S131=1S66=1S95=2 S96=1 S97=0 S106=1

Telebit T2500 - MNP-4 mode
ATS11=60S50=0S51=254S131=1S66=1S95=2S96=0S97=0S106=1

Telebit T2500 - PEP-Only mode
ATS11=60S50=255S51=254S131=1S66=1S95=2 S96=1 S97=0 S106=1

Telebit T2500 - PEP-Last mode
ATS11=60S50=0S51=254S131=1S66=1S95=2S97=0S106=1

Telebit T3000
AT&F9X12&C1&D2S59=15 S50=0S51=7

Telebit T3000 Auto Reliable mode
AT&F9TX12&C1&D2S50=0S59=15S190=1

Telebit T3000 V.32/V.42bis mode
AT&F9TX12&C1&D2S50=0S59=15S190=1

Telebit T3000 V.32bis/V.42bis mode
AT&F9TX12&C1&D2S50=0S59=15S190=1

Telebit T3000 - MNP-5 mode
AT&F9TX12&C1&D2S50=0S59=15S180=3S190=1

Telebit T3000 - MNP-4 mode
AT&F9TX12&C1&D2S50=0S59=15S180=3S190=0

Telebit T3000 - PEP-Only mode
AT&F9TX12&C1&D2S50=255S59=15

Telebit T3000 - PEP-Last mode
AT&F9TX12&C1&D2S50=0S59=15S92=1

Telebit Worldblazer
AT&F9X12&C1&D2S59=15 S50=0S51=7

Telebit Worldblazer - Auto Reliable mode
AT&F9TX12&C1&D2S50=0S59=15S190=1

Telebit Worldblazer - V.32/V.42bis mode
AT&F9TX12&C1&D2S50=0S59=15S190=1

Telebit Worldblazer - V.32bis/V.42bis mode
AT&F9TX12&C1&D2S50=0S59=15S190=1

Telebit Worldblazer - MNP-5 mode
AT&F9TX12&C1&D2S50=0S59=15S180=3S190=1

Telebit Worldblazer - MNP-4 mode
AT&F9TX12&C1&D2S50=0S59=15S180=3S190=0
```

```
Telebit Worldblazer - PEP-Only mode
AT&F9TX12&C1&D2S50=255S59=15

Telebit Worldblazer - PEP-Last mode
AT&F9TX12&C1&D2S50=0S59=15S92=1

Telebit Trailblazer
AT&FS131=1 S11=60 S51=252 S52=1S7=60 S58=2S66=1

Telebit Trailblazer - Auto-Reliable mode
ATS131=1S11=60S51=252S52=1S58=2S66=1S7=60

Telebit Trailblazer - V.42 mode
ATS131=1S11=60S51=252S52=1S58=2S66=1S7=60S98=0

Telebit Trailblazer - MNP-4 mode
ATS131=1S11=60S51=252S52=1S58=2S66=1S7=60S96=0

Telebit Trailblazer - PEP-only mode
ATS131=1S11=60S51=252S52=1S58=2S66=1S7=60S50=255

Telebit Trailblazer - PEP-last mode
ATS131=1S11=60S51=252S52=1S58=2S66=1S7=60S92=1

Telebit Q-Blazer
AT&FS11=60S51=252&C1&D2L1X4S58=2S59=15

Telebit Q-Blazer - Auto-Reliable mode
AT S11=60 S51=252 &C1 &D2 X4 S58=2S59=15

Telebit Q-Blazer - V.42bis mode
AT S11=60 S51=252 &C1 &D2 X4 S58=2S59=15 S180=2 S190=1

Telebit Q-Blazer - V.42 mode
AT S11=60 S51=252 &C1 &D2 X4 S58=2S59=15 S180=2 S190=0

Telebit Q-Blazer - MNP-5 mode
AT S11=60 S51=252 &C1 &D2 X4 S58=2S59=15 S180=3

Telebit Q-Blazer - MNP-4 mode
AT S11=60 S51=252 &C1 &D2 X4 S58=2S59=15 S180=3 S190=0

Telecraft Pocket Genius 14400
AT&F2S7=60S11=60

Telecraft Pocket Genius 14400 - Auto Reliable
AT&F2&C1&D2S7=60S0=0

Telecraft Pocket Genius 14400 - MNP-4 mode
AT&F2&C1&D2%C0S7=60S11=60

Telecraft Industries Inc., All
AT E1Q0V1X4

Teleglobe, All
AT E1Q0V1X4
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Telenetics Corp., All
AT E1Q0V1X4

Telsat 12/2447
ATE1Q0V1X4&C1&D2 S7=60 S0=0

Telsat 12/2472 MNP
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2472 MNP - Auto Reliable
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2472 MNP - MNP-4 mode
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0 AT%C0

Telsat 12/2481
ATE1Q0V1X4&C1&D2&S1 S7=60 S0=0

Telsat 12/2482 MNP
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2482 MNP - Auto Reliable
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2482 MNP - MNP-4 mode
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0%C0

Telsat 12/2491
ATE1Q0V1X4&C1&D2&S1 S7=60 S0=0

Telsat 12/2492
AT&FE1Q0V1X4&C1&D2\N0&K2&R2&M0S7=60S0=0

Telsat 12/2492 - Auto Reliable
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2492 - MNP-4 mode
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0%C0

Telsat 12/2492 MNP
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2492 MNP - Auto Reliable
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0

Telsat 12/2492 MNP - MNP-4 mode
AT&FE1Q0V1X4&C1&D2\N3&K2&R2&M0S7=60S0=0%C0

Telsat 2223
ATE1Q0V1X1&C1&D2&S1 S7=60 S0=0

Telsat 9662
AT&FE1Q0V1X4&C1&D2S7=60S0=0

Telsat 9662
AT&FE1Q0V1X4&C1&D2S7=60S0=0
```

```
Telsat 9662 - Auto Reliable
AT&FE1Q0V1X4&C1&D2S7=60S0=0

Telsat 9662 - MNP-4 mode
AT&FE1Q0V1X4&C1&D2S7=60S0=0%C0

Telsat 9662 MNP
AT&FE1Q0V1X4&C1&D2\N3&K3S7=60S0=0

Telsat 9662 MNP - Auto Reliable
AT&FE1Q0V1X4&C1&D2\N3&K3S7=60S0=0

Telsat 9662 MNP - MNP-4 mode
AT&FE1Q0V1X4&C1&D2\N3&K3S7=60S0=0%C0

Telsat 9682/D
AT&FE1Q0V1X4&C1&D2S7=60S0=0

Telsat 9682/D - Auto Reliable
AT&FE1Q0V1X4&C1&D2S7=60S0=0

Telsat 9682/D - MNP-4 mode
AT&FE1Q0V1X4&C1&D2S7=60S0=0%C0

Telsat 9682/D MNP
AT&FE1Q0V1X4&C1&D2\N3&K3S7=60S0=0

Telsat 9682/D MNP - Auto Reliable
AT&FE1Q0V1X4&C1&D2\N3&K3S7=60S0=0

Telsat 9682/D MNP - MNP-4 mode
AT&FE1Q0V1X4&C1&D2\N3&K3S7=60S0=0%C0

Telsat 9692/D
AT&FE1Q0V1X4&C1&D2S7=60S0=0

Telsat 9692/D - Auto Reliable
AT&E1Q0V1X4&C1&D2S7=60S0=0

Telsat 9692/D - MNP-4 mode
AT&FE1Q0V1X4&C1&D2S7=60S0=0%C0

Telsat 9692/D MNP
AT&FE1Q0V1X4&C1&D2&R1\N3&K3S7=60S0=0

Telsat 9692/D MNP - Auto Reliable
AT&FE1Q0V1X4&C1&D2&R1\N3&K3S7=60S0=0

Telsat 9692/D MNP - MNP-4 mode
AT&FE1Q0V1X4&C1&D2&R1\N3&K3S7=60S0=0%C0

Texas Instruments V.32bis
AT&F&C1&D2W2\V1%C1\J0\N7\Q3 S7=60 S11=60

Texas Instruments V.32bis - Auto-Reliable mode
AT&F&C1&D2W2\V1%C1\J0\N7\Q3S7=60S11=60
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Texas Instruments V.32bis - MNP-4 mode
AT&F&C1&D2W2\V1%C0\J0\N7\Q3S7=60S11=60

Texas Instruments V.32bis - 2400 mode
AT&F&C1&D2W2\V1%C0\J0\N7\Q3S7=60S11=60

Texas Instruments 9600 V.32/V.42bis
AT&F&C1&D2W2\V1%C1\J0\N7\Q3S7=60 S11=55

Texas Instruments 9600 V.32/V.42bis - Auto-Reliable mode
AT&F&C1&D2W2\V1%C1\J0\N7\Q3S7=60S11=55

Texas Instruments 9600 V.32/V.42bis - MNP-4 mode
AT&F&C1&D2W2\V1%C0\J0\N7\Q3S7=60S11=55

Texas Instruments 9600 V.32/V.42bis - 2400 mode
AT&F&C1&D2W2\V1%C0\J0\N7\Q3S7=60S11=60%B2400

Texas Instruments, All
AT E1Q0V1X4

The Complete PC Inc., All
AT E1Q0V1X4

TKR Faxmodem DM-24VF+ Postzugelassen
#AT &F
#AT +FCLASS=0
#AT &S0 B0 P E1 L2 M1 Q0 V1 X4 Y0
#AT &C1 &D3 &G0 &J0 &L0 &M0
#AT &P0 &R0 &S0 &X0 &Y0
#AT \A3 %C3 \G1
#AT \K5 \N3 &K3
#AT %E0 F0 W1 &Y0
#AT S0=0 S7=45
#AT &W0
#AT Z
#AT &F
#AT \N0 %C0
#AT &W1
#AT Z

TKR IM-144VF+  oder ACEEX DM-1496  oder  CSR 14400
#AT &F
#AT +FCLASS=0
#AT &Q0
#AT B0 P E1 L1 M1 Q0 V1 X3 Y0
#AT &C1 &D3 &G0 &P0
#AT &R0 &S0 &X0 &Y0 %P0
#AT %A13 \A3 %C1 \C0 \E0
#AT \G0 \J0 \K5 \N3 \Q3 \T0
#AT \V1 \X0 S0=0
#AT &Q5 W1 &K3
#AT &N0 &L0
#AT S95=3
#AT &W0
#AT Z
```

```
#AT \N1 %C0 &Q0
#AT &W1
#AT Z

TKR Datenmodem IM-24V+
#AT
#AT &F
#AT B0 P E1 L1 M1 Q0 V1 X3 Y0
#AT &C1 &D3 &G0 &J0 &L0
#AT &P1 &R0 &S0 &X0 &Y0 %A13
#AT \A3 \B3 %C1 \C2 \G1 \J0
#AT \K5 \N7 \T0 \V1 \X1
#AT \Q3
#AT S0=0 S7=45
#AT &W0 &W1
#AT Z

TKR Faxmodem IM-24VF+
Silbernes Alu-Gehäuse, D/V- und ORG/ANS-Schalter an der Frontseite.
#AT &F
#AT +FCLASS=0
#AT B0 P E1 L1 M1 Q0 V1 X3 Y0
#AT &C1 &D3 &G0 &J0 &L0
#AT &P0 &R0 &S0 &X0 &Y0 %A13
#AT \A3 \B3 %C1 \C2 \G1 \J0
#AT \K5 \N7 \T0 \V1 \X1
#AT S0=0 S7=45
#AT \Q3
#AT &W0
#AT Z
#AT \N1 %C0
#AT &W1
#AT Z

TKR Faxmodem IM-24VF+ II (neues Modell)
Schwarzes Gehäuse, keine Schalter an der Frontseite
#AT &F
#AT +FCLASS=0
#AT B0 P E1 L1 M1 Q0 V1 X3 Y0
#AT &C1 &D3 &G0 &J0 &L0
#AT &P0 &R0 &S0 &X0 &Y0 %A13
#AT \A3 %C1 \C2 \G1 \J0
#AT \K5 \N3 \T0 \V1 \X1
#AT S0=0 S7=45 S95=3
#AT \Q3 &Q5 W1
#AT &W0
#AT Z
#AT \N0 &Q0 &N3 %C0
#AT &W1
#AT Z

TKR Faxmodem DM-24VF+ Postzugelassen
#AT &F
#AT +FCLASS=0
#AT &S0 B0 P E1 L2 M1 Q0 V1 X4 Y0
#AT &C1 &D3 &G0 &J0 &L0 &M0
#AT &P0 &R0 &S0 &X0 &Y0
```

```
#AT \A3 %C3 \G1
#AT \K5 \N3 &K3
#AT %E0 F0 W1 &Y0
#AT S0=0 S7=45
#AT &W0
#AT Z
#AT &F
#AT \N0 %C0
#AT &W1
#AT Z

TKR Speedstar Postzugelassen
#AT &F
#AT +FCLASS=0
#AT B0 P E1 L1 M1 Q0 V1 X3 Y0
#AT &C1 &D2 &G0
#AT &R0 &S0 &X0 &Y0 %S0
#AT %A13 \A3 %C1 \C0 \E0 \H0
#AT \G0 \J0 \K5 \N6 \Q3 \T0
#AT \V1 \X0 S0=0
#AT &W0
#AT Z
#AT &F
#AT \N0
#AT &W1
#AT Z

Toshiba T144 D/F
AT&F&C1&D2\N7\J0\Q3\V2S7=60S11=55

Toshiba T144 D/F - Auto Reliable
AT&F&C1&D2\N7\J0\Q3\V2S7=60S11=55

Toshiba T144 D/F - MNP-4 mode
AT&F&C1&D2\N7\J0\Q3\V2%C0S7=60S11=55

Toshiba T24D/X
AT&F&C1 &D2 W1 X4 &K3 &Q5 &R0 \G0 \N3 %C1 S7=60
S11=60

Toshiba T24D/X - Auto-Reliable mode
AT &C1&D2W1X4&K3&Q5&R0\G0\N3%C1 S7=60S11=60

Toshiba T24D/X - MNP-4 mode
AT &C1&D2W1X4&K3&Q5&R0\G0\N3%C0S7=60S11=60

Toshiba, Other
AT E1Q0V1X4

Toshiba, T144D
AT E1Q0V1X4&K3

Touchbase Worldport 2496
ATE1Q0V1X4&C1&D2S0=0

Touchbase Worldport V.32 Pocket Modem
AT&F&C1 &D2 S7=60 S11=60\N3 \Q3 \J0 \V1
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Touchbase Worldport V.32 - Auto Reliable
AT&F&C1&D2\N3\Q3\J0\V1S7=60S11=60

Touchbase Worldport V.32 - MNP-4 mode
AT&F%C0&C1&D2\N3\Q3\J0\V1S7=60S11=60

TriCom, Business Administrator
AT&F  Q0V1 X1

TriCom, Other
AT E1Q0V1X4

TriCom, Tempest Quin
AT Q0V1E1

TriCom, Tornado 12/42
ATE1V1 Q0%C0\N4&C1&D2

TriCom, Tornado 5/42
AT&F \N2\J0\V1\Q3 E0&C1&D2 S0=1

Turbomodem, All
AT E1Q0V1X4

TYIN, All
AT E1Q0V1X4

Twinhead 2400 V.42
AT&F &C1 &D2 X4 \N3 %C2 W2 &Q5 S36=7 S46=138 S48=7 S7=60
S11=60

Twinhead 2400 V.42 - Auto Reliable
AT&F&C1&D2X4\N3%C2W2&Q5 S36=7S46=138S48=7S7=60 S11=60

Twinhead 2400 V.42 - MNP-4 mode
AT&F&C1&D2X4\N3%C0W2&Q5 S36=7S46=136S48=128S7=60 S11=60

UDS FasTalk FAX32bx
AT&F&C1 &D2 \Q3 &R0 S7=60

UDS FasTalk FAX32bx - Auto Reliable
AT&F &C1 &D2 \Q3 &R0 S7=60

UDS FasTalk FAX32bx - V.42bis mode
AT&F &C1 &D2 \Q3 &R0 S7=60 \N5

UDS FasTalk FAX32bx - V.42 mode
AT&F&C1 &D2 \Q3 \N5 &R0 %C0 S7=60

UDS FasTalk FAX32bx - MNP-5 mode
AT&F &C1 &D2 \Q3 \N3 &R0 S7=60

UDS FasTalk FAX32bx - MNP-4 mode
AT&F &C1 &D2 \Q3 &R0 S7=60 \N3 %C0

UDS FasTalk FAX32bx - 2400 Compatibile mode
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```
AT&F &C1 &D2 &R0 %B2400\Q0 S7=60 \N0

UDS FasTalk 32bx
AT&F&C1 &D2 \Q3 &R0 S7=60

UDS FasTalk 32bx - Auto Reliable
AT&F&C1 &D2 \Q3 &R0 S7=60

UDS FasTalk 32bx - V.42bis mode
AT&F&C1 &D2 \Q3 &R0 S7=60 \N5

UDS FasTalk 32bx - V.42 mode
AT&F &C1 &D2 \Q3 \N5 &R0 %C0 S7=60

UDS FasTalk 32bx - MNP-5 mode
AT&F &C1 &D2 \Q3 \N3 &R0 S7=60

UDS FasTalk 32bx - MNP-4 mode
AT&F &C1 &D2 \Q3 &R0 S7=60 \N3 %C0

UDS FasTalk 32bx - 2400 Compatibile mode
AT&F &C1 &D2 &R0 \Q0 %B2400 S7=60 \N0

UDS Fastalk V.32/V.42
AT&F&C1&D2%B9600C%C1\C1\J0\N3\Q3

UDS Fastalk V.32/V.42 - Auto Reliable
AT&F&C1&D2%B9600C%C1\C1\J0\N3\Q3

UDS Fastalk V.32/V.42 - V.42bis mode
AT&F&C1&D2%B9600C%C1\C1\J0\N3\Q3\N5

UDS Fastalk V.32/V.42- V.42 mode
AT&F&C1&D2%B9600C%C1\C1\J0\N3\Q3\N5%C0

UDS Fastalk V.32/V.42 - MNP-5 mode
AT&F&C1&D2%B9600C%C1\C1\J0\N3\Q3\N3

UDS Fastalk V.32/V.42 - MNP-4 mode
AT&F&C1&D2%B9600C%C1\C1\J0\N3\Q3\N3%C0

UDS V.3224/V.3225
AT&F&C1&D2%B6\N3\C1\J0\Q3\V1S0=0

UDS V.3224/V.3225 - MNP-5 mode
AT&F&C1&D2%B6\N3\C1\J0\Q3\V1S0=0

UDS V.3224/V.3225 - MNP-4 mode
AT&F&C1&D2%B6\N3\C1\J0\Q3\V1S0=0%C0

UDS V.3227
AT&F&C1&D2%B6\C1\J0\Q3S0=0

UDS V.3227 - Auto Reliable
AT&F &C1&D2%B6\C1\J0\Q3S0=0

UDS V.3227 - V.42bis mode
```

```
AT&F &C1&D2%B6\C1\J0\Q3S0=0\N5

UDS V.3227- V.42 mode
AT&F &C1&D2%B6\C1\J0\Q3S0=0\N5%C0

UDS V.3227 - MNP-5 mode
AT&F &C1&D2%B6\C1\J0\Q3S0=0\N3

UDS V.3227 - MNP-4 mode
AT&F &C1&D2%B6\C1\J0\Q3S0=0\N3%C0

UDS V.3229
AT&F&C1 &D2 \Q3 S0=0 S7=60

UDS V.3229 - Auto Reliable
AT&F&C1 &D2 \Q3 S0=0 S7=60

UDS V.3229 - V.42bis mode
AT&F&C1 &D2 \Q3 S0=0 S7=60 \N5

UDS V.3229- V.42 mode
AT&F &C1 &D2 \Q3 S0=0 \N5 %C0 S7=60

UDS V.3229 - MNP-5 mode
AT&F &C1 &D2 \Q3 S0=0 \N3 S7=60

UDS V.3229 - MNP-4 mode
AT&F &C1 &D2 \Q3 S7=60 S0=0 \N3 %C0

UDS Sync-Up V.32/5
AT&F&C1 &D2 &R0 %B9600C %C1 \N3 \J0 \Q3 S0=0 S7=60

UDS Sync-Up V.32/5 - Auto Reliable
AT&F &C1&D2&R0%B9600C%C1\N3\J0\Q3S7=60

UDS Sync-Up V.32/5 - MNP-4 mode
AT&F&C1&D2&R0%B9600C%C1\N3\J0\Q3S7=60

UDS LanFast
AT

UDS Motorola, FasTalk V.32/42
AT Q0 V1 X4&C1\J0\N7\V1\Q3%C0

UDS Motorola, Other
AT E1Q0V1X4

UDS Motorola, V.3224/V.3225
AT Q0 V1 X4&C1\J0\N7\V1\Q3%C0

UDS Motorola, V.3227
AT Q0 V1 X4&C1\J0\N7\V1\Q3%C0

Unisys 9600
AT&F&C1 &D2 %C1 \J0 \N3 \Q3 \V1 S7=60

Unisys 9600 - Auto Reliable
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AT&F &C1&D2%C1\J0\N3\Q3\V1S7=60

Unisys 9600 - MNP-4 mode
AT&F &C1&D2%C0\J0\N3\Q3\V1S7=60

Universal Data Systems Fastalk 2400
ATE1Q0V1X4&C1&D2 S7=60 S0=0

Universal Data Systems FasTalk V.32/42b (V.42bis)
InitString=AT&F&C1&D3\J0\M0\N7\V1\Q2%C1S7=60
AnswerInit=AT&F&C1&D3\J0\M0\N7\V1\Q2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Universal Data Systems V.32 (no MNP or V.42)
InitString=AT&F&C1&D2S7=60
AnswerInit=AT&F&C1&D2S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Universal Data Systems V.3224 (MNP 4)
InitString=AT&F&C1&D2\J0\N3\Q2S7=60
AnswerInit=AT&F&C1&D2\J0\N3\Q2S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware<BR>

Universal Data Systems V.3225 (MNP 5)
InitString=AT&F&C1&D2\J0\N3\Q2%C1S7=60
AnswerInit=AT&F&C1&D2\J0\N3\Q2%C1S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Universal Data Systems V.3227 (V.42bis)
InitString=AT&F&C1&D2\J0\M0\N7\Q2%C1S7=60
AnswerInit=AT&F&C1&D3\J0\M0\N7\Q2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Universal Data Systems V.3229 (V.42bis)
InitString=AT&F&C1&D3\J0\M0\N7\Q2%C1S7=60
AnswerInit=AT&F&C1&D3\J0\M0\N7\Q2%C1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

US Robotics Sportster 2400 (no MNP or V.42)
InitString=AT&F&C1&D3S7=60
AnswerInit=AT&F&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

US Robotics Sportster 2400 (MNP 5)
InitString=AT&F&C1&D3&B6&H1&I0&K1&M4S7=60
AnswerInit=AT&F&C1&D3&B6&H1&I0&K1&M4S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware
```

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US Robotics Sportster 2400 (V.42bis)
InitString=AT&FX4&A3&B1&H1&K2&M4S7=60
AnswerInit=AT&FX4&A3&B1&H1&K2&M4S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

US Robotics Sportster 9600 (V.42bis)
InitString=AT&FX4&A3&B1&D3&H1&I0&K1&M4S7=60
AnswerInit=AT&FX4&A3&B1&D3&H1&I0&K1&M4S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

US Robotics Sportster 14400 (V.42bis)
InitString=AT&FX4&A3&B1&D3&H1&I0&K1&M4S7=60
AnswerInit=AT&FX4&A3&B1&D3&H1&I0&K1&M4S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

US Robotics Sportster 14400 (ARA 1.0)
InitString=AT&FE0V1B0&H1&M0X4&A0&B1
AnswerInit=AT&FE0V1B0&H1&M0X4&A0&B1S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

US Robotics Sportster 28800
InitString=AT&FX4&A3&B1&D3&H1&I0&K1&M4S7=60
AnswerInit=AT&FX4&A3&B1&D3&H1&I0&K1&M4S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

US Robotics Sportster 28800 (ARA 1.0)
InitString=AT&FX4&B1&R2&C1&D3&H1&K0&M0&A0S7=60
AnswerInit=AT&FX4&B1&R2&C1&D3&H1&K0&M0&A0S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware
ARAv1=1

US Robotics Courier 2400 (no MNP or V.42)
InitString=ATZX4S7=60
AnswerInit=ATZX4S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

US Robotics Courier 2400e (MNP 4)
InitString=AT&F&M4&H1&I0&B6&N0S7=60
AnswerInit=AT&F&M4&H1&I0&B6&N0S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

US Robotics Courier 2400 (ARA 1.0)
InitString=AT&F&M0X4
AnswerInit=AT&F&M0X4S0=1&W
BPSRate=2400
FlowControl=Hardware
ARAv1=1
```

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US Robotics Courier V.32bis (V.42bis)
InitString=AT&FX4&A3&C1&D2&M4&H1&K1&B1
AnswerInit=AT&FX4&A3&C1&D2&M4&H1&K1&B1S0=1&W
BPSRate=38400
FlowControl=Hardware

US Robotics Courier V.32bis (ARA 1.0)
InitString=AT&F&D2E0&H1&M0X4
AnswerInit=AT&F&D2E0&H1&M0X4S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

US Robotics Courier V.32terbo (ARA 1.0)
InitString=AT&F&D2E0V1B0&H1&M0X4&A0
AnswerInit=AT&F&D2E0V1B0&H1&M0X4&A0S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

US Robotics Courier HST Dual Standard (V.42bis)
InitString=AT&FB0X4&A3&C1&D2&M4&H1&K1&B1
AnswerInit=AT&FB0X4&A3&C1&D2&M4&H1&K1&B1S0=1&W
BPSRate=38400
FlowControl=Hardware

US Robotics Courier HST (V.42bis)
InitString=AT&FB0X4&A3&C1&D2&M1&H1&K1&B1
AnswerInit=AT&FB0X4&A3&C1&D2&M1&H1&K1&B1S0=1&W
BPSRate=9600
FlowControl=Hardware

US Robotics Courier V.FC/V.34
InitString=AT&FB0X4&A3&C1&D2&M4&H1&K1&B1S7=60
AnswerInit=AT&FB0X4&A3&C1&D2&M4&H1&K1&B1S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

US Robotics WorldPort 2400 (no MNP or V.42bis)
InitString=AT&FX4&C1&D2S7=60
AnswerInit=AT&FX4&C1&D3S7=60S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

US Robotics WorldPort 2400 (V.42bis)
InitString=AT&FX4&C1&D3%C1"H3\J0-J1\N3\Q2\V2S7=60
AnswerInit=AT&FX4&C1&D3%C1"H3\J0-J1\N3\Q2\V2S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

US Robotics WorldPort 2496 FAX/Data (V.42bis)
InitString=AT&FX4&C1&D3%C1"H3\J0-J1\N3\Q2\V2S7=60
AnswerInit=AT&FX4&C1&D3%C1"H3\J0-J1\N3\Q2\V2S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware
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US Robotics WorldPort 9696 FAX/Data (MNP 5)
InitString=AT&FX4&C1&D3%C1\J0\N3\Q2\V2S7=60
AnswerInit=AT&FX4&C1&D3%C1\J0\N3\Q2\V2S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

US Robotics WorldPort 9600 (MNP 5)
InitString=AT&FX4&C1&D3%C1\J0\N3\Q2\V2S7=60
AnswerInit=AT&FX4&C1&D3%C1\J0\N3\Q2\V2S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

US Robotics WorldPort 14400 (V.42bis)
InitString=AT&FX4&A3&B1&C1&D3&H1&K1&M4S7=60
AnswerInit=AT&FX4&A3&B1&C1&D3&H1&K1&M4S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

US Robotics Sportster 1200/1200 PC
ATE1Q0V1X2 S7=60 S11=55 S0=0

US Robotics Sportster 2400/2400 PC
ATE1Q0V1X6&C1&D2 S7=60 S11=55 S0=0

US Robotics Sportster 2400 V.42bis
AT&FX4 &A3&B1&C1&D2&H1&K1 &R2 S7=60 S11=55

US Robotics Sportster 2400 V.42bis - Auto Reliable Mode
AT&F &B1&C1&D2&H1&K1&R2 S7=60S11=55

US Robotics Sportster 2400 V.42bis - MNP-4 Mode
AT&F &B1&C1&D2&H1&K3&R2 S7=60S11=55

US Robotics Sportster 9600/PC
AT&FX4&B1 &C1 &D2 &H1 &K1 &R2 S7=60 S11=55

US Robotics Sportster 9600/PC - Auto Reliable Mode
AT&F &B1&C1&D2&H1&K1&R2 S7=60S11=55

US Robotics Sportster 9600/PC - MNP-4 Mode
AT&F &B1&C1&D2&H1&K3&R2 S7=60S11=55

US Robotics Sportster 14.4
AT&FX4&B1 &C1 &D2 &H1 &K1 &R2 S7=60 S11=55

US Robotics Sportster 14.4 - Auto Reliable Mode
AT&F &B1&C1&D2&H1&K1&R2 S7=60S11=55

US Robotics Sportster 14.4 - MNP-4 Mode
AT&F &B1&C1&D2&H1&K3&R2 S7=60S11=55

US Robotics 2400PC
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

US Robotics 2400PC MNP
AT&FX4&K0&H1&R2 S7=60S11=60S0=0
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US Robotics 2400PC MNP - Auto Reliable
AT&F X4&K0&H1&R2S0=0S7=60 S11=60

US Robotics Courier 2400e/ 2400e/ps
AT&FX6&B6&H1&R2S7=60S11=55

USR Courier 2400e/ 2400e/ps - Auto Reliable
AT&F&C1&D2X6&B6&H1&R2 S7=60 S11=60

US Robotics Courier 2400PC
AT&FX6&B7&H1&R2S7=60S11=55

US Robotics Courier 2400PC - Auto Reliable
AT&F X6&B7&H1&R2 S7=60 S11=60

US Robotics Courier HST
AT&FX6&B1&H1&R2S7=60S11=55

US Robotics Courier HST - Auto Reliable
AT&F X6&B1 &H1 &R2 S7=60 S11=60

US Robotics Courier HST V.42
AT&FX6&B1&H1&R2&M4&A3S7=60S11=55

USR Courier HST V.42 - Auto Reliable
AT&F X6&B1&H1&R2&M4&A3 S7=60 S11=60

US Robotics Courier HST-ASL
AT&F&H1&R2&K3&B1&A3X7S7=60S11=60

US Robotics Courier HST-ASL - Auto Reliable
AT&F &H1&R2&K3&B1&A3 X7 S7=60 S11=60

US Robotics V.32
AT&FX6&H1&R2&B1S7=60S0=0

US Robotics V.32 - Auto Reliable
AT&F X6 &H1 &R2 &B1 S7=60 S11=60

US Robotics V.32bis-ASL
AT&F&H1&R2&K3&B1&A3X7S7=60S11=60

US Robotics V.32bis-ASL - Auto Reliable
AT&F X7 &H1&R2&K3&B1&A3 S7=60 S11=60

US Robotics Dual Standard
AT&FX6&B1&H1&R2S7=60S11=55

US Robotics Dual Standard - Auto Reliable
AT&F X6&B1&H1&R2 S7=60 S11=60

US Robotics Dual Standard V.32bis-ASL
AT&F&H1&R2&K3&B1&A3X7 S7=60S11=60

USR Dual Standard V.32bis-ASL - Auto Reliable
AT&F X7&H1&R2&K3&B1&A3S7=60S11=60
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USR Dual Standard V.32bis-ASL - HST mode
AT&F B1X7&H1&R2&K3&B1&A3S7=60S11=60

USR Dual Standard V.32bis-ASL - MNP-5 mode
AT&F X7&H1&R2&K1&B1&A3S7=60S11=60

US Robotics Dual Standard 16.8
AT&F&C1 &D2 &H1 &R2 &K3 &B1 &A3 X7
S7=60S11=60

USR Dual Standard 16.8 - Auto Reliable
AT&F &C1&D2X7&H1&R2&K3&B1&A3 S7=60S11=60

USR Dual Standard 16.8 - HST mode
AT&F &C1&D2B1X7&H1&R2&K3&B1&A3 S7=60S11=60

USR Dual Standard 16.8 - MNP-5 mode
AT&F &C1&D2X7&H1&R2&K1&B1&A3S7=60S11=60

US Robotics Dual Standard V.32 Terbo
AT&F&C1 &D2 &H1 &R2 &K3 &B1 &A3 X7
S7=60S11=55

US Robotics Dual Standard V.32 Terbo - Auto Reliable
AT&F&C1&D2X7&H1&R2&K3&B1&A3 S7=60S11=55

US Robotics Dual Standard V.32 Terbo - HST mode
AT&F&C1&D2B1X7&H1&R2&K3&B1&A3 S7=60S11=55

US Robotics Dual Standard V.32 Terbo - MNP-5 mode
AT&F&C1&D2X7&H1&R2&K1&B1&A3S7=60S11=55

US Robotics Worldport 2496
ATE1Q0V1X4&C1&D2S0=0

US Robotics Worldport V.32 Pocket Modem
AT&F&C1 &D2 S7=60 S11=60 \N3 \Q3 \J0 \V1

US Robotics Worldport V.32 - Auto Reliable
AT&F &C1&D2\N3\Q3\J0\V1S7=60S11=60

US Robotics Worldport V.32 - MNP-4 mode
AT&F %C0&C1&D2\N3\Q3\J0\V1S7=60S11=60

US Robotics WorldPort 14.4
AT&FX4&B1&C1&D2&H1&K1&R2S7=60S11=55

US Robotics WorldPort 14.4 - Auto Reliable Mode
AT&F &B1&C1&D2&H1&K1&R2 S7=60S11=55

US Robotics WorldPort 14.4 - MNP-4 Mode
AT&F &B1&C1&D2&H1&K3&R2 S7=60S11=55

US Robotics WorldPort 14.4 - V.23 Mode
AT&F &B1&C1&D2&H1&R2S34=8S7=60S11=55
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US Robotics WorldPort 9696 Fax Modem
AT&F&A3X4&B1&C1&D2&H1&K1&R2S7=60S11=55

US Robotics WorldPort 9696 Fax Modem - Auto Reliable Mode
AT&F&A3&B1&C1&D2&H1&K1&R2S7=60S11=55

US Robotics WorldPort 9696 Fax Modem - MNP-4 Mode
AT&F&A3&B1&C1&D2&H1&K3&R2S7=60S11=55

US Robotics WorldPort 9696 Fax Modem - V.23 Mode
AT&F&A3&B1&C1&D2&H1&K1&R2S7=60S11=55 S34=8

USR, Courier Dual Standard V.34 Ready Data/Fax
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Courier HST Dual Standard terbo Fax with ASL
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Courier HST with ASL
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Courier V.32 terbo Fac with ASL
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Courier V.32 terbo with ASL
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Courier V.34 Ready Data/Fax
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Dual Standard
AT&F Q0 V1 X4B0F1S27=128&K0

USR, Dual Standard UK
AT E1Q0V1 F1 B0 &M0 &K0

USR, Other
AT E1Q0V1X4

USR, Sportster Series
AT E1Q0V1X4 &B1&C1&D2&H1&K0&N0

USR, WorldPort 14,400 FAX PCMCIA
AT B0E1Q0V1X6 &B1&C1&D2&H1&R2

USR, WorldPort 14,400 V.42bis FAX
AT B0E1Q0V1X6 &B1&C1&D2&H1&R2

USR, WorldPort 9,600
AT E1Q0V1X4 \N3\J0\Q3\V1 &C1&D2

USR, WorldPort Dual Standard Cellular FAX PCMCIA
AT&F Q0 V1 X4B0F1S27=128&K0

USR, WorldPort Palmtop FAX
AT&F Q0 V1 X4B0F1S27=128&K0
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USA General 14400FX
AT&F&C1&D2W1S7=60S95=41S11=60

USA General 14400FX - Auto Reliable
AT&F &C1&D2W1S7=60S11=60S95=41

USA General 14400FX - MNP-4 Mode
AT&F &Q9&C1&D2W1S7=60S11=60S95=41

UST, All
AT E1Q0V1X4

Ven-Tel,  9600 Plus / Plus II
AT E1Q0V1X4&K3

Ven-Tel,  Halfcard
AT E1Q0V1X4&K3

Ven-Tel,  Halfcard 24
AT E1Q0V1X4&K3

Ven-Tel,  Pathfinder
AT E1Q0V1X4&K3

Ven-Tel, Other
AT E1Q0V1X4

Ven-Tel EC2400-33 (MNP)
InitString=AT&F&C1&D3%C1\J0\N3\Q2S7=60
AnswerInit=AT&F&C1&D3%C1\J0\N3\Q2S7=60S0=1&W
BPSRate=9600
FlowControl=Hardware

Ven-Tel PCM 9600 Plus (MNP)
InitString=AT&FB0&C1&D3\N3\Q3%B0%C1%F1S7=60
AnswerInit=AT&FB0&C1&D3\N3\Q3%B0%C1%F1S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware

Ven-Tel 212Plus
ATE1Q0V1X1 S7=60 S11=55 S0=0

Ven-Tel Halfcard
ATE1Q0V1X4 S7=60 S0=0

Ven-Tel Halfcard 24
ATE1 Q0 V1 X4 S7=30 S0=0

Ven-Tel 2400 Plus II
AT&F&C1&D2S7=60S11=55S0=0\N3\Q3\C1\G0\J0\V1

Ven-Tel 2400 Plus II - MNP-5 mode
AT&F&C1&D2S7=60S11=55S0=0 AT\N3\Q3\C1\G0\J0\V1

Ven-Tel 2400 Plus II - MNP-4 mode
AT&F &C1&D2S7=60S11=55S0=0 AT\N3\Q3%C0\C1\G0\J0\V1
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Ven-Tel MCM 144
AT&F&C1&D2&K3&Q5S7=60S11=55

Ven-Tel MCM 144 - Auto Reliable
AT&F &C1&D2&K3&Q5S7=60S11=55

Ven-Tel MCM 144 - MNP-4 mode
AT&F%C0&C1&D2&K3&Q5S7=60S11=55S0=0

Ven-Tel 9600 Plus / Plus II
AT&F&C1&D2S7=60S11=55S0=0 %F2\N3\Q3

Ven-Tel 9600 Plus / Plus II - Auto Reliable
AT&F &C1&D2S7=60S11=55S0=0 %F2\N3\Q3

Ven-Tel 9600 Plus / Plus II- V.42 mode
AT&F &C1&D2S7=60S11=55S0=0 %F2\N3\Q3%C0

Ven-Tel 9600 Plus / Plus II - MNP-5 mode
AT&F &C1&D2S7=60S11=55S0=0 %F2\N3\Q3*Y3

Ven-Tel 9600 Plus / Plus II - MNP-4 mode
AT&F &C1&D2S7=60S11=55S0=0 %F2\N3\Q3*Y3%C0

Ven-Tel PCM2400E
AT&F&C1&D2S7=60S11=55S0=0\N3\Q3\C1\G0\J0\V1

Ven-Tel PCM2400E - MNP-5 mode
AT&F &C1&D2S7=60S11=55S0=0 \N3\Q3\C1\G0\J0\V1

Ven-Tel PCM2400E - MNP-4 mode
AT&F &C1&D2S7=60S11=55S0=0 \N3\Q3%C0\C1\G0\J0\V1

Ven-Tel Pathfinder
AT&F&C1&D2S11=60S51=252S52=1S58=2S66=1

Ven-Tel Pathfinder - Auto-Reliable mode
AT&C1&D2S11=60S51=252S52=1S58=2S66=1

Ven-Tel Pathfinder - V.42 mode
AT&C1&D2S11=60S51=252S52=1S58=2S66=1 S98=0

Ven-Tel Pathfinder - MNP-4 mode
AT&C1&D2S11=60S51=252S52=1S58=2S66=1 S96=0

ViVa 24m
AT&F\J0\N3\V1\Q3

ViVa 24m - MNP-5 mode
AT&FATAT\J0\N3\V1\Q3S7=60S11=55

ViVa 24m - MNP-4 mode
AT&F\J0\N3\V1\Q3S7=60S11=55%C0

ViVa 24im
AT&F0&C1&D2S7=60S11=55
```

```
ViVa 24im - MNP-5 mode
AT&F0S7=60S11=55

ViVa 24im - MNP-4 mode
AT&F0S7=60S11=55%C0

ViVa 2442i
AT&F\J0\V1\Q3

ViVa 2442i - Auto Reliable
AT&F\J0\V1\Q3

ViVa 2442i- V.42bis mode
AT&F \J0\V1\Q3\N5

ViVa 2442i- V.42 mode
AT&F \J0\V1\Q3%C0\N5

ViVa 2442i - MNP-5 mode
AT&F AT\J0\V1\Q3\N3

ViVa 2442i - MNP-4 mode
AT&F \J0\V1\Q3\N3%C0

ViVa 9642e
AT&F&C1&D2S36=7S38=0S95=44

ViVa 9642e - Auto Reliable
AT&F AT&C1&D2S36=7S38=0

ViVa 9642e- V.42 mode
AT&F &C1&D2S36=7S38=0%C0

ViVa 9642e - MNP-5 mode
AT&F &C1&D2S36=7S38=0S48=128

ViVa 9642e - MNP-4 mode
AT&F&C1&D2S36=7S38=0S48=128%C0

ViVa 9642i
AT&F&C1&D2\J0S36=7S38=0

ViVa 9642i- Auto Reliable
AT&F &C1&D2\J0S36=7S38=0

ViVa 9642i V.42 mode
AT&F &C1&D2\J0S36=7S38=0%C0

ViVa 9642i - MNP-5 mode
AT&F&C1&D2\J0S36=7S38=0S48=128

ViVa 9642i - MNP-4 mode
AT&F&C1&D2\J0S36=7S38=0S48=128%C0

ViVa 14.4 Fax (pre-1994)
AT&F&C1&D2&K3S36=7S38=0S95=44
```

```
ViVa 14.4/FAX (pre-1994) - Auto Reliable
AT&F&C1&D2&K3S36=7S38=0

ViVa 14.4Fax (pre-1994) - V.42 mode
AT&F&C1&D2&K3S36=7S38=0%C0

ViVa 14.4/FAX (pre-1994) - MNP-5 mode
AT&F&C1&D2&K3S36=7S38=0S48=128

ViVa 14.4/FAX (pre-1994) - MNP-4 mode
AT&F&C1&D2&K3S36=7S38=0S48=128%C0

ViVa 14.4 Fax (1994)
AT&F&C1&D2S7=60S11=55

ViVa 14.4 FAX (1994) - Auto Reliable
AT&F&C1&D2S7=60S11=55

ViVa 14.4/FAX (1994) - MNP-4 mode
AT&F&C1&D2S7=60S11=55%C0

ViVa 9642e (V.42bis)
InitString=AT&F&C1&D3&K3&Q5\N3%C3S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C3S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

ViVa 14.4/FAX (V.42bis)
InitString=AT&F&C1&D3&K3&Q5\N3%C3S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C3S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

Wang, All
AT E1Q0V1X4

Wang 14/14i
AT&F&C1&D2&K3&Q5\N3S7=60S11=60

Wang 14/14i - Auto Reliable
AT&F &C1&D2&K3&Q5\N3S7=60S11=60

Wang 14/14i - MNP4 mode
AT&F &C1&D2&K3&Q5\N3S7=60S11=60%C0

Wang 14/14i Data Fax Modem
InitString=AT&F&C1&D3&K3&Q5\N3%C1S7=60S36=7S46=138S48=7S95=37
AnswerInit=AT&F&C1&D3&K3&Q5\N3%C1S7=60S36=7S46=138S48=7S95=37S0=1&W
BPSRate=38400
FlowControl=Hardware

Western Datacom Co. Inc., All
AT E1Q0V1X4

Winfast, 9600
AT&F E1Q0V1X4 &K3 *E0
```

```
Winfast, Other
AT E1Q0V1X4

Winfast, V.32bis
AT&F E1Q0V1X4 &K3 *E0

XirCom, CEM-10BT (AM) Creditcard Ethernet Modem
AT E1Q0V1X4&K3

XirCom, Other
AT E1Q0V1X4

XyComm Systems Inc., All
AT E1Q0V1X4

ZAT Modem 14.4/14.4-7
InitString=AT&F&C1+C1&D3\N3\Q3+Q3%C1+PC1S7=60
AnswerInit=AT&F&C1+C1&D3\N3\Q3+Q3%C1+PC1S7=60S0=1&W
BPSRate=38400
FlowControl=Hardware

Zeos Notebook Modem
AT&F&C1&D2X4\Q3\N3\J0\V1%C1

Zeos Notebook Modem - Auto Reliable
AT&F&C1&D2\Q3\N3\J0\V1%C1S7=60S11=60

Zeos Notebook Modem - MNP-4
AT&F&C1&D2\Q3\N3\J0\V1%C0S7=60S11=60

Zoltrix ZX1896
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Zoltrix 2400 (No MNP)
AT&FE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Zoltrix Enhanced 96/24 V.42bis
AT&FE1Q0V1X4&C1&D2S7=60S11=55S0=0\Q3\N9

Zoltrix Enhanced 96/24-Auto-Reliable
AT&FE1Q0V1X4&C1&D2S7=60S11=55S0=0\Q3\N9

Zoltrix 9600 V.42bis
AT&F1X4 &C1 &D2 &M5 &K3 &R0 &Y0 %C1 \J0 \N3 \Q3
W1

Zoltrix 9600 V.42bis - Auto Reliable
AT&F1X4&C1&D2&M5&K3&R0\J0\N3\Q3W1S7=60S11=55

Zoltrix 9600 V.42bis - MNP-4 mode
AT&F1%C0X4&C1&D2&M0&K3&R0\J0\N3\Q3W1S7=60S11=55

Zoltrix 96/144
AT&F&C1&D3&R0&Y0S7=60S11=55S36=7S95=43\Q3\N9

Zoltrix 96/144-Auto-Reliable
AT&F&C1&D3S7=60S11=55S36=7S95=43\Q3\N9
```

```
Zoltrix 96/96
AT&F&C1&D2&Y0S7=60S11=55S95=43

Zoltrix 96/96 - Auto-Reliable
AT&F&C1&D2S7=60S11=55S95=43

Zoltrix 96/96 - MNP-5 mode
AT&F &C1&D2S7=60S11=55S95=43S48=128

Zoltrix 96/96 - MNP-4 mode
AT&F&C1&D2S7=60S11=55S95=43S48=128%C0

Zoltrix 96/96 - Normal mode
AT&F&C1&D2S7=60S11=55S95=43 &Q6

Zoltrix 14400
AT&F&C1 &D2 &Q5 &K3 &Y0 %C1 \N3 W2 S7=60 S11=60

Zoltrix 14400 - Auto Reliable
AT&F&C1&D2&Q5&K3&Y0\N3W2S7=60S11=60

Zoltrix 14400 - MNP-4 mode
AT&F%C0&C1&D2&Q5&K3&Y0\N3W2S7=60S11=60

Zoltrix Inc., FM-1414i
AT&F E1Q0V1X4 &C1&D2S95=3

Zoltrix Inc., Other
AT E1Q0V1X4

Zoom, 14.4 EX
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, 14.4 PC
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, 14400 VFP V.32bis
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, 14400 VFX V.32bis
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, 14400 VP V.32bis
AT&F E1Q0V1X4 \N0%C0 &C1&D2&K3

Zoom, 14400 VX V.32bis
AT&F E1Q0V1X4 \N0%C0 &C1&D2&K3

Zoom, 9600 VFP V.32
AT E1Q0V1X4 S46=128&c1&d2&K3

Zoom, 9600 VFX V.32
AT E1Q0V1X4 S46=128&c1&d2&K3

Zoom, 9600 VP V.32
AT E1Q0V1X4 S46=128&c1&d2&K3
```

```
Zoom, 9600 VX V.32
AT E1Q0V1X4 S46=128&c1&d2&K3

Zoom, Other
AT E1Q0V1X4

Zoom, PCMCIA 14.4C
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, PKT 14.4
AT&F E1Q0V1X4 \N0%C0 &C1&D2&K3

Zoom, VFP 14.4V
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, VFP 24K
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, VFP28.8
AT&F E1Q0V1X4 \N0%C0 &C1&D2&K3

Zoom, VFX 14.4
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, VFX 24K
AT E1Q0V1X4 S46=136 &C1&D2&K3

Zoom, VFX28.8
AT&F E1Q0V1X4 \N0%C0 &C1&D2&K3

ZOOM MX2400R (no MNP or V.42)
InitString=AT&F&C1&D3S7=30
AnswerInit=AT&F&C1&D3S7=30S0=1&W
BPSRate=2400
FlowControl=None
LockBPS=No

ZOOM 2400/V.42bis (V.42bis)
InitString=AT&F&C1&D3S7=30S36=7
AnswerInit=AT&F&C1&D3S7=30S36=7S0=1&W
BPSRate=9600
FlowControl=Hardware

Zoom 14.4 VFX (ARA 1.0)
InitString=AT&FS7=90E0&K3&D0&Q6W2L1S37=15
AnswerInit=AT&FS7=90E0&K3&D0&Q6W2L1S37=15S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

ZOOM V.32 turbo (V.42bis)
InitString=AT&FW1&C1&D3&K3&Q5%C1\N3S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&FW1&C1&D3&K3&Q5%C1\N3S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware
```

```
ZOOM V.32bis (V.42bis)
InitString=AT&FW1&C1&D3&K3&Q9%C1\N3S7=60S36=7S95=47
AnswerInit=AT&FW1&C1&D3&K3&Q9%C1\N3S7=60S36=7S95=47S0=1&W
BPSRate=38400
FlowControl=Hardware

ZOOM FaxModem 14.4 PC
InitString=AT&F&C1&D3&K3S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

ZOOM FaxModem VFP 288
InitString=AT&FW2X4&C1&D3&S1%C3\N3S7=60S36=7S95=1
AnswerInit=AT&FW2X4&C1&D3&S1%C3\N3S7=60S36=7S95=1S0=1&W
BPSRate=57600
FlowControl=Hardware

ZOOM FaxModem VFX V.32bis
InitString=AT&F&C1&D3&K3&Q5%C3\N3S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5%C3\N3S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

ZOOM FaxModem VFX 24K
InitString=AT&F&C1&D3&K3&Q5%C3\N3S7=60S36=7S46=138S48=7S95=47
AnswerInit=AT&F&C1&D3&K3&Q5%C3\N3S7=60S36=7S46=138S48=7S95=47S0=1&W
BPSRate=57600
FlowControl=Hardware

Zoom VFX 28.8 FaxModem (ARA 1.0)
InitString=AT&F&C1&D3&Q5&K0%C0W2\N3S7=60
AnswerInit=AT&F&C1&D3&Q5&K0%C0W2\N3S7=60S0=1&W
BPSRate=19200
FlowControl=Hardware
ARAv1=1

Zoom VFX 28.8 FaxModem
InitString=AT&F&C1&D3&Q5W2\N3S7=60
AnswerInit=AT&F&C1&D3&Q5W2\N3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

Zoom Modem PC 1200
ATE1Q0V1X1 S7=60 S11=55 S0=0

Zoom Modem PC 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Zoom Fax Modem 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Zoom Fax Modem PKT 2400
ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0

Zoom 2400 V.42bis (no fax)
AT&F&C1&D2S7=60S11=55S36=7S95=43
```

```
Zoom 2400 V.42bis (no fax) - Auto Reliable
AT&F&C1&D2S7=60S11=55S36=7S95=43

Zoom 2400 V.42bis (no fax) - V.42 mode
AT&F&C1&D2S7=60S11=55S36=7S95=43

Zoom 2400 V.42bis (no fax) - MNP-5 mode
AT&F&C1&D2S7=60S11=55S36=7S95=43

Zoom 2400 V.42bis (no fax) - MNP-4 mode
AT&F&C1&D2S7=60S11=55S36=7S95=43

Zoom 2400 FCV/FXV Fax Modem
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV/FXV Fax Modem - Auto Reliable
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV/FXV Fax Modem - V.42 mode
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV/FXV Fax Modem - MNP-5 mode
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV/FXV Fax Modem - MNP-4 mode
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV+ Fax Modem
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV+ Fax Modem - Auto Reliable
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV+ Fax Modem - V.42 mode
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV+ Fax Modem - MNP-5 mode
AT&F&C1&D2S7=60S11=55

Zoom 2400 FCV+ Fax Modem - MNP-4 mode
AT&F&C1&D2S7=60S11=55

Zoom 2400 AMC/AMX (no fax) Modem
AT&FX4&C1&D2S7=60S11=55

Zoom 2400 AMC/AMX (no fax) Modem - Auto Reliable
AT&FX4&C1&D2S7=60S11=55

Zoom 2400 AMC/AMX/PKT Fax Modem
AT&FX4&C1&D2S7=60S11=55

Zoom 2400 AMC/AMX/PKT Fax Modem - Auto Reliable
AT&FX4&C1&D2S7=60S11=55

Zoom VP/VX 9600 (no fax)
AT&F&C1&D2&K3S7=60S11=55S95=43
```

```
Zoom VP/VX 9600 (no fax) - Auto Reliable
AT&F&C1&D2&K3S7=60S11=55S95=43

Zoom VP/VX 9600 (no fax) - MNP-4 mode
AT&F&C1&D2&K3S7=60S11=55S95=43S48=128%C0

Zoom VFP/VFX 9600 Fax Modem
AT&F&C1&D2&K3S7=60S11=55S95=43

Zoom VFP/VFX 9600 Fax Modem - Auto Reliable
AT&F&C1&D2&K3S7=60S11=55S95=43

Zoom VFP/VFX 9600 Fax Modem - MNP-4 mode
AT&F&C1&D2&K3S7=60S11=55S95=43S48=128%C0

Zoom VFDI/VFDX 2400 Modem
AT&F&C1&D2&Q5%C3\J0S7=60S11=55S95=43

Zoom VFDI/VFDX 2400 Modem - Auto Reliable
AT&F&C1&D2&Q5%C3\J0S7=60S11=55S95=43

Zoom VFDI/VFDX 2400 Modem - MNP-4 mode
AT&F&C1&D2&Q5%C2\J0S48=0S7=60S95=43

Zoom V.32 Turbo
AT&F&C1&D2&K3S7=60S11=55S95=43

Zoom V.32 Turbo - Auto Reliable
AT&F&C1&D2&K3S7=60S11=55S95=43

Zoom V.32 Turbo - MNP-5 mode
AT&F&C1&D2&K3S7=60S11=55S95=43S48=128

Zoom V.32 Turbo - MNP-4 mode
AT&F&C1&D2&K3S7=60S11=55S95=43S48=128%C0

Zoom VP/VX 14400 (no fax) Modem
AT&F&C1&D2&K3W2S95=43

Zoom VP/VX 14400 (no fax) Modem - Auto Reliable
AT&F&C1&D2W2S7=60S11=55S95=43

Zoom VP/VX 14400 (no fax) Modem - MNP-4 mode
AT&F\N3&C1&D2S7=60S11=55S95=43%C0W2

Zoom VFP/VFX 14400 Fax Modem
AT&F&C1&D2&K3W2S95=43

Zoom VFP/VFX 14400 Fax Modem - Auto Reliable
AT&F&C1&D2W2S7=60S11=55S95=43

Zoom VFP/VFX 14400 Fax Modem - MNP-4 mode
AT&F\N3&C1&D2S7=60S11=55S95=43%C0W2

Zyxel U-1496 Series
AT&F&D2&R0&T5S11=60
```

```
Zyxel U-1496 - Auto Reliable
AT&F&D2 &R0 &T5 S11=60

Zyxel U-1496 - V.42 mode
AT&F&D2&R0 &T5 S11=60 &K3

Zyxel U-1496 - MNP-5 mode
AT&F&D2&R0 &T5 S11=60 &K2

Zyxel U-1496 - MNP-4 mode
AT&F&C1&D2&R0&T5S11=60%C0

Zyxel Elite 2864I (ISDN)
InitString=ATB40&W&C1&D2&H3
AnswerInit=ATB40&W&C1&D2&H3S0=1&W
BPSRate=57600
FlowControl=Hardware

Zyxel U-1496 (V.42bis)
InitString=AT&FX6&B1&C1&D2&N0&K4&H3S7=60
AnswerInit=AT&FX6&B1&C1&D2&N0&K4&H3S7=60S0=1&W
BPSRate=57600
FlowControl=Hardware

ZyXEL, Other
AT E1Q0V1X4

ZyXEL, U1496B
AT E1Q0V1X4&K3

ZyXEL, U1496E
AT E1Q0V1X4&K3
```

1.3 Parancsösszefoglaló

```
AT    Minden parancsot kötelezõen megelõzõ elõtag (kivéve A/ és +++)
A/    Utolsó parancs ismétlése
+++   Escape karakterek adatmódból parancsmódba kerüléshez
```

1.4 Tárcsázási parancsok és módosítók

```
D     Hívás kezdeményezés (pld.: ATDT1234567  TONE módban tárcsázza a számot)
N     Alternatív tárcsázás
S=n   n- edik telefonszám tárcsázása
T     Tárcsahangos tárcsázás
P     Pulzus tárcsázás
R     Tárcsázás fordított módban
W     Tárcsahangra várás (pld.: ATDT 01W123456  a ’01’ után tárcsahangra vár)
,     Szünet
!     Hívás átadás alközponton keresztül
;     Visszatérés parancsmódba
```

```
/n    n sorszámú telefonszám tárcsázása
```

1.5 Modem mükõdtetõ parancsok

```
A     Automatikus válaszadás

B0    CCITT V.21, V.22
B1    Bell 103 / 212 A

C0    Vivõ küldés tiltva
C1    Vivõ küldés engedélyezve

E0    Parancs echo tiltva
E1    Parancs echo

F0    Félduplex mód
F1    Teljes duplex mód

H0    Telefonvonal megszakítás
H1    Telefonvonalra kapcsolódás

I0    Termékkód
I1    ROM ellenõrzõ õsszeg
I2    ROM ellenõrzés eredménye
I3    Információ a beállításokról

J0    Hang / adat érzékelés tiltva
J1    Hang / adat érzékelés engedélyezve

L1    Alacsony hangerõ
L2    Közepes hangerõ
L3    Nagy hangerõ

M0    Hangszóró kikapcsolva
M1    Hangszóró bekapcsolva az õsszeköttetés létrejöttéig
M2    Hangszóró mindig bekapcsolva
M3    Hangszóró kikapcsolva a tárcsázás alatt, különben ua. mint M1

N=n   Ujrahívások száma foglaltság esetén
N?    Ujrahívások számának lekérdezése

O0    On-line adatmódba kapcsolás
O1    On-line adatmódba kapcsolás visszacsatolással (2400 bps)

Q0    Válaszkódok engedélyezése
Q1    Válaszkódok tiltva

Sr?   Regiszter kiolvasása
Sr=n  Regiszter beírása n tartalommal

V0    Számjegyes válaszkódok
V1    Szavas válaszkódok

X0    Válaszkód 0-4
X1    Válaszkód 0-5, 10
```

```
X2    Válaszkód 0-6, 8-10
X3    Válaszkód 0-5, 7-10
X4    Minden válaszkód engedélyezve

Y0    Hosszú megszakítás engedélyezve
Y1    Hosszú megszakítás tiltva

Z0    Modem alapállapotba állítás SCP0 konfigurációs profillal
Z1    Modem alapállapotba állítás SCP1 konfigurációs profillal

&C0   Vivõ figyelés tiltva
&C1   Távoli modem vivõjének figyelése engedélyezve

&D0   DTR (adatterminál készenlét) jel figyelmen kívül hagyva
&D1   DTR megszünése után feltételezett parancsmód vonalbontás nélkül
&D2   DTR megszünése után feltételezett parancsmód vonalbontással
&D3   DTR megszünése után modem alapállapotba állítás

&F    Gyári alapbeállítás betõltése

&G0   Õrzõhang tiltás
&G1   550 Hz õrzõhang
&G2   1800 Hz õrzõhang

&J0   RJ-11 telefoncsatlakozó, egy telefonvonalas rendszer
&J1   RJ-11 telefoncsatlakozó, tõbb telefonvonalas rendszer

&L0   Tárcsázási üzemmód
&L1   Bérelt vnalas üzemmód

&P0   Pulzustárcsázás kitöltési tényezõ 39/61
&P1   Pulzustárcsázás kitöltési tényezõ 33/67

&Q0   Aszinkron mód
&Q1   Szinkrin mód 1
&Q2   Szinkrin mód 2
&Q3   Szinkrin mód 3

&R0   CTS követi az RTS jelet
&R1   CTS mindíg bekapcsolva, RTS figyelmen kívül hagyva

&S0   DSR jel bekapcsolva
&S1   DSR követi az RS-232C-t

&T0   Diagnosztikai teszt befejezése
&T1   Lokális analóg hurok
&T3   Lokális digitális hurok
&T4   Távolról vezérelt digitális hurkolású teszt engedélyezve
&T5   Távolról vezérelt digitális hurkolású teszt tiltva
&T6   Távoli digitális hurkolású teszt kezdeményezés
&T7   &T6 + modem õnteszt
&T8   Lokális analóg hurok + modem õnteszt

&V    Aktív konfigurációs profil megjelenítése
&V0   SCP0 profil megjelenítése
&V1   SCP1 profil megjelenítése
```

```
&W0   Aktiv konfigurációs profil SCP0-ba írása
&W1   Aktiv konfigurációs profil SCP1-be írása

&X0   Modem órajel
&X1   Terminál órajel
&X2   Távoli vivõ órajel

&Y0   SCP0 a bekapcsolás utáni aktiv (konfigurációs profil)
&Y1   SCP1 a bekapcsolás utáni aktív konfigurációs profil

&Zn=  n-edik telefonszám tárolása

Megjegyzés: a & kezdetû parancsok 1200-as modemre nem érvényesek
```

1.6 Válaszkódok

```
OK            0      Sikeres parancssor végrehajtás
CONNECT       1      Összeköttetés távoli modemmel (300 bps/1200 bps)
RING          2      Csengetés jel érkezett
NO CARRIER    3      Távoli vivõ jel nem érzékelhetõ
ERROR         4      Parancssor hiba
CONNECT 1200  5      Õsszeköttetés távoli modemmel 1200 bps
NO DIALTONE   6      Nincs tárcsahang
BUSY          7      Foglalt jel érzékelve
NO ANSWER     8      Nincs 5 mp csend
CONNECT 2400  10     Összeköttetés távoli modemmel 2400 bps
NVRAM ERROR   30     Modem memória hiba
VOICE CALL    31     Hanghívás érkezett automatikus válasz módban
HANG UP       32     Hanghívás megszakítása 60 mp után
```

1.7 Regiszterek

```
Regiszter   Tartomány Egység     Alapérték   Funkció

   *S0      0-255     csengetés  01     csengetésszám válasz elõtt
    S1      0-255     csengetés  00     csengetésszámláló
    S2      0-127     ASCII      43     escape karakter
    S3      0-127     ASCII      13     kocsivissza karakter
    S4      0-127     ASCII      10     soremelés karakter
    S5      0-32,127  ASCII      08     szókõz vissza karakter
   *S6      2-255     másodperc  02     tárcsahangra várás
   *S7      3-255     másodperc  45     vivõ jelre várás
   *S8      0-255     másodperc  02     vesszõ szünetidõ
   *S9      1-255     0.1 mp     06     vivõérzékelés válaszidõ
   *S10     1-255     0.1 mp     14     vivõ kimaradás érzékelés
   *S11     70-255    0.001 mp   95     hangtárcsázás sebessége
   *S12     0-255     0.02 mp    50     escape késleltetés
   S13-S17                fenntartott
   *S18     0-255     másodperc  00     tesztidõ
   *S19-S24               fenntartott
   *S25     0-255     0.01 mp    05 **  DTR jel késleltetés
   *S26     0-255     0.01 mp    00     RTS-bõl CTS-be átmenet
```

```
S27            fenntartott
```

1.8 U.S. ROBOTICS 28.8k Modem

```
        U.S. ROBOTICS ANNOUNCES THE LAST MODEM YOU'LL EVER BUY
     Provides Migration Path to Forthcoming CCITT 28.8 Kbps Standard
     ---------------------------------------------------------------
```

SKOKIE, Ill. -- June 8, 1992 -- U.S. Robotics today announced an upgrade program for the CCITT-proposed standard of 28.8 Kbps, previously referred to as V.FAST. The Courier V.32bis, Courier HST Dual Standard and Shared Access Modem Sharing Kits are the products currently included in the program. Field upgrades will be available for $299 as soon as the CCITT 28.8 Kbps draft recommendation is completed. Official approval of the standard is not expected until January, 1994.

"The CCITT-proposed 28.8 Kbps standard won't be a reality for most manufacturers until 1994," said Jonathan Zakin, U.S. Robotics executive vice president, sales and marketing. "By offering modems ready for 28.8 Kbps now, we're providing insurance against technical obsolescence. Customers can purchase a Courier high-speed modem or Shared Access Modem Sharing Kit now and take advantage of the most updated technology available. When the 28.8 Kbps standard becomes available later, they'll already have a cost-effective upgrade option and won't have to re-invest in new equipment."

"Key to the 28.8 Kbps program is the fact that the upgrade to the Courier high-speed modems and Shared Access Modem Sharing Kits can be completed by the end user at their worksite, which reduces their 'down' time and eliminates excess costs like shipping and handling," continued Zakin. "You may hear about other 28.8 Kbps modems that are available now, but until the standard is defined, no one knows what hardware will be needed to comply. Our unique modem architecture makes future 'field' upgrades a realistic and simple procedure."

Because of U. S. Robotics' advanced modular modem architecture, the company's Courier V.32bis, Courier HST Dual Standard, and Shared Access modems are readily upgradable to 28.8Kbps. The modems are made up of a motherboard and a smaller daughterboard, which holds the modems' microprocessors and firmware. The current, high-speed daughterboard can easily be replaced with a new board containing the 28.8 Kbps CCITT standard. U.S. Robotics is the only modem manufacturer to implement this kind of flexible design.

"In the CClTT, the previously called 'V.FAST' standard has gained universal support at the 28.8Kbps speed," said Dale Walsh, U.S. Robotics vice president, advanced development and participant in the CCITT committee on the 28.8 Kbps standard, "This is how our modular architecture works. The data pump (which executes the modulation and demodulation of the data), and the key controller functions (which perform the data compression, error control and the AT command set) are on one board, making upgrades simple. We can easily make the data pump faster and upgrade the controller functions to keep up with the new speed. It's all in just one small plug-in card."

Because compatibility with CCITT standards is crucial, U.S. Robotics' availability and implementation of the 28.8Kbps standard will depend on the CClTT's progress. At this time, the standard is expected to define a connect speed of 28.8 Kbps, two times faster than V.32bis, the fastest CCITT standard now available.

U.S. Robotics is one of the first vendors to announce a program for 28.8Kbps compatibility. The company has a history of industry "firsts," including the first CCITT V.32bis modem from a major manufacturer, the first self-managing modem management system and the first portable CCITT V.32 modem.

U.S. Robotics will upgrade any Modem Sharing Kit to 28.8Kbps. Current Courier models, which have the smaller footprint and a higher, 57.6 Kbps DCE to DTE (modem-to-computer) interface speed, are also upgradable. The company's upgrade program does not include WorldPort and Sportster modems.

U. S. Robotics Courier modems offer a wide range of features, including fax, remote configuration, and synchronous capabilities. The Shared Access Modem Sharing Kits, which began shipping in March, 1992, allow for the pooling of modems on a LAN so that a LAN user can access them for dial-in or dial-out communications.

The following products will be upgradable to 28.8 Kbps:

```
Courier V.32 bis, internal and external          (57,600 bps versions only)
Courier HST Dual Standard, internal and external (57,600 bps versions only)
Courier V.32 bis FAX, internal and external
Courier HST Dual Standard FAX, internal and external
Shared Access Modem Sharing Kit Single Port and Dual Port
```

THE CCITT 28.8 KBPS STANDARD: SOME BACKGROUND

The standard for 28.8 Kbps dial-up communications being developed by the CCITT will stretch the limits of dial-up telephone lines. But don't expect to be sending files at top speeds immediately.

Dale Walsh, vice president for advanced development at U.S. Robotics, Inc., cautions that most users won't be able to achieve the maximum speeds permitted under the standard right away. When the standard is adopted, modems that conform should be able to transmit at 19.2 Kbps on lines where a modem conforming to V.32bis (the current high-speed standard) can now transmit at 14.4 Kbs. But Walsh, a member of the CCITT committee developing the standard, says it is being formulated with the increasing digitization of dial-up phone networks in mind.

The improved quality of phone lines, as much as any modem technology improvements, has made high speed dial-up communications possible" says Walsh. "We are designing the standard keeping in mind that phone networks will use more and more digital circuits and digital central office switches."

Consequently, speeds in the neighborhood of 28.8 Kbps will be the exception, rather than the rule--at least until the public switched telephone network becomes completely digital.

"I'd say when it's finished in a year or so, the standard will allow 19.2 Kbps transmissions on 80 percent of all lines, 24 Kbps on 50 percent of all lines, and 28.8 Kbps communications on 20 percent of all lines," says Walsh, who also helped develop the CCITT V.32bis standard for 14.4 Kbps dial-up communications. "As the phone networks improve, top speeds will be more easily achieved, so I think it's more realistic to think of it as a 19.2 Kbps standard that is sometimes capable of higher speeds.

A common misconception is that the coming 28.8 Kbps standard will allow speeds of 115.2 Kbps, when combined with V.42bis data compression. Walsh noted that such calculations are based on an assumption that V.42bis allows 4 to 1 data compression. Outside the lab, V.42bis allows compression ratios between 2 to 1 and 3 to 1, meaning that under REAL LIFE conditions, the forthcoming standard will allow maximum throughput of about 86.4 Kbps.

"It's a mistake to use the 28.8 number and max everything out from that," said Walsh.

Not that the 28.8 Kbps standard doesn't have its advantages. After all, 19.2 Kbps is an improvement over 14.4 Kbps. And the forthcoming standard will adjust for line conditions, a critical factor in high-speed data communications--like no previous standard. The standard under development will include a "probing" function that the modem can use to "sound out" the quality of the phone line. That will allow the modem to optimize transmissions to take advantage of available bandwidth.

"We are still working on the training sequences," says Walsh. "But before transmission starts, the standard will enable the modem to determine what bandwidth is available and how to best position the signal to match available bandwidth."

The standard achieves higher speeds through its ability to use more of a line’s bandwidth, not just the center portion of the channel used under current standards.

"It will more closely match the modulation scheme to what’s available," says Walsh. "That way, the modem can shape the transmissions to adapt precisely to the channel, which is very important if you want to transmit at high speeds.

The most recent committee meeting was held last month. Still to be agreed upon are such critical issues as training sequences, coding schemes, and signaling rates. Walsh said he expects the committee to reach final agreement in 1993, with official CCITT adoption likely in 1994.

While some have taken to calling the standard under development V.Last, Walsh isn’t convinced this will be the final modem standard. After all, he notes, no one thought dial-up phone lines would ever be this noise-free, and further advances in that area could make even higher speed dial-up communication possible.

"I’m certain we’ll have at least a fax version of this standard as the quality of phone lines keep improving," he said. "We’re trying to be sure that this standard will serve users into the year 2000. But modem standards are like wars: you always think it’s going to be the last one."

1.9 Discovery 1200/2400 modem felhasználói kézikönyv

DISCOVERY 1200/2400

modem felhasználói kézikönyv

1990.május

Tartalomjegyzék

- 4 -

- 5 -

1. Fejezet
....
1.0 A fejezet rövid áttekintése
....

Ez a fejezet összefoglalja a kicsomagolási és az üzembehelyezési eljárásokat. Az IBM/PC/XT/AT és kompatibilis számítógépek, ill.

```
RS-232, vagy V.24 kimenettel rendelkezö számítógépek felhasználói
számára csupán valamelyik közismert kommunikációs program, mint
pl. a PROCOMM, BITCOM,CROSSTALK, stb. és ez a fejezet elegendö
lehet kezdetben.

1.1 A doboz kicsomagolása
.........................
Vegye ki óvatosan a modemet és tartozékait. Ellenörizze a doboz
tartalmát:

1/ Modem

2/ RJ-11 kábel

3/ Tápfeszültség adapter  (opcionális, külsö modem esetén)

4/ Felhasználói kézikönyv

5/ PROCOMM kommunikációs szoftver (opcionális)

6/ DO-8 fali csatlakozó     (opcionális)

7/ Soros kábel (külsö,dobozos modem esetén)

Kérjük jelezze azonnal az eladónak, ha a fentiek valamelyike hi-
ányzik, vagy sérült.

1.2 Modem LED kijelzök        (külsö modem esetén)
......................

A modem elölapján levö LED kijelzö a modem állapotát jelzi:

LED         Jelentés és Funkció
-----------------------------------------------------------------
MR          Modem kész
            Világít, ha a modem be van kapcsolva
TR          Terminál kész
            Világít, ha a számítógép vagy a terminál kész a kom-
            munikációra
CD          Távoli vivö jel
            Világít, ha a távoli modem vivö jele érzékelhetö
SD          Adatküldés
            Villog, ha a modem adatot küld a távoli modem felé;
            ill.amikor adatot kap a helyi számítógéptöl
RD          Adatvétel
            Villog, ha a modem adatot kap a távoli modem felöl;
            ill.amikor adatot küld a helyi számítógép felé


                              - 7 -


HS          Nagysebességü átvitel
            Világít CCITT V.22bis vagy Bell 212A módban;
            Nem világít CCITT V22,V21 vagy Bell 103 módban
AA          Autómatikus válaszadás
```

```
            Világít, ha a modem automatikus válaszaás módba van
            állítva;villog csengetés közben
OH          Felefonkagyló felemelve
            Világít, ha a modem rákapcsolódott a telefonvonalra,
            ill."felemelte" a kézibeszélöt
```

1.3 A hátlap
....

A modem hátlapján van a hálózati kapcsoló, a hálózati csatlakozó, egy RS-232 csatlakozó, két moduláris csatlakozó, és egy hangerö- szabályozó gomb, belsö modem esetén csak az utóbbi kettö.

A hálózati csatlakozóba a modemhez járó hálózati adaptert kell csatlakoztatni.Nem megfelelö adapter használata tönkreteheti a modemet! A hálózati kapcsoló felfelé billentve kapcsolja be a modemet, lefelé billentve pedig kikapcsolja a modemet.Ajánlatos a számítógépet mindíg a modem elött bekapcsolni, ill. a modemet a számítógép elött kikapcsolni.

A LINE cimkéjü moduláris csatlakozóba kell a telefonvonalat kötni, A PHONE címkéjübe pedig a telefonkészüléket. Ez utóbbi dugaszt ü- resen lehet hagyni, ha nem használ telefonkészüléket.

A számítógépének RS-232 kábeljét csatlakoztassa a modem RS-232 dugaszába. A hangeröszabályozó gombbal a modembe épített hangszóró hangerejét állíthatja be.

1.4 Fali telefoncsatlakozó
....

A modem üzembehelyezéséhez a POSTA csak akkor adja meg az engedélyt, ha a modem fali telefoncsatlakozója DO-8 -as típusú!

1.5 Hova helyezzük a modemet
....
Külsö modem:
A modemnek megfelelö helye lehet pl.a telefonkészülék alatt.Helyezze el úgy a modemet, hogy lehetöleg

1/ legyen közel a hálózati csatlakozóhoz

2/ legyen közel a fali telefoncsatlakozóhoz

3/ az elölap LED kijelzöi legyenek jól láthatóak

4/ a hálózati kapcsoló a modem hátlapján legyen könnyen elérhetö

5/ legyen hallható a modem hangja
Belsö modem:
bármely üres kártyahelyre

```
1.6 A telefonvonal ellenörzése
..............................

Gyözödjön meg róla, hogy a telefonvonal állapota megfelelö, mielött
a modemet rácsatlakoztatná. Ha a tárcsahang nem tiszta, vagy tele-
fonbeszélgetés közben nem hallja elég erösen és tisztán a hívott
fél hangját, akkor ajánlatos egy jobb vonalat keresni a modem szá-
mára.

Ha módja van rá, akkor közvetlen városi vonalra kösse a modemet, és
lehetöleg ne a vállalati telefonközpont belsö vonalát használja.

Tartsa mindíg észben, hogy a jó minöségü telefonvonal alapvetöen
hozzájárul a megbízható számítógépes kommunikációhoz.

1.7 A modem üzembehelyezése
...........................
1/ Gyözödjön meg róla, hogy mind a számítógép, mind a moden ki van
kapcsolva.
2/ Csatlakoztassa a modemet a számítágéphez :
Az RS-232 kábelnek a huszonöt pólusú DB-25 apa csatlakozóját dugja
a modem hátlapján levö RS-232C anya csatlakozóba, majd a kábel
másik felét csatlakoztassa a számítógépe soros portjára. Ne felejtse
el becsavarni a csatlakozón levö csavarokat.
Jegyezze meg a soros port sorszámát, amelyre az imént rácsatlakozott,
mert ez alapvetöen fontos lesz a szoftver konfigurálásához.
3/ Kösse a modemet a telefonvonalra :
A telefonhálózat DO-8 -as fali csatlakozóját kösse össze a modem
hátlapján levö LINE jelü csatlakozójával.
4/ Kösse a modemhez a telefonkészüléket :
A modem hátlapján levö PHONE jelü csatlakozóhoz kösse a telefonké-
szüléket.
5/ Kösse a modemet a hálózati feszültségre :
Illessze a hálózati adapter dugaszát a modem hátlapján levö POWER
jelü csatlakozóba, majd az adapter hálózati csatlakozóját dugja a
falban lévö hálózati konnektorba.
Belsö modem esetén a port konfigurálását a kártya hátsó lapján el-
helyezett dip kapcsolósoron kell elvégezni. A beállított porthoz
tartozó megszakítás a kártya közepén elhelyezett berg tüskék meg-
felelö rövidrezárásával hozható létre. Ajánlott beállítás COM1 és
INT4.
Figyelem ! Az IBM PC/XT/AT egyszerre csak két COM portot kezel. E-
zek beállítása lehet COM1-töl COM4. Egy porthoz csak egy készülék
rendelhetö. Ugyanarra a portra kijelölt két eszköz esetén müködési
zavarok állnak elö !
A portok, megszakítások és címek megtalálhatók az angol nyelvü leí-
rásban.
Konfigurálás után a modemet be kell illeszteni a számítógép egyik
üres kártyahelyére, majd végrehajtani a 3-as és 4-es pontokat.

Ellenörizze ismét, hogy a telefonkészülékén zavarmentes-e a tele-
fonvonal. Amennyiben ez nem áll, úgy ismételje meg körültekintöen
a 3/ és a 4/ lépéseket az elöbbiekben leírtak szerint.

1.8 A kommunikációs szoftver konfigurálása
..........................................
```

Kapcsolja be a számítógépét a modemét is. Töltse be a kommunikációs programot és ellenörizze a következö paramétereket :

1/ A soros port sorszáma

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2/ Kommunikációs sebesség és protokoll

3/ Adatformátum : adatbit, stopbit, paritás

Állítsa be a port sorszámot COM1, COM2, COM3 vagy COM4-re, annak megfelelöen, hogy melyikre kötötte a modemet. Vegye figyelembe, hogy egy port csak egy eszközhöz lehet kijelölve egyszerre.

Ha automatikusan válaszolóként konfigurálja a modemet, akkor a sebességet CCITT V.22bis-be kell beállítania. Az adatformátum általában: 8 adatbit, nincs paritás, 1 stop bit.

Ha tárcsázónak konfigurálja a modemet, akkor a sebesség és az adatformátum meg kell egyezzen a hívott oldaléval. Például, ha a hirdetötábla, amelyet fel akar hívni, Bell 212A(1200 bps), 8 adatbit, nincs paritás, 1 stop bit-re van állítva, akkor Önnek is így kell beállítania a kommunikációs szoftverét.

Amennyiben IBM PC,XT,AT-t Smartcom-mal vagy Apple Macintosh-t MacTerminal-lal használ, akkor még egy &D0 parancsot is kell a tárcsázó prefix-be írnia, mert a szoftver számára szükséges, hoy a DTR (adatterminál üzemképes) jel mindíg igaz állapotba legyen kényszerítve.

A PC-Talk vagy más, BASIC-ben írt szoftver számára a CD jelnek kell állandóan igaz állapotban lenni, ezért a tárcsázó prefix-be &C0 parancsot kell illeszteni.

Ha kézi müködtetésü módban használja a terminálját, akkor a tárcsázó prefixbe mind a &C0, mind a &D0 parancsokat be kell illeszteni. Ez lehet pl.AT&C0&D0.

Az európai felhasználóknak modemük kezdeti üzemmódját CCITT protokoll-ra kell beállítani. Ehhez a tárcsázó prefixbe B0 parancsot kell írni az Ön szoftverében. Ez lehet pl.ATB0DP.

A pulzus módú telefonhálózatok számára sok európai országban más jel kitöltési tényezö lehet megfelelö, mint az USA-ban. ezekben az országokban a &P1 parancsnak a tárcsázó prefixbe való írásával a kitöltési tényezö 33/67-re módosítható. Pl.AT&P1DP.

Speciális esetekben más paraméterek megváltoztatására is szükség lehet. Pl. duplex mód, automatikus soremelés, a terminálemuláció, a DSR jel stb.

Sajnos esetkben más a szoftver konfigurálási eljárásaok pontos, minden részletre kiterjedö leírása, mivel az a szoftvertöl, a számítógéptöl, és az alkalmazástól függöen más és más. Ha problémájára a kommunikációs szoftver leírásában sem találna választ, úgy forduljon segítségért a modem eladójához.

1.9 Hangszóró hangerösség állítás
....

A hangeröszabályozó gomb VOL felirattal a modem hátlapján található. A gombnak az óramutató járásával megegyezö irányba forgatva csökkenti.

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1.10 Kezdeti lépések
....

Töltsön be egy kommunikációs programot, hogy fel tudjon hívni egy hirdetötáblát, egy adatbázist, vagy csak egy másik, modemmel felszerelt számítógépet. Az Ön modeme automatkusan fog tárcsázni, és létrehozza a számítógépes összeköttetést. Ezután Önnek lehetösége nyílik

1/ levelet olvasni, és küldeni elektronikus postán keresztül

2/ áttekinteni a legújabb híreket, és információkat

3/ számítógépes programokat küldeni ill. beolvasni

4/ szöveges üzeneteket, és adatfeldolgozási eredményeket küldeni, beolvasni

5/ interaktív játékokat játszani egy távoli felhasználóval.

Élvezze a számítógépes kommunikáció kényelmét és örömeit !

2. Fejezet
....

A modem müködése

2.0 Bevezetés
....

Ez a fejezet azon felhasználók számára készült, akik a modem részletesebb leírását igénylik. Ez a fejezet szól a müködési módokról, átviteli sebességekröl, protokollról és az adatformátumról.

2.1 Parancsmód és adatmód
....

Bekapcsolás után a modem vagy parancsmódba, vagy adatmódba kerül, feltéve, hogy a számítógépen, amelyhez a modem üzembe lett helyezve, megfelelö kommunikációs szoftver fut.

Parancsmódban a modem a kapott karaktereket parancsnak értelmezi. A parancsmód lehet on-line vagy off-line. Ha a modem közvetlen összeköttetésben van a távoli modemmel akkor on-line, máskülönben off-line állapotú a parancsmód.

Adatmódban a modem egy automatikus adatfogó és adatküldö eszköznek tekinthetö. Ez azt jelenti, hogy mindent adatként fogad, mint vevö (kivéve az escape szekvenciát) és adatként is küld mindent a távoli modem és a helyi számítógép számára.

2.2 Escape szekvencia
....

Az escape szekvencia lehetövé teszi a modem adatmódból parancsmódba való kapcsolását a kommunikációs kapcsolat megszakítása nélkül. Ez az egyetlen olyan adatsorozat, amelyet a modem parancsnak értelmez az adatmódban. Igy lehetséges a modem parancsmódba kapcsolása, parancsok végrehajtása a modemmel, majd az adatátvitel folytatás.

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Az aescape szekvencia kiadásához Önnek

1/ meg kell bizonyosodnia, hogy a modemnek adatmódú kapcsolata van egy távoli állomással

2/ várnia kell legalább egy másodpercet a begépelés és az adatátvitel szüneteltetésével

3/ escape karaktert kell kiadnia, háromszor egymás után (alapállapotban +++).

4/ várakozni ismét legalább egy másodpercet

A modem ezután OK válaszkódot bocsát ki, és parancsmódba kerül.

Az egy másodperces várakozási idöt és a +escape karaktert az S12 és az S2 regiszterek beállításával lehet megváltoztatni.

2.3 Protokoll és átviteli sebesség
....

A két legjelentösebb, a világon legszélesebb körben használt kommunikációs protokoll a Bell szabvány és a CCITT ajánlás. A Bell szabvány legföképpen az USA-ban és Kanadában használatos, míg a CCITT ajánlás nemzetközileg elfogadott a világ legtöbb más országában.

A kommunikációs adatátvittel két modem között csak akkor lehet sikeres, ha mindkét modem ugyanazt a protokollt használja. A protokoll meghatározza az adatátvitel sebességét (baud rate) és az átviteli szabványt (Bell vagy CCITT).

Az ön modeme a következö protokollokat támogatja:

0-300 bps	Bell 103	vagy	CCITT V.21
1200 bps	Bell 212A	vagy	CCITT V.22
2400 bps			CCITT V.22bis (kezdeti beállítás)

Általános alkalmazásokban a Bell 212A vagy CCITT V.22 átvitelre állított modemek kielégítöen tudnak egymással kommunikálni. Használja azonban a megfelelö protokollt, amennyire csak lehetösége van rá.

2.4 Adatformátum
....

A kommunikációs adatátvitelben egy byte egyes bitjeit külön-külön küldik hasonlóképpen a közöttük levö szünet bitekhez és a hibaellenörzö bitekhez. Az egyes byte-ok bitmintáját nevezzük adatformátumnak, amely a start bitböl, adatbitekböl, paritás és stop bitböl tevödik össze. Az Ön modeme a következö adatformátumokat támogatja:

Start bit	1	1	1	1
Adatbit	7	7	7	8
Paritás	páratlan,páros	nincs	szóköz,mark	nincs

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Ha a két modem különbözö adatformátumot használ, akkor az hibás adatot, az összeköttetés meghiúsulását ill. megszakadását eredményezheti.

2.5 Kommunikációs sebesség
....

Bekapcsolás után a modem beállítja magának a megfelelö kommunikációs protokollt a háttértáron levö konfigurációs profil szerint. Ez meghatározza a kezdeti kommunikáció sebességet is. Minden alkalommal amikor a modem egy parancssort kap, az a sebesség, amelylyel ezt a parancsot kiadták lesz az új, aktív kommunikációs sebesség. Válasz módban az Ön modemje automatikusan beállítja magát a távoli hívó modem sebességére. Például, ha a modeme 2400 bps-ra van beállítva és a távoli modem 1200 bps-al hívja, akkor a kommunikációs kapcsolat 1200 bps-on jön létre. A helyi modem a számítógép elé 2400 bps sebességgel a CONNECT 1200 üzenetet küldi, és a kommunikációs sebességet 1200 bps-ra állítja. A továbbiakban nem ismeri fel a helyi számítógép felöl 2400 bps sebességgel érkezö karaktereket. Ha Ön egy kommunikációs szoftvert ír, akkor annak az eredmémykódból kell a kommunikációs sebességet meghatározni, és beállni a megfelelö sebességre.

Két különbözö sebességü modem közötti összeköttetés sebességét mutatja az alábbi táblázat. Ha a távoli modem nem képes az Ön modemjéhez hasonló automatikus sebességbeállításra, akkor az összeköttetés sebessége különbözhet a táblázatban feltüntetett értéktöl.

Hívó modem protokoll	Válaszoló modem protokoll Bell 103 300 bps	Bell 212A 1200 bps	CCITT V21 300 bps	CCITT V22 1200 bps	CCITT V22bis 2400 bps
Bell 103	300	1200	300	1200	2400
Bell 212A	300	1200	300	1200	2400
CCITT V21	300	1200	300	1200	2400
CCITT V22	300	1200	300	1200	2400
V22bis	300	1200	300	1200	2400

2.6 Gyárilag beállított kezdö profil (FDP)
....

A modem a csak olvasható (ROM) memóriájában tárolja összes regiszterének kezdö értékeit. Ez a gyárilag beállított kezdö profil (FDP) a modem müködési karakterisztikájának beállítására szolgál. Az FDP kezdö érték az Ön modemére a következö: CCITT V.22bis, automatikus válaszadás az elsö csengetésre páros paritással. A részletes parancs és regiszterbeállítási összefoglalót a kézikönyv utolsó oldalán találhatja meg. A gyárilag beállított kezdö értékeket vastagon nyomtattuk.

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2.7 Nem felejtö memória (NVRAM)
....

A nem felejtö memória olyan újraírható memória, amely nem veszíti el a beírt adatokat a tápfeszültség kikapcsolása után sem. Az Ön modemében levö nem felejtö memória a konfigurációs profilok és a telefonszámok tárolására szolgál.

Az eltárolt konfigurációs profil (SCP) 17 regiszter tartalmát foglalja magában. Ezek a következök: S0,S6,S7,S8,S9,S10,S11,S12,S18, S19,S20,S21,S22,S23,S24,S25 és S26.

Két profil, az SCP0 és az SCP1 vannak eltárolva az NVRAM-ban. Åltalában ezek megegyeznek a gyár FDP profiljával. Ha a helyi telefontársaság elöírásainak megfelelö beállításokat az Ön modemjéhez tartozó Opcionális Konfigurációs Profil tartalmazza.

A telefonszámok és a tárcsázás módosítók tárolására kb. 100 karakter hely van az NVRAM-ban. Ezek hosszától függöen max. 10 készlet telefonszám tárolására alkalmas. Az S vagy a / tárcsázás módosítók segítségével lehet az eltárolt telefonszámokat hívni.

2.8 Aktív Konfigurációs Mezö (ACA)
....

Az Ön modemében levö RAM memóriának egy része az aktív konfigurá-
ciós mezö (ACA). Ez tárolja a regiszterek értékeit, amelyek a mo-
dem aktuális müködési karakterisztikáját határozzák meg.

A modem bekapcsolása után az ACA elöször a firmware ROM-ból töl-
tödik be, majd ezt felülírja az NVRAM-ban levö konfigurációs pro-
fil. Az utoljára kiadott &Y0 vagy &Y1 parancstól függ, hogy az
SCP0 vagy az SCP1 konfigurációs profil íródik be az ACA-ba.

A regiszterekbe író parancsok, és a legtöbb müködtetö parancs csak
az ACA-t változtatják meg. Ha el akarja menteni a megváltoztatott
profilt az NVRAM-ba, akkor a &W0 vagy a &W1 parancsot kell kiadnia.

Ha a modemet Z0 vagy Z1 paranccsal állítja alapállapotba, akkor az
ACA elöször az FDP-böl töltödik be, majd az SCP0-val vagy az SCP1-
el felülíródik.

A &F parancs kiadása azt eredményezi, hogy az aktív konfigurációs
mezöbe a gyárilag beállított profil töltödik be.

A modem kikapcsolása után az ACA értékei elvesznek.

2.9 Smart/Dumb kapcsoló
....

A modem elölapja mögött, a LED kijelzöktöl balra van egy jumper.
Ennek smart állásában a modem felismeri a parancsokat, és a számí-
tógép képernyöjén válaszkódokat jelenít meg. Ez a gyárilag beállí-
tott tárcsázó modem üzemmód.

A kapcsoló dumb állásában a modem figyelmen kívül hagyja a paran-
csokat, és nem küld válaszkódokat sem. Ez megfelel a dedikált, au-
tomatikusan válaszoló üzemmódú modemnek ill. 2-es, 3-as szinkron
üzemmódú müködésnek.

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2.10 Hang/adatátvitel kapcsoló
....

A modem elölapján van egy voice/data jelü kapcsoló, amely lehetö-
vé teszi az átkapcsolást a hang és az adatátvitel között a vonal
bontása nélkül.

Hangátvitel módba kapcsolva a modem kiad egy NO CARRIER üzenetet.
Az összeköttetés azonban nem szakad meg, amennyiben Ön az átkap-
csolás elött felvette a beszélgetéshez a telefonkagylót.

2.11 Hang/adat megkülönböztetés
....

A funkció engedélyezésével a modem képes megkülönböztetni hogy a
beérkezö hívás hangátvitel és adatátvitel módjait. Ha a modem au-
tómatikus válaszoló módban van a telefonvonalra rákapcsolódva, ak-
kor a hívó hangos és tiszta beszédhangja esetén érzékelni fogja a

modem, hogy hanghívás történt.

A funkciót a J1 parancsnak a parancssorba való illesztésével lehet engedélyezni. Például változtassa meg az ATS0=1 parancssort ATJ1S0=1 parancssorra.

3.Fejezet
....

Parancssor szintaktika és a válaszok

3.0 Bevezetés

Ez a fejezet a parancsnyelv szintaktikáját és a hozzájuk tartozó válaszkódokat tárgyalja.

3.1 Parancsok kiadása
....

Amikor a modem parancs állapotban van, akkor Ön a billentyüzetröl begépelve adhat ki parancsokat. A parancssornak AT-vel (vagy at-vel) kell kezdödnie, ezt a parancsok követik, végül egy kocsivissza karakter zárja le.

Egy parancssorban egyszerre több parancs is kiadható. Az egyes parancsok közé szóköz karakter illeszthetö a világos olvashatóság érdekében.

3.2 Parancs buffer
....

A billentyüzetröl begépelt parancsok a 40 karakter méretü parancs bufferben tárolódnak. A parancssor kezdetét jelzö AT vagy at, a kocsivissza karakter, a sorvége karakter és a szóköz karakter nem tárolódik a parancs bufferben.

A bufferben tárolt parancssor a kocsivissza karakter leütéséig nem hajtódik végre. Ha a parancssor túl hosszú, akkor az nem hajtódik végre, hanem a kocsivissza karakter leütésekor a modem ERROR válaszkódot fog küldeni.

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3.3 Parancsok törlése
....

Ha a parancssor begépelésekor hibázott, akkor az AT elötag kivételével törölhetök a hibás karakterek. Az S5 regiszter tartalmának átírásával a backspace karaktertörlö billentyühöz más ASCII karaktetr jelölhetö ki.

3.4 Modem válaszkódok
....

A modem egy parancsor végrehajtása után válaszkódot küld, hacsak nem kapott elözöleg egy ezt tiltó Q1 parancsot. A válaszkód lehet szó vagy szám, az alábbiakban mindkettöt feltüntetjük

OK (0)

A parancssor hiba nélkül hajtódott végre; vagy a tárcsázás ill. a válaszolás parancsot érvénytelenítette egy billentyü lenyomása a billentyüzeten.

CONNECT (1)

A modem sikeresen hozott létre összeköttetést a távoli modemmel.

RING (2)

A modem bejövö csengetést érzékel. A RING kód minden egyes csengetés után megjelenik, amíg a modem a várakozó módból ki nem lép, hogy megválaszolja a hívást.

NO CARRIER (3)

A modem nem érzékel vivö jelet 45 másodpercig, vagy az S7 regiszterben beállított ideig, hívás vagy válasz megkezdése után; vagy a modem a vivö jel hiányát érzékeli, miközben on-line módon össze van kötve a távoli modemmel, vagy az analóg visszacsatolású teszt esetén.

ERROR (4)

A modem érvénytelen paranccsal találkozik a parancssor végrehajtása közben; vagy érvénytelen karakterrel a tárcsázó parancs karaktersorában.

CONNECT 1200 (5)

A modem sikeresen hoz létre összeköttetést a távoli modemmel 1200 bps sebességen; az X1, X2, X3, X4 parancsok engedélyezik, az X0 parancs tiltja.

NO DIALTONE (6)

A modem nem érzékeli a tárcsahangot egy, a számára kiadott tárcsázási parancs után; engedélyezve a tárcsázást módosító elötagba írt W paranccsal, vagy az X2 ill. az X4 parancsokkal.

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BUSY (7)

A modem foglalt jelet érzékel tárcsázás után; X3, X4 paranccsal vagy a @ tárcsázás módosítóval engedélyezve.

NO ANSWER (8)

A modem a @ tárcsázás módosító kiadása után nem képes érzékelni egy 5 másodperces csendet a 30 másodperces várakozási idöszak alatt.

CONNECT 2400 (10)

Sikeres összeköttetés jött létre 2400 bps sebességen.

NVRAM ERROR (30)

Hiba történt a nem felejtö memória írása közben.

VOICE CALL (31)

A modem hanghívást érzékel, amikor a VDD funkció engedélyezett.

HANG UP (32)

60 másodpercig megválaszolatlan hanghívás.

4.Fejezet
....

Regiszterek

4.0 Bevezetés
....

A modem 28 regisztere meghatározza a modem müködési karakterisztikáját. Ez a fejezet leírja az egyes regiszterek funkcióját, beírásuk és kiolvasásuk módját.

4.1 Regiszterek olvasása és írása

Az egyes regiszterek tartalmának kiolvasására az Sr? parancs szolgál. A tartalmát az Sr=n paranccsal lehet megváltoztatni. Itt az r a regiszter sorszámát (0 -tól 27 -ig) jelöli, míg az n a regiszterbe beirandó új érték. Pl. az ATS7? parancs az S7 regiszter tartalmát olvassa ki; az ATS7=150 parancs az S7 regiszterbe 150-et ír be.

4.2 S0: Automatikus válaszadásnál a kicsengetések száma
....

Tartomány: 0-255 Alapérték: 0

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A S0 regiszter határozza meg a kicsengetések számát, ami után a modem automatikusan válaszol a hívásra. Ha az S0 regiszter tartalma 0, akkor a modem nem lesz automatikusan válaszoló módban.

4.3 S1: Csengetésszámláló
....

Tartomány: 0-255 Alapérték: 0

Az S1 regiszter tartalma eggyel növekedik minden alkalommal, amikor a modem a telefonvonalon csengetés jelet érzékel. Csak akkor mükö-dik, ha az S0 reiszter tartalma nem 0, és az utolsó csengetés után 8 másodperccel törlödik.

4.4 S2: Escape karakter
....

Tartomány: 0-127 Alapérték: 43

Az S2 regiszter az escape karakter decimális ASCII értékét tárolja. A 43-as alapérték egy + karakternek felel meg.

4.5 S3: Kocsivissza karakter (CR)
....

Tartomány: 0-127 Alapérték: 13

Az S3 regiszter a kocsivissza karakter decimális ASCII értékét tá-rolja. Ez a karakter szolgál mind a parancssor, mind a válaszkód le-zárására.

4.6 S4: Sorvége karakter (LF)
....

Tartomány: 0-127 Alapérték: 10

Az S4 regiszter a sorvége karakter decimális ASCII értékét tárolja. Ez a karakter a kocsivissza karaktert követi szavas válaszkód ese-tén.

4.7 S5: Szóközvissz karakter (backspace)
....

Tartomány: 0-32,127 Alapérték: 8

Az S5 regiszter a szóközvissza karakter decimális ASCII értékét tá-rolja. Ez az ASCII érték nem lehet 33 és 126 között. A karakter be-írása után az azt megelözö karakter törlödik a parancssorban, és a képernyöre két, S5 tartalmának megfelelö, egymástól egy szóköz ka-rakterrel elválasztott karakter íródik ki.

4.8 S6: Tárcsahangra várakozás
....

Tartomány: 2-255 Alapérték: 2(mp)

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Az S6 regiszter meghatározza, hogy a modem hány másodpercet várjon a tárcsázás elött, a telefonvonalra kapcsolódás után. A tárcsázás-módosító W elötag hatástalanítja, mivel ekkor a modem csak a tár-csahang megérkezte után kezd el tárcsázni.

4.9 S7: Vivö jelre várakozás

....

Tartomány: 3-255 Alapérték: 45 (mp)

Az S7 regiszter meghatározza, hogy a modem hány másodpercet várjon a tárcsázás befejezése után a távoli modem vivö jelére. Ha a beállított idön belül érzékeli a vivö jelet, akkor rákapcsolódik a vonalra. Ellenkezö esetben megszakítja a vonalat, és NO CARRIER válaszkódot küld.

4.10 S8: A vesszö karakter szünetidö
....

Tartomány: 0-255 Alapérték: 2 (mp)

Az S8 regiszter meghatározza, hogy a modem hány másodperc szünetet tartson tárcsázás közben a vesszö karakter hatására.

4.11 S9: A vivö jel érzékelési idö
....

Tartomány: 1-255 Alapérték: 6 (tizedmásodperc)

Az S9 regiszter meghatározza, hogy a vivö jelnek milyen hosszan kell jelen lennie folyamatosan ahhoz, hogy a modem azt élönek ismerje el. Hosszabb érzékelési idö a modemnek több idöt ad, hogy a vivö jelet megkülönböztesse a telefonvonali zajoktól.

4.12 S10: A vivö jel megszakadás érzékelési idö
....

Tartomány: 1-255 Alapérték: 14 (tizedmásodperc)

Az S10 regiszter meghatározza, hogy a vivö jelnek milyen hosszan kell folyamatosan kimaradnia ahhoz, hogy a modem felismerje a vivö jel megszakadását. Ez a késleltetés megengedi a vivö átmeneti eltünését anélkül, hogy a modem megszakítaná a vonalat.

4.13 S11: Tárcsahangos tárcsázás sebessége
....

Tartomány: 70-255 Alapérték: 95 (ezredmásodperc)

Az S11 regiszter meghatározza a tárcsázó hangok és a közöttük levö szünetek idötartamát. Az alapérték kb. 5.26 számjegyet jelent másodpercenként.

4.14 S12: Escape szekvencia késleltetés
....

Tartomány: 0-255 Alapérték: 50 (húsz ezredmásodperc)

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Az S12 regiszter meghatározza azt a késleltetési idöt, amely az escape karakter elött és után szükséges az escape szekvenciához.

4.15 S18: Tesztidö

Tartomány: 0-255 Alapérték: 0 (másodperc)

Az S18 regiszter meghatározza a modem diagnosztikai tesztjének idötartamát. A teszt futása megszakítható a &T0 parancs kiadásával. A gyári &T0 beállítás hatástalanítja a tesztidö mérését.

4.16 S25: DTR jel késleltetés

Tartomány: 0-255 Alapérték: 5 (századmásodperc)

Az S25 regiszter meghatározza a DTR (adatterminál készenlétben) jel pillanatnyi változásának azt a leghosszabb idejét, amelyet a modem még figyelmen kívül hagy. Az 5 századmásodperces gyári beállítás asszinkron módra, ill. szinkron 2-es és szinkron 3-as módra vonatkozik. A szinkron 1-es mód esetén az alapérték 5 másodperc, minthogy ebben a módban a regiszterbe írt értékek másodpercben értendök.

4.17 S26: RTS-böl CTS-be átmenet késleltetése

Tartomány: 0-255 Alapérték: 0 (tizedmásodperc)

Az S26 regiszter meghatározza, hogy amikor az &R0 opció be van kapcsolva, akkor a modem az RTS érzékelését követöen milyen hosszú késleltetés után kapcsolja be a CTS-t.

5.fejezet

Parancsok

5.0 Bevezetés

A fejezet a parancsokat alfabetikus sorrendben tárgyalja.

5.1 A: Válaszoló mód

Az A parancs hatására a modem a távoli modem jelére vár, hogy arra válaszoljon, és a parancssorban ezután megjelenö parancsokat már nem hajtja végre.

5.2 AT: Parancs elötag

Az AT vagy at parancs elötag törli a parancs buffert és informálja a modemet az Ön számítógépének átviteli sebességéröl, az adatformátumról és a paritásról. Minden parancssornak (az A/ kivételével) az AT elötaggal kell kezdödnie.

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5.3 A/: Utolsó parancs ismétlése
....

Az A/ parancs hatására a modem ismételten végrehajtja a parancs bufferben tárolt utolsó parancssort. Ehhez az egy paramcshoz nem szükséges beírni az AT elötagot és a kocsivissza karaktert. Általában sikertelen telefonhívás megismétlésére használatos.

5.4 B: Bell vagy CCITT szabvány
....

A B parancs a modemet vagy Bell vagy CCITT protokoll módba kapcsolja. A gyári alapbeállítás a Bell protokoll, amely a B1 parancsnak felel meg. A CCITT protokoll módba az ATB0 parancs kiadásával lehet átkapcsolni.

5.5 C: Vivö jel engedélyezés
....

A gyári C1 alapbeállítás engedélyezi a modem számára a vivö jel automatikus ki-be kapcsolását. Ha a modem éppen tárcsázik, válaszol vagy egy távoli modemhez kapcsolódik, akkor a vivö jel be van kapcsolva, másküllönben nincs vivö jel. A C0 parancs tiltja a vivö kiküldését, azaz teljesen kikapcsolja a vivö jelet.

5.6 D: Tárcsázás
....

A D parancs hatására az utána álló számot tárcsázza a modem, majd az összeköttetés létrehozása után on-line adatátviteli módba kerül. A parancs és a telefonszám közé P,T,S,R,W, stb. tárcsázást módosító karakterek írhatók.

5.7 E: Parancs karakter echo
....

A gyári E1 alapbeállítás engedélyezi a parancskarakterek kijelzését az Ön monitorának a képernyöjén. Az E0 parancs tiltja a parancskarakterek echo-zását.

5.8 F: Duplex adatmód
....

A gyári alapbeállítás az F1 parancsnak felel meg. Ez a modemet duplex módba állítja, azaz engedélyezi az egyidejü kétirányú adatforgalmat. Ekkor a modem nem echozza vissza a képernyöre a lokális számítógép adatait, mert duplex módban az echozás a távoli számítógép feladata.

Az F0 parancs a modemet fél-duplex módba állítja és nem engedélyezi az egyidejü kétirányú adatforgalmat. Ekkor a távoli modemnek küldött adatkarakterek megjelennek a lokális számítógép képernyöjén is, így félduplex módban az echozás a lokális számítógép feladata.

Az F parancs nincs hatással a parancskarakterek echozására, mert azt csak az E parancs szabályozza.

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5.9 H: Telefonvonalra kapcsolódás
....

A H0 parancs a telefonvonal megszakítását eredményezi, és a telefonkagyló letevésével egyenértékü. A H1 parancs telefonvonalra kapcsolódást jelent és a telefonkagyló felvételével egyenértékü.

5.10 I: Azonosítás
....

Az I0 parancs hatására a modem a termékkódját küldi vissza. Az I1 parancs hatására a modem firmware ROM teszt végrehajtása után az ellenörzö összeg íródik ki. Az I2 parancs hatására a modem OK üzenetet küld, ha a teszt hibátlanul futott le. Hiba esetén ERROR üzenetet ír a képernyöre. Az I3 parancs az aktuális beállitást irja ki.

5.11 J: Hang/adat felismerés
....

A J0 parancs megfelel a modem alapbeállításának és tiltja a hang/adat felismerésat, míg a J1 parancs engedélyezi azt.

5.12 L: Hangszóró hangerö
....

A gyári alapbeállítás az L2 paranccsal egyenértékü közepes hangeröt jelent. Ennél kisebbre állítja a modem hangszórójának hangerejét az L,L0, vagy az L1 parancs, nagy hangeröt pedig az L3 parancs kiadásával állíthatunk be.

A hangerö a modem hátlapján levö forgatógombbal is szabályozható.

5.13 M: Hangszóró üzemmód
....

Az M parancs meghatározza, hogy a modem hangszórója mikor legyen bekapcsolva. Az M1 parancs, ill. az alapbeállítás hatására a hangszóró addig lesz bekapcsolva amíg az összeköttetés létre nem jön.

Az M0 parancs teljesen kikapcsolja a hangszórót.

Az M2 parancs hatására a hangszóró mindíg be lesz kapcsolva.

Az M3 parancs bekapcsolja a hangszórót, kivételt képez a tárcsázás ideje és amikor a modem távoli vivöt érzékel.

5.14 N: Alternatív tárcsázás
....

A tárcsázó arancssorban két telefonszám közé illesztett N parancs hatására a modem elöször az elsö telefonszámot tárcsázza, és ha az foglalt, akkor a másodikat. A parancssor azonban, leszámítva a szóközÖket, nem lehet hosszabb 40 karakternél, máskülönben parancsbuffer túlcsordulás lesz.

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5.15 N=n: Ujrahívások száma
....

Az N=n parancs meghatározza, hogy a modem hányszor ismételje meg a hívást a hívott fél foglaltsága esetén. Az alapérték 0, azaz a modem nem hív újra. Az újrahívások száma azonban 0-15 közötti értékre állítható.

5.16 N?: Ujrahívások számának kiolvasása
....

Az N? parancsra a modem az újrahívások számának beállított értékével válaszol.

5.17 O: On-line
....

az O parancs hatására a modem parancs állapotból on-line adatállapotba kerül és folytatja az adatátvitelt a távoli modemmel.

5.18 P: Pulzus tárcsázás
....

A P parancsot egy telefonszám elé írva a modem pulzus módban fogja tárcsázni a telefonszámot. A pulzustárcsázás sebessége 10 pulzus másodpercenként. A P parancs akár a szám jegyek közé is beilleszthetö. Pl. az ATDT9,P7623202 parancssor hatására a modem a 9-es számot hanggal tárcsázza, majd két másodpercet vár a vesszö parancs hatására és a 7623202 számot pulzussal tárcsázza.

5.19 Q: Válaszkádok küldése
....

Az alapbeállítás ill. a Q0 parancs hatására a válaszkódok a képernyön jelennek meg.

A Q1 parancs letiltja a válaszkódokat. Ez szinkron módban hasznos, vagy akkor, ha a modem nyomtatóhoz van kötve, és ekkor az eredménykódok kiírása esetleg nem kívánatos.

5.20 R: Tárcsázás válasz (fordított) módban
....

Az R parancsot egy tárcsázási parancssor végére írva a modem válasz módban fel tud hívni egy csak hívó modemet.

5.21 S=n: Tárolt telefonszám hívása

....

Ha a D tárcsázási parancssorba S=n tárcsázást módosítót beírva a modem az n+1-edik telefonszámot hívja, amennyiben a szám a &Z paranccsal el lett tárolva. Pl. az ATDPS=2NS=4 hatására a modem a 3. telefonszámot hívja, és ha az foglalt akkor az 5. számot.

Tárcsázásmódosító használatakor ügyelni kell arra, hogy a parancsbufferbe legfeljebb 40 karakter fér el. Pl. 10 számjegyü tárolt telefonszám hívásakor a parancsbufferben a szám 10 karakternyi helyet foglal el annak ellenére, hogy a parancssorban ennek csak 3 karaktere jelenik meg.

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Az S=n tárcsázásmódosítót meg kell elözze egy D,DT, vagy DP tárcsázási parancs, máskülönben,elöfordulhat, hogy regiszterbeállító parancsnak értelmezödik.

5.22 Sr?: Regiszter kiolvasása
....

Az Sr? parancs hatására az r regiszter tartalma íródik ki. Pl. az ATS5?S7? parancssor hatására a képernyön az S5 és S7 regiszterek tartalma jelenik meg, valamint egy OK válaszkód.

5.23 Sr=n: Regiszter beírás
....

Az Sr=n parancs hatására az Sr regiszter új tartalma n lesz. Bekapcsolás után, ill. az ATZ parancs hatására a regiszterekben a modem firmware ROM-jában tárolt alapértékek lesznek.

5.24 T: Tárcsahangos tárcsázás
....

A T parancs hatására a modem a T után álló számot tárcsahanggal hívja. A tárcsázás sebessége 5.26 számjegy másodpercenként, hacsak az S11-es regiszterben nem állítunk be más értéket. A T parancs akár számjegyek közé is illeszhetö, pl. az ATDP9,T7623202 parancssor hatására a modem pulzussal tárcsázza a 9-es számot, vár két másodpercet -a vesszö parancs hatására- és tárcsahanggal tárcsázza a 762-3202 telefonszámot.

5.25 V: Szavas / számjegyes válaszkód
....

Az alapbeállítás és a V1 parancs hatására a válaszkódok szavas formában jelennek meg, pl. OK vagy CONNECT.

A V0 parancs hatására a válaszkódok számjegyként jelennek meg, amely elönyös lehet olyan szoftver esetén, amely nem kezeli hatékonyan a karaktersorozatokat.

5.26 W: Várakozás tárcsahangra

....

A tárcsázási parancssorba illesztett W parancs hatására a modem 3 másodperces folyamatos tárcsahangra vár a tárcsázás megkezdése elött. Ha két másodpercig, vagy az S6 regiszterben beállított ideig nem észlel a modem tárcsahangot, akkor NO DIALTONE válaszkódot küld. Ha a tárcsázást követöen foglalt jelet érzékel a modem, akkor BUSY válaszkódot ír a képernyöre.

5.27 X: Válaszkód-készlet választás
....

Az X parancs a különbözö válaszkód készleteket aktivizálja. Az alapbeállítás az X4 parancsnak felel meg. Bövebb információk a 3.4 fejezetben találhatók.

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5.28 Y: Hosszú megszakítás
....

Az Y1 parancs hatására a modem 1.6 másodperc folyamatos, a távoli modem által küldött megszakításjel vétele után bontja a vonalat. A hosszú megszakítás engedélyezésekor a modem az ATH vonalbontás parancs után 4 másodpercig hosszú bontójelet küld a távoli modemnek és csak utána bontja a vonalat.

Az alapbeállítás és az Y0 parancs tiltja a hosszú megszakítást.

5.29 Z: Alapállapot
....

A Z0 parancs hatására a modem újra alapállapotba kerül. Ujratöltödik az aktív konfigurációs mezö a nem törlödö memória SCP0 konfigurációs profiljából, és 2 másodpercig fut a modem öntesztje.

A &Z1 parancs az SCP1 konfigurációs profilt tölti be az aktív konfigurációs mezöbe.

A soronkövetkezö, & jelü parancsok 1200-as modemre nem érvényesek !

5.30 &C: Vivö jel érzékelés
....

A &C1 parancs és az alapbeállítás hatására a modem figyeli a távoli modemtöl érkezö vivö jelet.

A &C0 parancs csak aszinkron módban hatásos, és a CD adatvivö jelet igaz állapotba kényszeríti.

5.31 &D: Adatterminál készenlét
....

A &D parancs meghatározza a modem viselkedését a DTR adatterminál készenléti jel megszünésére.

Alapállapotban, és a &D2 parancs hatására, a DTR megszünése után a modem bontja a vonalat, parancsállapotba kerül és tiltja az automatikus válaszolást. A DTR jel visszaállításával az automatikus válaszadás újra engedélyezett.

A &D0 parancs után a modem figyelmen kívül hagyja a DTR jel változását.

A &D1 parancs hatására, a DTR megszünése után a modem parancsmódot feltételez, de nem bontja a vonalat.

A &D3 parancs hatására a modemet alapállaptba hozza a DTR jel megszünése.

5.32 &F: Gyári alapbeállítás
....

Az &F parancs hatására az aktív konfigurációs mezöbe a gyárilag beállított konfigurációs profil töltödik be.

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5.33 &G: Örzöhang választás
....

A &G parancs csak a CCITT V.22 módban hatásos, és az örzöhang frekvenciáját határozza meg.

A &G0 parancs és az alapbeállítás tiltja az örzöhangot.

A &G1 parancs 550 Hz, míg a &G2 parancs 1800 Hz frekvenciájú örzöhangot választ ki.

5.34 &J: Telefoncsatlakozó választás
....

A &J0 parancs és a gyári alapbeállítás RJ-11/RJ-41S/RJ45S csatlakozót választ ki, és a modemnek egy telefonvonalas rendszerben való használatát jelenti.

A &J1 parancs RJ-12/RJ-13 csatlakozót választ ki a modemnek egy több telefonvonalas rendszerben való használatához.

5.35 &L: Bérelt vonal
....

Az &L0 parancs az alapbeállításnak felel meg, és a modem tárcsázási módban való müködtetését jelenti.

Az &L1 parancs bérelt vonalon ponttól pontig müködés esetén használatos.

Az &L1 parancs kiadása után a vonal egyik oldalán levö modemet ATD paranccsal kezdeményezö üzemmódba, a másik oldalon leö modemet ATA paranccsal válaszoló üzemmódba kell tenni. Ez után létrejön a modemek közötti összeköttetés és lehetövé válik a távadatátvitel.

5.36 &Q: Aszinkron / szinkron mód kiválasztás
....

A &Q0 parancs és a gyári alapbeállítás az aszinkron müködési mód.

A &Q1, &Q2, &Q3 parancsok szinkron 1,2,3 módú müködtetésnek felelnek meg.

5.37 &P: Pulzustárcsázás kitöltési tényezö
....

A &P0 parancs és az alapbeállítás 39/61 kitöltési tényezönek felel meg, és az USA-ban használatos.

A &P1 parancs 33/67-re állítja a kitöltési tényezö értékét, amely az Európában, így Magyarországon is szabvány.

5.38 &R: CTS / RTS opció
....

A &R parancs csak szinkron módban haználatos a CTS jel szabályozásá- ra.

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Az &R0 parancs és az alapbeállítás esetén a CTS jel az S26 regisz- terben beállított késleltetéssel követi az RTS jelet.

Az &R1 parancs hatására a modem figyelmen kivül hagyja az RTS jelet.

5.39 &S: DSR opció
....

Az &S0 parancs és az alapbeállítás esetén mindíg van DSR jel.

Az &S1 parancs hatására a DSR jel az EIA RS-232C szabvány szerint fog müködni.

5.40 &T: Teszt
....

A &T paranccsal különbözö diagnosztikai tesztek hajthatók végre.

A &T0 parancs hatására az éppen futó teszt végrehajtása befejezö- dik.

A &T1 parancs a CCITT V.54,L3 ajánlásának megfelelö lokális analóg hurkolású tesztet hajtja végre, amely a lokális számítógép és mo- dem közötti összeköttetést vizsgálja.

A &T3 egy lokális digitális hurkolású tesztet indít, amely lokális vizsgálat, és egyben lehetövé teszi egy nem CCITT V.54 kompatibilis, távoli modem által vezérelt ellenörzést is.

A &T4 parancs és a modem alapállapot lehetövé teszi a modem számára, hogy elfogadja a távoli modem kérését egy távoli vezérlésü, digitálisan hurkolt teszt végrehajtására.

A &T5 ellentettje a &T4 parancsnak, és tiltja a távoli modem által vezérelt tesztet.

A &T6 parancs távoli digitális hurkolású tesztet kezdeményez, a CCITT V.54,L2 ajánlásnak megfelelöen.

A &T7 a &T6 paranccsal azonos hatású, de még egy öntesztet is elindít.

A &T8 lokális analóg hurkolást és öntesztet kezdeményez a modem ellenörzésére.

5.41 &V: Konfigurációs profil kiolvasás
....

A &V parancs hatására kiíródik a képernyöre az aktív konfigurációs profil és a tárolt telefonszámok.

A &V0 az SCP0 profilt, a &V1 az SCP1 profilt jelenít meg.

5.42. &W: Konfigurációs profil írás
....

A &W0 parancs az aktív konfigurációs profilt a modem nem felejtö memóriájának SCP0 profiljába, a &W1 pedig az SCP1 profiljába írja.

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5.43 &X: Szinkron átvitel órajel választás
....

Az &X0 parancs és a gyári alapbeállítás hatására a modem állítja elö a szinkron átvitel órajelét amely az RS-232 csatlakozó 15-ös pontjára kerül.

Az &X1 parancs kiadása után a modem az adattermináltól kapja az órajelet az RS-232 csatlakozó 24-es pontján, és ezt a 15-ös ponton továbbítja.

Az &X2 parancs után a modem a beérkezö vivö jel órajelét használja és azt az RS-232 csatlakozó 15-ös pontjára továbbítja.

5.44 &Y: Bekapcsolási profil
....

Az utoljára kiadott &Y0 vagy &Y1 parancstól függöen az SCP0 vagy az SCP1 lesz a bekapcsolás utáni aktív konfigurációs profil.

5.45 &Zn=: Telefonszám tárolás

....

A &Zn= parancs az egyenlöségjel után álló telefonszámot eltárolja a nem felejtö memóriában, és az pl. az Sn vagy a /n tárcsázásmódosítók-kal aktivizálható. Maximum 10 szám tárolható, a memória 100 karakter nagyságú. A számjegyek közé írt módosító karakterek tárolódnak, a szóköz karakterek nem tárolódnak.

5.46 @: Csend válaszra várás
....

Egy tárcsázó parancssorban levö @ parancs hatására a modem az S7 re-giszter szerinti idöt vár egy, vagy több csengetésre, majd 5 másod-perc folymatos csendre a következö számjegy tárcsázása elött. Ha nem érzékeli a folyamatos szünetjelet, akkor bontja a vonalat és NO ANSWER üzenetet ír ki. Ha foglalt jelet érzékel, akkor BUSY-t ír ki a képernyöre.

5.47 ,(vesszö): Szünet
....

A vesszö parancs hatására a modem az S8 regiszter értéke szerinti szünetet tart a parancssor végrehajtásában. Az alapbeállítás 2 má-sodperc.

5.48 /n: Tárolt szám tárcsázása
....

A /n tárcsázás módosító az S=n paranccsal egyenértékü, és hatására a modem az n+1.-ik tárolt telefonszámot tárcsázza.

5.49 +++: Escape karakterek
....

Az escape karakterek hatására a modem az adatátviteli módból parancs módba tud kerülni a vonal megszakadása nélkül. Az escape szekvencia a következö:

1/ Egy másodperc várakozás beírás nélkül

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2/ Három +++ escape beírás kocsivissza nélkül

3/ Egy másodperc várakozás beírás nélkül

A modem az escape szekvenciát OK üzenet kiírásával hagyja jóvá.

5.50 !:
....

A ! parancs hatására a modem fél másodpercig a vonalra kapcsolódik, majd 1/2 mp-ig lekapcsolódik a vonalról. Ez egyes telefon - alköz-pontoknál a hívás átadásra használható.

5.51 ; (pontosvesszö): Parancsmódba visszatérés
....

Egy tárcsázási parancssor végére írt pontosvesszö arra utasítja a modemet, hogy tárcsázás után térjen vissza parancsmódba.

6. Fejezet
....

Szinkron és bérelt vonalú müködés

6.1 Szinkron órajel
....

A szinkron adatküldés óra jelét a modem RS-232 portjának a 15-ös lábára kell vezetni. Az alkalmazásnak megfelelö &X paranccsal lehet kiválasztani, hogy az órajel forrása maga a modem, a vételi vivö jel, vagy az adatterminál legyen. Ez utóbbi a modem RS-232 portjának 24-es lábára küldi az órajelet.

A vételi órajel forrása mindíg a vételi vivö jel. Ezt a modem RS-232 portjának 17-es lábára kell vezetni.

6.2 Félduplex szinkron müködési mód
....

A modem fél-duplex müködtetése esetén az &R0 RTS/CTS opció érvényes kell legyen. A modem nem kapcsolgatja ki és be az adatküldés vivö jelét ténylegesen, hiszen csak szimulálja a fél-duplex müködést.

Bizonyos adatterminálоknál szükség lehet az RTS-böl CTS-be való átmenet késleltetésére. A késleltetést az S26-os regiszter értéke határozza meg. Ha a nulla gyári alapbeállítás nem megfelelö, akkor is érdemes a szem elött tartani, hogy ha nagyobb késleltetés, akkor az adatátvitel lassúbbá válik. Az S26-ba írt késleltetés teljes duplex módban a modem figyelmen kivül hagyja.

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6.3 Szinkron mód 1: Szinkron / aszinkron mód
....

Azok a terminálok tudnak szinkron 1 módban müködni, amelyek a szinkron, az aszinkron kommunikációt is támogatját, méghozzá úgy, hogy azok programból átkapcsolhatók ugyanarra az RS-232 portra. Ilyenek pl. azok a számítógépek, amelyek az újabb Zilog 8030 és 8530 SCC USART-okkal müködnek.

Ebben a módban a modem bekapcsolás után aszinkron parancsmódba kerül. A hívások aszinkron módban történnek, és a modem automatikusan szinkron módba kerül, amikor a kapcsolat kiépült a távoli modemmel.

A szinkron 1 módú müködéshez &Q1 parancsot kell kiadni a modem számára. Automatikus válasz módba a modem akkor, kerül, ha az S0 regiszterbe zérustól különbözö érték lett írva. Ekkor a modem az on-line kapcsolatból aszinkron parancsmódba csak a vonal megszakításával tud visszakerülni.

6.4 Szinkron mód 2: Tárolt telefonszám tárcsázási mód
....

A szinkron 2 mód a csak szinkron müködésü adatterminálokat támogatja, és nagyon hasonló a CCITT V.25 ajánláshoz. Ebben a módban a modem tárcsázik egy elözöleg eltárolt telefonszámot a DTR (adatterminál készenlétben) jel bekapcsolódása után, és bontja a vonalat a DTR jel, vagy a vivö jel megszünése után.

A szinkron 2 módú müködéshez &Q1 parancsot kell kiadni a modem számára. A telefonszámot &Z paranccsal lehet eltárolni. A Q1 paranccsal ajánlatos a válaszkódokat letiltani. az E0 paranccsal a parancsok echozása tiltható le. A &W parancs a modem megváltoztatott konfigurációs profilját menti el.

6.5 Szinkron mód 3: Kézi tárcsázási mód
....

A szinkron 3 módban a szinkron adatterminálоknál a DTR jel mint egy adatátvitel/beszélgetés kapcsoló müködik. A telefonkészülék legyen a modem hátlapján levö PHONE dugaszba csatlakoztatva. Az adatterminál operátora a kézi tárcsázás után a DTR (adatterminál készenlétben) jel bebillentésével a modemet adatmódba kapcsolja és leteszi a telefonkagylót.

A szinkron 3 módú módú müködéshez &Q3 parancsot kell kiadni a modem számára. A Q1 paranccsal ajánlatos a válaszkódokat letiltani. Az E0 paranccsal a parancsok echozása tiltható le. A &W parancs a modem megváltoztatott konfigurációs profilját menti el.

7.Fejezet
....

Bevezetés a PROCOMM kommunikációs program használatához.

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7.1 Installálás
....

Másolja a ProComm floppy lemezen levö négy file-t a merevlemezes egység megfelelö könyvtárába. Az ARC *.ARC   parancssor a három tömörített formátumú file-ból visszakonvertálja futtatható formátumúra a ProComm programrendszert. Ennek része a PROCOMM.DOC részletes angol nyelvü kézikönyv.

A PROCOMM.EXE program elsö elindítása után jönnek létre a szükséges rendszerfile-ok. Az ALT-F10 billentyük leütésével megjelenik a ProComm parancsok listája.

7.2 Kommunikációs paraméterek
....

Az ALT-P leütése után beállítható a kommunikációban aktív soros port sorszáma, a hozzá tartozó kommunikációs paraméterekkel. Pl. az 1200, N,8,1,COM1 jelentése: egyes soros port, 1200 baud kommunikációs sebesség, nincs paritás, 8 adatbit, 1 stopbit. Figyelem: csak a 24-es SAVE parancs kiválasztásával íródnak be a rendszerfile-ba a megváltoztatott kommunikációs paraméterek.

7.3 Modem beállítás
....

Az ALT-S begépelése után jelentkezik be a kezdeti beállítások menüje. Válassza ki modem beállítás (1) menüpontot! Ezen belül a tárcsázó parancs (2) legyen pl. ATDPW, amely tárcsahangra várakozást és pulzussal való tárcsázást jelent. A modem init string (1) lehet pl. AT B0 E1 S6=20 S0=0!, ahol a B0 a CCITT protokollt, az E1 a parancs echozást, az S6=20 húsz másodperces tárcsahangra várakozást jelent. A zérustól eltérö S0 regiszterérték automatikus válasz módot jelölne ki a modem számára. ESC leütésével visszatérve a kezdeti beállítás menühöz az S) menüpont kiválasztásával lehet elmenteni a megváltoztatott modemparamétereket.

7.4 Telefonkönyv feltöltés, automatikus hívás, és válasz
....

Az ALT-D beírásával érhetö el a telefonkönyv. Itt az új telefonszámokat az R paranccsal lehet beírni, és max. száz telefonszám tárolására van lehetöség. A megfelelö telefonszám sorszámának begépelése után a modem automatikusan tárcsázza a távoli modemet, és kiépíti vele a vonali kapcsolatot, amennyiben az kész fogadni a hívást. Automatikus válaszoló módba az ALT-Y beírása után kerül a modem. Szükséges, hogy a kommunikáció sebessége, és egyéb paraméterei megegyezzenek a hívást kezdeményezö, és az arra válaszoló oldalon.

7.5 Karakterek átvitele
....

Ha az elözö pontban leírtak szerint sikeresen kiépült a kapcsolat a távoli modemmel, akkor a billentyüzeten leütött arakterek megjelennek a távoli modem képernyöjén, és viszont. Az ALT-E paranccsal lehet fél-duplex módba váltani, hogy a begépelt üzenetek a saját képernyön is megjelenjenek. Beszélgetö üzemmódba az ALT-O paranccsal lehet kerülni. Itt a lokális és a távoli modemtöl érkezö üzenetek elkülönítve jelennek meg.

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7.6 File-ok átvitele
....

Ha a távoli modemmel kiépült az összeköttetés, akkor a fileátvitelhez a vonal egyik oldalán a PG UP billentyü leütéséval a file-küldés, a másik oldalon a PG DN billentyü leütésével a file-fogadás választható ki. Fontos, hogy a vonal két oldalán ugyanaz az átviteli protokoll legyen kijelölve.

7.7 ProComm parancsösszefoglaló
....

ALT-D: Telefonkönyv szolgáltatások

ALT-R: Automatikus hívásismétlés

ALT-M: Billentyüzet makrók

ALT-P: Kommunikációs paraméterek beállítása

ALT-W: Konvertáló tábla

ALT-A: Szövegszerkesztö

ALT-X: Programfutás vége

ALT-Q: Távolról vezérelhetö host mód

ALT-O: Dialógus mód

ALT-F4: Dos kijárat /shell/

ALT-F5: Parancsfile-ok

ALT-I: Program információ

ALT-S: Kezdeti beállítások

ALT-K: Kermit server

ALT-B: Könyvtár kijelölés

ALT-C: Képernyö törlés

ALT-E: Duplex/félduplex kapcsoló

ALT-H: Telefonvonal megszakítás

ALT-T: Idömérés

ALT-L: Nyomtató ki/ bekapcsolás

ALT-Z: Színbeállítás

ALT-Y: Automatikus válaszadás

ALT-F3: Kocsivissza/kocsivissza+sorvége kapcsoló

ALT-F7: Megszakítás

PG UP: Fileküldés

PG DN: Filefogadás

ALT-F: Könyvtár tartalom

ALT-V: File olvasása

ALT-G: Képernyötartalom file-ba mentése

ALT-F1: Naplózás ki/bekapcsolása

ALT-F2: Naplózás felfüggesztése

Függelék A
....

Technikai adatok

Postai engedélyezési számok:

VT-6-0109: (Discovery 1200 Hk belsö modem)

VT-6-0110: (Discovery 1200 Ck külsö modem)

Kompatibilitás a következö kommunikációs protokollokkal:

CCITT V.22 bis: 2400 bps aszinkron és szinkron

CCITT V.22: 1200 bps aszinkron és szinkron

CCITT V.21: 0-300 bps aszinkron

Bell 212A: 1200 bps aszinkron és szinkron

Bell 103: 0-300 bps aszinkron

CCITT V.25 bis (108/1): szinkron, tárolt szám tárcsázási mód

Vételi érzékenység: -45 dBm

Adási szint: -10 dBm

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Müködési módok:

Duplex és félduplex, két-vezetékes bérelt vonalon, vagy kapcsolt vonalon

Interfész: RS-232 soros

Tárcsázási jellemzök:

Pulzussal vagy hanggal

Programozható szünetidö

Csend válaszra várás (PBX)

Hívás átadás alközponton keresztül (PBX)

Tárcsahagngra várakozás tárcsázás elött

Hívott szám foglaltságának érzékelése

Hívás kezdeményezés válasz módú modemmel

Csatlakozók:

RJ-11 a telefonkészülékhez

DO-8 fali telefoncsatlakozó

Tápfeszültség adapter: 230 V-ból 9 V, 7 W

Hangszóró: forgatógombbal és programból változtatható hangerö

Memória: Nem felejtö, a felhasználó által módosítható konfigurációs profil és telefonszámok tárolására

Parancsbuffer: 40 karaktert

Tesztelés:

Lokális analóg hurok

Lokális analóg hurok önteszttel

Távoli digitális hurok

Távoli digitális hurok önteszttel

Lokális digitális hurok

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Programozható tesztidö

Szinkron müködési módok:

Kézi tárcsázás

Tárolt telefonszám tárcsázása

Aszinkron tárcsázás, szinkron átvitel

Automatikusan válaszoló mód:

Mind aszinkron, mind szinkron módban programozhatóan beállítható. A parancsmód teljesen letiltható a néma kapcsolónak a dedikált automatikus válaszoló módba állításával.

Adó jel frekvenciák:

1200+-0.01 %	V.22 bis alsó csatorna, hívás mód
2400+-0.01 %	V.22 bis felsö csatorna, válasz mód *
1200+-0.01 %	V.22 alsó csatorna, hívás mód
2400+-0.01 %	V.22 felsö csatorna, válasz mód
980	CCITT V.21 csatorna #1, mark
1180	CCITT V.21 csatorna #1, szóköz
1650	CCITT V.21 csatorna #2, mark
1850	CCITT V.21 csatorna #2, szóköz
1200+-0.01 %	Bell 212A alsó csatorna, hívás mód
2400+-0.01 %	Bell 212A felsö csatorna, válasz mód
1270	Bell 103, hívás mód, mark
1070	Bell 103, hívás mód, szóköz
2225	Bell 103, válasz mód, mark
2025	Bell 103, válasz mód, szóköz

Vételi jel türése: +-7 Hz

RS-232 csatlakozó

Láb	RS-232	V.24	irány	funkció
1	AA	101	kétirányú	védöföld
2	BA	103	modem felé	adatküldés
3	BB	104	modemtöl	adatvétel
4	CA		modem felé	RTS:küldéskérés
5	CB	106	modemtöl	CTS:törlés küldéshez
6	CC	107	modemtöl	DSR:adat készre áll.
7	AB	102	kétirányú	föld
8	CF	109	modemtöl	vivö jel érzékelve

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*12	CI	112	modemtöl	váltakozó sebesség
15	DB		modemtöl	órajel küldés(szink.)
17	DD		modemtöl	órajel vétel (szink.)
20	CD	108	modem felé	DTR:adatterminál kész
22	CE	125	modemtöl	csengetés jelzés
*23	CI		modemtöl	váltakozó sebesség
24	DA		modem felé	órajel küldés

*CI kimenet 12-es (Bell 212A)és a 23-as (RS-232) lábon

Parancsösszefoglaló

```
AT    Minden parancsot kötelezöen megelözö elötag (kivéve A/ és +++)
A/    Utolsó parancs ismétlése
+++   Escape karakterek adatmódból parancsmódba kerüléshez

Tárcsázási parancsok és módosítók

D     Hívás kezdeményezés
N     Alternatív tárcsázás
S=n   n- edik telefonszám tárcsázása
T     Tárcsahangos tárcsázás
P     Pulzus tárcsázás
R     Tárcsázás fordított módban
W     Tárcsahangra várás
,     Szünet
!     Hívás átadás alközponton keresztül
;     Visszatérés parancsmódba
/n    n sorszámú telefonszám tárcsázása

Modem müködtetö parancsok

A     Automatikus válaszadás
B0    CCITT V.21, V.22
B1    Bell 103 / 212 A
C0    Vivö küldés tiltva
C1    Vivö küldés engedélyezve
E0    Parancs echo tiltva
E1    Parancs echo
F0    Félduplex mód
F1    Teljes duplex mód
H0    Telefonvonal megszakítás
H1    Telefonvonalra kapcsolódás




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I0    Termékkód
I1    ROM ellenörzö összeg
I2    ROM ellenörzés eredménye
I3    Információ a beállításokról
J0    Hang / adat érzékelés tiltva
J1    Hang / adat érzékelés engedélyezve
L1    Alacsony hangerö
L2    Közepes hangerö
L3    Nagy hangerö
M0    Hangszóró kikapcsolva
M1    Hangszóró bekapcsolva az összeköttetés létrejöttéig
M2    Hangszóró mindíg bekapcsolva
M3    Hangszóró kikapcsolva a tárcsázás alatt, különben ua. mint M1
N=n   Ujrahívások száma foglaltság esetén
N?    Ujrahívások számának lekérdezése
O0    On-line adatmódba kapcsolás
O1    On-line adatmódba kapcsolás visszacsatolással (2400 bps)
```

```
Q0    Válaszkódok engedélyezése
Q1    Válaszkódok tiltva
Sr?   Regiszter kiolvasása
Sr=n  Regiszter beírása n tartalommal
V0    Számjegyes válaszkódok
V1    Szavas válaszkódok
X0    Válaszkód 0-4
X1    Válaszkód 0-5, 10
X2    Válaszkód 0-6, 8-10
X3    Válaszkód 0-5, 7-10
X4    Minden válaszkód engedélyezve
Y0    Hosszú megszakítás engedélyezve
Y1    Hosszú megszakítás tiltva
Z0    Modem alapállapotba állítás SCP0 konfigurációs profillal
Z1    Modem alapállapotba állítás SCP1 konfigurációs profillal
&C0   Vivö figyelés tiltva
&C1   Távoli modem vivöjének figyelése engedélyezve
&D0   DTR (adatterminál készenlét) jel figyelmen kívül hagyva
&D1   DTR megszünése után feltételezett parancsmód vonalbontás nélkül
&D2   DTR megszünése után feltételezett parancsmód vonalbontással
&D3   DTR megszünése után modem alapállapotba állítás
&F    Gyári alapbeállítás betöltése
&G0   Örzöhang tiltás
&G1   550 Hz örzöhang
&G2   1800 Hz örzöhang




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&J0   RJ-11 telefoncsatlakozó, egy telefonvonalas rendszer
&J1   RJ-11 telefoncsatlakozó, több telefonvonalas rendszer
&L0   Tárcsázási üzemmód
&L1   Bérelt vnalas üzemmód
&P0   Pulzustárcsázás kitöltési tényezö 39/61
&P1   Pulzustárcsázás kitöltési tényezö 33/67
&Q0   Aszinkron mód
&Q1   Szinkron mód 1
&Q2   Szinkron mód 2
&Q3   Szinkron mód 3
&R0   CTS követi az RTS jelet
&R1   CTS mindíg bekapcsolva, RTS figyelmen kívül hagyva
&S0   DSR jel bekapcsolva
&S1   DSR követi az RS-232C-t
&T0   Diagnosztikai teszt befejezése
&T1   Lokális analóg hurok
&T3   Lokális digitális hurok
&T4   Távolról vezérelt digitális hurkolású teszt engedélyezve
&T5   Távolról vezérelt digitális hurkolású teszt tiltva
&T6   Távoli digitális hurkolású teszt kezdeményezés
&T7   &T6 + modem önteszt
&T8   Lokális analóg hurok + modem önteszt
&V    Aktív konfigurációs profil megjelenitése
&V0   SCP0 profil megjelenitése
```

```
 &V1   SCP1 profil megjelenitése
 &W0   Aktiv konfigurációs profil SCP0-ba írása
 &W1   Aktiv konfigurációs profil SCP1-be írása
 &X0   Modem órajel
 &X1   Terminál órajel
 &X2   Távoli vivö órajel
 &Y0   SCP0 a bekapcsolás utáni aktiv @TABLAZAT=konfigurációs profil
 &Y1   SCP1 a bekapcsolás utáni aktív konfigurációs profil
 &Zn=  n-edik telefonszám tárolása
 Megjegyzés: a & kezdetü parancsok 1200-as modemre nem érvényesek
 Válaszkódok
 OK           0      Sikeres parancssor végrehajtás
 CONNECT      1      Összeköttetés távoli modemmel (300 bps/1200 bps)
 RING         2      Csengetés jel érkezett
 NO CARRIER   3      Távoli vivö jel nem érzékelhetö



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 ERROR        4      Parancssor hiba
 CONNECT 1200 5      Összeköttetés távoli modemmel 1200 bps
 NO DIALTONE  6      Nincs tárcsahang
 BUSY         7      Foglalt jel érzékelve
 NO ANSWER    8      Nincs 5 mp csend
 CONNECT 2400 10     Összeköttetés távoli modemmel 2400 bps
 NVRAM ERROR  30     Modem memória hiba
 VOICE CALL   31     Hanghívás érkezett automatikus válasz módban
 HANG UP      32     Hanghívás megszakítása 60 mp után

 Regiszterek

 Regiszter   Tartomány Egység     Alapérték   Funkció

*S0          0-255     csengetés  01          csengetésszám válasz elött
 S1          0-255     csengetés  00          csengetésszámláló
 S2          0-127     ASCII      43          escape karakter
 S3          0-127     ASCII      13          kocsivissza karakter
 S4          0-127     ASCII      10          soremelés karakter
 S5          0-32,127  ASCII      08          szóköz vissza karakter
*S6          2-255     másodperc  02          tárcsahangra várás
*S7          3-255     másodperc  45          vivö jelre várás
*S8          0-255     másodperc  02          vesszö szünetidö
*S9          1-255     0.1 mp     06          vivöérzékelés válaszidö
*S10         1-255     0.1 mp     14          vivö kimaradás érzékelés
*S11         70-255    0.001 mp   95          hangtárcsázás sebessége
*S12         0-255     0.02 mp    50          escape késleltetés
S13-S17                                       fenntartott
*S18         0-255     másodperc  00          tesztidö
*S19-S24                                      fenntartott
*S25         0-255     0.01 mp    05 **       DTR jel késleltetés
*S26         0-255     0.01 mp    00          RTS-böl CTS-be átmenet
 S27                                          fenntartott

 * Regiszterek eltárolódnak a &W parancs hatására a modem nem felejtö
 NVRAM memóriájában
```

```
** Szinkron 1 módban 5 másodperc az alapérték
```

1.10 Prodem modem 9600M

```
                    Prodem modem 9600M

 B0   CCITT V.32/22bis/22/21 compatible, Auto data rate
 B1   CCITT V.32/22bis/22, Bell 212A/103 compatible, Auto data rate
 B2   CCITT V.32/22bis//22/21 compatible, Fixed data rate
 B3   CCITT V.23 compatible
      (DTE data rate is fixed at 1200 bps. Data buffer is provided for
      the 1200/75 bps conversion)
      Auto Logon/Callback, E-Mail and MNP or V42 error correction are
      automatically disabled in this mode.
&C0   DCD forced ON
&C1   DCD follows received carrier
&D0   Modem ignores DTR
&D1   Returns to Command mode following an ON to OFF transition of DTR
&D2   Hangs up, returns to Command mode following an ON to OFF
      transition of DTR
&D3   Modem resets following an ON to OFF transition of DTR. (*)
      If AT&Yn or AT&Wn has ever been entered, ATZn will be executed,
      otherwise AT&F will be taken. See AT&F or AT&Yn status from the
      Active profile by entering AT&V command.
*D0   Normal operation
*D1   In ORG mode, the modem will dial the number stored in Phone list N0
      upon detecting OFF to ON transition of DTR. The call can be aborted by
      entering any key.
      In ANS mode, the modem will go OFF hook and start sending answer tone
      upon detecting OFF to ON transition of DTR.
*D2   In ORG mode, the modem will dial the number stored in Phone list N0
      upon detecting OFF to ON transition of DTR.  The call cannot be aborted
      by entering any key.
      In ANS mode, the modem will go OFF hook and start sending answer tone
      upon detecting OFF to ON transition of DTR.
 E0   Command echo disabled
 E1   Command echo enabled
 F0   Echo transmit data in ON-Line mode
 F1   Transmit data are not echoed in ON-Line mode
&G0   No guard tones
&G1   550Hz guard tone selected
&G2   1800Hz guard tone selected
*G0   1300Hz calling tone disabled
*G1   1300Hz calling tone enabled
&H0   List of Asynchronous commands
&H1   List of Immediate action commandsu
&H2   List of Dial modifier
&H3   List of Auto Logon/Callback commands
&H4   List of commands for Night answer mode
&H5   List of MNP/V.42bis commands
 I0   Display product code
 I1   Display EPROM version number
 I2   Perform EPROM test
 I3   Display MNP/V.42bis identification code
 K    Display connection time
```

```
 L0   Low speaker volume
 L1   Low speaker volume
 L2   Medium speaker volume
 L3   High speaker volume
&L0   Dial up mode selected
&L1   Leased line mode selected
 M0   Speaker always OFF
 M1   Speaker ON until carrier detected
 M2   Speaker always ON
 M3   Speaker ON until carrier detected but OFF while dialing
&O0   Decimal value for S-register
&O1   Hexdecimal value for S-register

 P    Pulse dialing
&P0   39/61 Make/Break ratio selected
&P1   33/67 Make/Break ratio selected
 Q0   Response enabled
 Q1   Response disabled
 Q2   Response disabled in Answer mode but enabled in Originating mode
%R0   Retrainning disabled
%R1   Retrainning enabled (*)
Sn=   Write to S register
Sn?   Read S register
&S0   DSR forced ON
&S1   DSR according to CCITT V.22/V.22bis
\S    Display modem configurations
*S    S-register summary
 T    Touch tone dialing
%T0   Trellis code modulation disabled
%T1   Trellis code modulation enabled
 V0   Digit response
 V1   Word response
&V    Display configuration profiles
 W0   Display DTE speed in CONNECT message (if \V0)
      Display DTE speed/link type in CONNECT message (if \V1)
 W1   Display DTE speed and link speed in CONNECT message (if \V0)
      Display DTE speed/link type and link speed in CONNECT message (if \V1)
 W2   Display link speed in CONNECT message (if \V0)
      Display link speed and link type in CONNECT message (if \V1) (*)
 X0   Basic response set
 X1   Extended response set with speed information
 X2   Same as X1 with dialtone detection enabled
 X3   Same as X1 with busy tone detection enabled
 X4   Same as X1 with both dialtone and busy tone detection enabled
&Y0   Select profile 0 when power ON
&Y1   Select profile 1 when power ON
&Y2   Select profile 2 when power ON
&Y3   Select profile 3 when power ON
 Y0   Long space disconnect disabled
 Y1   Long space disconnect enabled
 A    Manual answer
 A/   Re-execute last command
 D    Dial Telephone number
&F    Fetch the factory configuration profile
 H0   Modem is ON hook
 H1   Modem is OFF hook
 O    Return to On-line state
```

```
&T0   Terminate all the Loopback tests
&T1   Initiate a Local Analog Loopback test
&T3   Initiate a Local Digital Loopback test
&T4   Grant a request of RDL from the remote modem
&T5   Reject the request of RDL from the remote modem
&T6   Initiate a Remote Digital Loopback test
&T7   Initiate a Remote Digital Loopback test with test pattern
&T8   Initiate a Local Analog Loopback test with test pattern
&W0   Save configurations profile in location 0
&W1   Save configurations profile in location 1
&W2   Save configurations profile in location 2
&W3   Save configurations profile in location 3
 Z0   Reset & resume configurations from location 0
 Z1   Reset & resume configurations from location 1
 Z2   Reset & resume configurations from location 2
 Z3   Reset & resume configurations from location 3
&Z    Store Tel. No.
 P    Pulse dialing
 T    Touch tone dialing
 %    Adaptive dialing
 W    Wait for dial tone
 R    Originating call in answer mode
 @    Wait for quiet answer
 ,    Pause in a dial sequence
 /    Pause for 1/8 sec.
 !    Initiate a flash
 ;    Return to Command mode after dialing
 Nn   Dial the phone number stored in Phone list n and enter Auto Logon mode
 S    Dial a stored number
 G    Redial the last number
 U    Redial until answer
Nn=   Store Logon strings in Phone list n
Nn?   Display Logon strings in Phone list n
*E    Reset and erase all the Logon strings
*Kn   Erase Logon strings in Phone list n
*L0   Display the Logon strings of all the Phone lists
*L1   Display the name strings of all the Phone list
*N    Show spare memory size for the Phone lists
<CTRL+A>  Insert a return code in the Logon string
<CTRL+D>  Disconnect the data link
<CTRL+N>  Store the callback phone number
<CTRL+P>  Set a 2-seconds pause
<CTRL+R>  Store the receive string
<CTRL+T>  Store the transmit string

Note 1. The syntax of the receive string is <CTRL+R>#nn:xx..x.
        Where xx..x is the receive string and #nn: is the sequence number
        corresponding to the callback number strings.
Note 2. The syntax of the callback number strings is <CTRL+N>#nn:yy...y.
        Where yy...y is the callback number and #nn: is the sequence number
        corresponding to the <CTRL+R>#nn:yy...y receive strings.
Note 3. The user must enter <CTRL+D> in the Logon strings to have the modem
        disconnect the line and make a call back to the calling site with the
        corresponding call back number stored in the Logon strings.
Note 4. The <CTRL+D> code must be entered after the <CTRL+R> strings and
        before the <CTRL+N> strings.
Note 5. The name string must be not over 12 characters.
```

```
        The phone number and <CTRL+R> or <CTRL+T> string must be not
        over 40 characters
&B    Show spare memory size
&E    Clear all the memory
&K    Erase current stored message
&N0   Disable Night answer mode
&N1   Enable Night answer mode
&R    Read all the stored message
&S    Start saving data
&X    Stop saving data
&V    Read current stored message

MNP or V.42BIS Command help

%An   Set Auto Fallback character, n=0 - 127
%Cn   Data Compression Enable/Disable
         %C0     Disabled
         %C1     MNP5 Enabled
         %C2     V.42bis (BTLZ) Enabled
         %C3     MNP5 & V.42bis (BTLZ) Enabled
%En   Auto Retrain & Fallback/Fall Forword based on line quality monitoring
         %E0=Disabled (Default)
         %E1=Enable Auto Retrain based on line quality
         %E2=Enable Fallback/Fall Forward baed on line quality
         %E3=enables auto rate negotiation fall back/forward feature
%Fn   Split-Speed Direction Select
         %F1    75TX/1200RX
         %F2    1200TX/75RX
         %F3    v.23 Half-Duplex (independant of \W)
%Gn   Rate Renegotiation based on line monitor readings
         %G0=Disabled
         %G1=Enabled (Default)
%L    Reports Received Signal Level (at connection to DSP) nnn in -dBm.
         nnn=9 or stronger       reports as 9
         nnn=10 to 42            reports as value directly
         nnn=43 or weaker        reports as 43
%Q    Report Received signal Quality (nnn range 0 to 127)
         nnn=1 to 8 current signal quality excellent (higher rate may be used)
         nnn=9 to 20 current signal good (best carrier rate for line condition)
         nnn=20 to 30 current signal poor (lower carrier rate should be used)
         nnn=31 to 127 signal very bad (or gone), try forcing a lower rate
         NOTE: Modem uses 8 and 20 as rate renegotiation watermarks.
%S    Read DIP switch setting
%TTnn PTT Testing Utilities
        (Set S10=255 to transmit data in the absence of a received signal)
        00-09   DTMF tone dial digits 0 to 9
        0A      DTMF digit *
        0B      DTMF digit A
        0C      DTMF digit B
        0D      DTMF digit C
        0E      DTMF digit #
        0F      DTMF digit D
        10      v.21 channel #1 mark (originate) symbol
        11      v.21 channel #2 mark symbol
        12      v.23 backward channel mark symbol
        13      v.23 forward channel mark symbol
        14      v.22 originate signalling at 600 bps
```

```
        15      v.22 originate signalling at 1200 bps
        16      v.22bis originate signalling at 2400 bps
        17      v.22 answer signalling (guard tone if PTT required)
        18      v.22bis answer signalling (quard tone if required)
        19      v.21 channel #1 space symbol
        1A      v.21 channel #2 space symbol
        1B      v.23 backward channel space symbol
        1C      v.23 forward channel space symbol
        1D      v.27ter carrier
        1E      v.29 carrier
        20      v.32 @9600 bps
        21      v.32bis @14400 bps
        22      v.17 @14400 bps
        30      Silence (on-line) - i.e. go off-hook
        31      v.25 answer tone
        32      1800 Hz guard tone
        33      v.25 calling tone (1300Hz)
        34      Fax calling tone (1100Hz)

*B    Return Blacklisted Numbers
         Displays a numbered chart of currently BLACKLISTED numbers {Except
         permanently forbidden numbers based on country setting}  "OK" is
         returned if no temporary numbers are BLACKLISTED.
*C    Remote Password Configuration (for MNP connections ONLY)
         Gives ENTER PASSWORD prompt and accepts a 6 to 12 charactor
         alphanumeric string.  (Default is QWERTY)
*D    Return Delayed Numbers
         Displays a numbered chart of DELAYED numbers and the length of delay
         in the format HH:MM:SS  "OK" is returned if no numbers are delayed.
*E    Exit Remote Configuration Mode
*Hn   Link Negotiation Speed (MNP 10)
         *H0    Link negotiation occurs at highest supported rate (Default)
         *H1    Link negotiation occurs at 1200 bps.
         *H2    Link negotiation occurs at 4800 bps.
*K    Enables keyboard interrupt during handshake
*K1   Disables keyboard interrupt during handshake
*L    Display Secure Access Directory
         Displays a numbered chart (0-19) of all secure access (callback)
         directory entries in the following format: #-Password:Callback_Number
         If no callback number is set then the colon is omitted.
*NCnn Country Select
         Sets country PSTN parameters to the code number specified.
         ERROR is returned if the country selected is not currently supported.
*Px:p:n Store/Delete a Password/Phone Number Pair
        *Px(0-19):p(password of 6 to 12 charactors):n(0 to 40 dialing codes)
         If the last colon and dialing codes are omitted then password check
         occurs, but no call-back occurs.
*R    Disables RING back message
*R1   Enables RING back message
*R    Request Remote Configuration Mode (during MNP mode connection ONLY)
         If successful, a REMOTE PASSWORD prompt is display, and you should
         issue the 6 to 12 charactor password currently set.  If the password
         is accepted, a !AT prompt will be displayed and a limitted set of
         commands can then be issued with the "AT" header omitted.  Exit this
         mode with the *E command.
*Zn   Change Dialing Codes (Used in countries like NORWAY that support two
                methods of pulse dialing.)
```

```
         *Z0    Use dial code 0 (default)
         *Z1    Use dial code 1

#CID?   Displays current CallerID mode (0-2)
#CID=n  Caller ID Mode
         #CID=0 Disable Caller ID (Default)
         #CID=1 Enable Formatted Caller ID Mode
          Result code syntax is as follows:
           DATE=MMDD (where MM is month number 01-12 & DD is day 01-31)
           TIME=HHMM (where HH is hour 00-23 & MM is minute 00-59)
         "Single Page Mode"
           NMBR= number code or statement*
               * The NUMBER CODE is normally either the subscriber's area code,
                 local exchange, and subscriber loop number, OR a code unique to
                 that individual subscriber. STATEMENTs are used for calls from
                 non Caller ID Areas and subscribers requesting no display.
           NAME= listed subscriber name <this is an option not always supported>
         "Multiple Page Mode"
           MESG= formatted number string * **
               * Here is an example string: 030A35303339363732343030
                 The string uses this code: CCLL#0#1#2#3#4#5#6#7#8#9
                 CC (03) is the code meaning this is "Multiple Page" Caller ID
                 LL is the hexadecimal length of the data in the string.
                    (in this case 0A hex - 10 decimal)
                 #n's are the ASCII digits dialed (in hexadecimal)
                    A neat trick to convert these to decimal is to note that
                    the first digit is always a number "3" and the second digit
                    is the decimal number dialed, so the formatted string:
                    030A35303339363732343030 converts directly to 5039672400
              ** At the time of this printing, conversion of "Multiple Page"
                    Caller ID string coversion is not supported in the modem,
                    so the data is displayed in the raw hexadecimal format.
         #CID=2 Enable Raw (ASCII printable HEX number) Mode
         #CID=? Returns Caller ID Modes supported.

)M      Cellular Power Level Adjustments (MNP 10)
         )M0    Power not adjusted during MNP 10 link negotiation (Default)
         )M1    Power level adjusted during MNP 10 link negotiation.

-Kn     MNP Extended Services (MNP 10)
         -K0    Disable v.42 LAPM to MNP 10 connection
         -K1    Enable v.42 LAPM to MNP 10 connection
-Qn     Fallback to v.22bis/v.22 in MNP10 mode
         -Q0    Disabled (Fallback only allowed to 4800 bps)
         -Q1    Enabled (Fallback allowed to v.22bis/v.22) (Default)

\A0     Error correction block size = 64 bytes
\A1     Error correction block size = 128 bytes
\A2     Error correction block size = 192 bytes
\A3     Error correction block size = 256 bytes (*)
\Bn     Set break length, n=1 - 9
\C0     Do not buffer data (*)
\C1     Buffer data for 4 seconds
\C2     Do not buffer data, switch to Normal mode when Fallback character
        is received
\E0     Do not echo data during a Normal link
\E1     Echo data during a Normal link
```

```
\G0   Disable DCE flow control
\G1   Enable DCE flow control (*)
\J0   Disable DTE baud rate adjustment (*)
\J1   Enable DTE baud rate adjustment
\Kn   Set break control, n=0 - 5, refer to the manual for details
\L0   Stream error correction link mode
\L1   Block error correction link mode
\N0   Normal data link only
\N1   Direct data link only
\N2   Reliable MNP link only
\N3   Auto-Reliable MNP or Normal link
\N4   Reliable V.42 link only
\N5   Reliable V.42 or MNP link only
\N6   Auto-Reliable V.42, MNP or Normal link (*)
\O    Initiate Reliable link during a Normal link
\Q0   Turn off software flow control
\Q1   XON/XOFF software flow control
\Q2   Unidirectional hardware flow control by CTS signal
\Q3   Bidirectional hardware flow control by RTS/CTS signal (*)
\Q4   Unidirectional XON/XOFF flow control from DCE to DTE
\Tn   Inactivity timer setting, n= 0 - 90 minutes (*) \T10
\U    Accept Reliable link during a Normal link
\V0   Do not send MNP/V.42bis extended responses
\V1   Send MNP/V.42bis extended responses (*)
\X0   Process XON/XOFF flow control and do not pass through (*)
\X1   Process XON/XOFF flow control and pass through
\Y    Switch to Reliable link from Normal link
\Z    Switch to Normal link from Reliable link

Sample Modem Config:
AT \A3 %C1 \C0 \G1 \J0 \Q3 %R1 W2 \V1 \T9 \X0 \N6 &D3 S0=1

MODEM HELPS:

AT &H0 The Asynchronous commands Help
AT &H1 Immediate action commands Help
AT &H2 Dial Help
AT &H3 Auto Logon & CallBack Help
AT &H4 Night Answer mode Help
AT &H5 MNP-s HELP
```

1.11 Supra MODEM Commands and Docs

```
NOTE:   This file includes commands, result codes, and display codes
        NOT AVAILABLE on all models and revisions.  Some commands are new
        or were omitted from Reference Manual.  NOT ALL commands are
        available or functional in all modes and states.  This document
        is provided for reference only and is NOT certified to be free
        from errors.  This document is produced and maintained by Supra's
        Technical Support Staff as a customer service.

144_LIST.TXT  Rev 1.1  (PHM 2/15/94)  from Supra BBS (503)967-2444

        This document covers the following SupraFAXModem products:
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        SupraFAXModem v.32bis (Ext)     sn: 14E165501 (and later)
        SupraFAXModem 144i              sn: 0051400   (and later)
        SupraFAXModem 144LC             sn: LCE038462 (and later)
        SupraFAXModem 144PB             All units
        SupraCOMcard 144                All units

The command string buffer on the SupraFAXModem is limited to 254 characters.

DIRECT Commands (Commands NOT preceded by other characters)

A/      Re-execute Last Command
nnn     Escape Code per setting in register S2 (Default is ANSI character 43,
        the "+" symbol) (This command must be preceded and followed by a
        minimum period of no transmission set is register S12.)
<CR>    (A carriage return) - Terminate connection attempt in progress during
        the dialing or protocol neg. process.

DIALING Commands (Commands that follow ATD)

-()i    These symbols and spaces are ignored (or invalid and therefore ignored)
         and maybe be used in the dialing string.
0-9     DTMF code for the given number
A-D     DTMF code for the given letter
L       Dial the last dialing string (limitted to the first 40 characters).
P       Pulse dial the following digits
R       Accepted, but no action occurs.
Sn      Use dialing string stored in register n (0 to 3)
T       Tone dial the following digits
W       Wait for dialtone
*       DTMF code for "star"
#       DTMF code for "gate"
@       Wait for "quiet answer" (A 5 second silence.)
,       Pause (time set in S8) before finishing dialing string
!       Hook flash (go on-hook for 700ms)
^       Turn on 1300Hz call originating pulse
;       Return to command state without going "on-hook"

AT Commands (Commands that follow AT)

=x      Write value x to the last S register viewed.
?       Displays current setting for the last S register accessed.
A       Answer Phone Line
Bn      BELL/V.2x mode switches for 300 & 1200 bps {varies by model}
         B0=V.21 (300 bps) & v.22 (1200 bps)
         B1=BELL 103 (300 bps) & Bell 212A (1200 bps) (default in NA)

         B0=v.22 (1200 bps)
         B1=Bell 212A (1200 bps) (default in NA)
         B15=V.21 (300 bps)
         B16=Bell 103 (300 bps) (default in NA)
C1      Carrier Control Selection
         Provided for backward compatibility only. Does nothing but return "OK"
D       Dial Command
         Dials any mixed string of dialing commands. (See Dialing Commands)
En      Command Echo
         E0=not echo
```

```
         E1=do echo (default)
Fn      Line Select Modulation (Use either ATFn or a combination of ATS37=n
              and ATN0, but DO NOT try to USE BOTH at the same time.)
         F0     AutoMode Selection (Same as N1)
         F1     300 bps only (Same as N0S37=1,uses protocol in Bn setting
                        S31 bit 1 set to 0 and S37=1)
         F2     Not Used (returns "OK")
         F3     v.23 only 75TX/1200RX (originate) or 1200TX/75RX (answer)
                        (Same as N0S37=7, S31 bit 1 set to 0 and S37=1)
         F4     1200 bps only (protocol according to Bn setting)
                        (Same as N0S37=5, S31 bit 1 set to 0 and S37=5)
         F5     2400 bps only (v.22bis)
                        (Same as N0S37=6, S31 bit 1 set to 0 and S37=6)
         F6     4800 bps only (v.32/v.32bis)
                        (Same as N0S37=8, S31 bit 1 set to 0 and S37=8)
         F7     7200 bps only (v.32bis)
                        (Same as N0S37=12, S31 bit 1 set to 0 and S37=12)
         F8     9600 bps only (v.32/v.32bis)
                        (Same as N0S37=9, S31 bit 1 set to 0 and S37=9)
         F9     12000 bps only (v.32bis)
                        (Same as N0S37=10, S31 bit 1 set to 0 and S37=10)
         F10    14400 bps only (v.32bis)
                        (Same as N0S37=11, S31 bit 1 set to 0 and S37=11)
Hn      Hook Control
         H0=On-Hook (Hang Up)
         H1=Off-Hook (pick up phone line) for the time period set in S7.
In      Identification Codes
         I0=SupraFAXModem product ID code
         I1=ROM checksum
         I2=Test Checksum (OK if correct, ERROR if not)
         I3=ROM revision code
         I4=Encrypted report of supported protocols
         I5=Supra Copyright info.
         I6=Country Code for country PSTN Signals are Configured for.
         I7=DSP Model & Version Code
         I10=Supported Features (encoded - see end of text for listing)
         I99=Electronic Serial Number
Ln      Speaker Volume
         L0,L1   Low
         L2      Medium (default)
         L3      High
L+n     Increase Total Volume Gain n units (1-32) (Not the same as Ln)
                (This command currently only in use on PowerBook models.)
L-n     Decrease Total Volume Gain n units (1-32) (Not the same as Ln)
                (This command currently only in use on PowerBook models.)
Mn      Speaker Control
         M0      OFF
         M1      On until carrier is received (default)
         M2      Always On
         M3      On when answering/On only after dialing & until carrier detect
Nn      AutoMode Selection (Carrier Rate when Originating Call)
         N0=Connect ONLY at rate set in S37 register
            (N0S37=0 forces the modem to dial at the current serial port rate.)
         N1=Connect Normally (default)
On      Return from COMMAND MODE to ONLINE state
         O0=Return to ONLINE state
         O1=Request a retrain & Return to ONLINE state
```

```
P       Set dialing mode to PULSE (Sets S14 bit 5 to 1)
Qn      Result Code Mode
         Q0=Enabled (Default)
         Q1=Disabled
         Q2=Enabled when Originating, Disabled when answering
Sr?     Reports value in S register r
SCr?    Reports value is SC register r
Sr=n    Write value n into S register r
SCr=n   Write value n into SC register r
T       Set dialing mode to TONE (Sets S14 bit 5 to 0)
Vn      Result Code mode select
         V0=Numeric
         V1=Verbose (default)
Wn      Error Correction Result Code Selection
         W0=CONNECT XXXX (DTE rate) (default)
         W1=Report Error Correction Mode
         W2=CONNECT XXXX (DCE rate)
Xn      Dialing mode/CONNECT result codes
         X0=Blind Dial (ignore Dialtone & Busy), send CONNECT
         X1=Blind Dial, send CONNECT XXXX
         X2=follow Dialtone, but ignore Busy, send CONNECT XXXX
         X3=follow Busy, but ignore Dialtone, send CONNECT XXXX or BUSY
         X4=send CONNECT XXXX, BUSY, or NO DIALTONE (default)
Yn      Long Space Disconnect
         Y0=Not active (default, S27 bit7 set to 0)
         Y1=Active (S27 bit7 set to 1, see manual for function)
Zn      Soft reset and Load Stored profile n (last functional command on line)
         Z0=resets modem & loads stored profile 0
         Z1=resets modem & loads stored profile 1
&Cn     DCD (RLSD) signal control
         &C0=DCD always on
         &C1=DCD follows carrier state (ON when carrier present)
&Dn     Modem reaction to DTR on to off transition greater than S25 setting
              a  b  c  (Settings of &Qn)
         &D0= N  2  1
         &D1= 3  3  1
         &D2= 1  1  1
         &D3= 4  4  1

         List of modem reactions:

         N=No Action
         1=Hang up if off-hook & auto-answer is disabled
         2=Hang up if off-hook & auto-answer not disabled
         3=Switch to asynchronous command state
         4=Perform soft reset (like ATZ and profile is set by &Y setting)

         List of &Q states:
         a. &Q0,&Q5,&Q6
         b. &Q1,&Q4
         c. &Q2,&Q3

&Fn     Load Factory Default Configuration
         &F0     No flow control, No error correction, No data compression
         &F1     MAC hardware flow control, correction & compression active
         &F2     Hardware flow control, correction & compression active
                 (&F2 is default for DOS, WINDOWS, AMIGA, & STAND ALONE units.)
```

```
&Gn     Guard Tone Selection
         &G0     Do Not generate guard tones   (US Default)
         &G1     Generate 550Hz guard tone     (not supported)
         &G2     Generate 1800Hz quard tone    (World Wide support models only)
&Jn     Phone Jack Selection
         &J0     Select RJ-11, RJ-41, & RJ-45S (Default)
         &J1     Select RJ-12 & RJ-13          (not supported)
&Kn     Serial Port Flow Control
         &K0=None
         &K3=Bidirectional Hardware (RTS/CTS)
         &K4=Software (XON/XOFF)
         &K5=Transparent Software flow control
         &K6=Software (XON/XOFF) & Hardware (RTS/CTS) flow control
&Ln     Line Type Selection
         &L0    Dial-up line (Default)
         &L1    Leased Line  (not supported)
&Mn     Same function as &Q(0-3) settings.
&Pn     Pulse dialing MAKE/BREAK ratio
         &P0 39%/61% make/break ratio at 10PPS {US/CANADA}  (Default)
         &P1 33%/67% make/break ratio at 10PPS {UK/Hong Kong}
         &P2 39%/61% make/break ratio at 20PPS
         &P3 33%/67% make/break ratio at 20PPS {Japan}
&Qn     Asynchronous/Synchronous Mode Selection
         &Q0     Asynchronous Direct mode
         &Q1 *   Synchronous Mode 1 (Terminal must support both modes.)
                  Call placed Async, modem switches to Sync. When DTR is dropped
                 modem returns to Async.
         &Q2 *   Synchronous Mode 2 Modem dials number in stored location 0
                  when DTR goes from LOW to HIGH.
         &Q3 *   Synchronous Mode 3 Dial number manually on a telephone, and
                  then bring DTR high to let the modems connect.
     * CAUTION!  Be VERY careful when issuing these commands!  Once you enter
                  &Q(1-3) and save it to memory, there are only three known
                  ways to return to Asynchronous Mode:
                 1. Issue AT &Q(0,5-9) &W from a Synchronous Terminal to restore
                    the modem to Asynchronous Mode.
                 2. Connect modem to an Asynchronous Terminal with the DTR
                    signal (line 20) disabled (a "break-out" box works very
                    nicely for this) and issue the configuration you want or
                    AT &Q(0,5-9) &W to return the modem to Asynchronous Mode.
                 3. Send the modem in to our repair department.
         &Q4     Not Used
         &Q5     Asynchronous Reliable Mode (most common default)
         &Q6     Asynchronous Normal Mode
&Rn     RTS Synchronous Mode
         (In Asynchronous mode CTS is always ON unless &K3 is set.)
         &R0     CTS responds to RTS (default)
         &R1     CTS always on unless &K3 is set
&Sn     DSR Action Select
         &S0 Always on (default)
         &S1 Follows EIA specification (Active following carrier tone, and
          until carrier is lost.)
&Tn     Modem test modes for trained technicians (you must set the serial port
          at 2400 or 9600, set the modem with AT&F0, and set S18 between 1 and
          255if you wish the tests to stop on their own.)
        AT&T0   Terminate test in progress
        AT&T1   Local Analog Loopback (+++ then &T0 to stop)
```

```
         AT&T2   Returns ERROR
         AT&T3   Local Digital Loopback for remote modem
         AT&T4   Grant request for Remote Digital Loopback (default)
         AT&T5   Prohibit request for Remote Digital Loopback
         AT&T6   Remote Digital Loopback
         AT&T7   Remote Digital Loopback with self-test
         AT&T8   Local Analog Loopback with self-test (+++ then &T0 to stop)
&V      Display Configuration Profiles
&Wn     Write ACTIVE Profile to Stored Profile n
         &W0     Writes to profile 0
         &W1     Writes to profile 1
&Xn     Synchronous Transmit Clock Source
         &X0=Modem generated (default)
         &X1=DTE supplied
         &X2=Derived from the data carrier received from the remote modem.
&Yn     Select Configuration Loaded at power-up
         &Y0=Load profile 0 (default)
         &Y1=Load profile 1
&Zx=n   Write telephone number n into register number x (0-3).
\An     Maximum MNP Block Size for Stream Links
         \A0     64 characters
         \A1     128 characters
         \A2     192 characters
         \A3     256 characters (default)
\Bn     Transmit Break of length n x 100ms where n is 1 to 9 in non-error
         correction state.  (Sends Link Attention in MNP mode)
\F      Display Telephone Directory (As stored via AT&Zn)
\Gn     Modem-to-Modem XON/XOFF flow control (Normal and Direct Mode Only)
         \G0=Disabled (default)
         \G1=Enabled
\Jn     Enable DTE Auto Rate Adjustment
         \J0    Disabled
         \J1    DTE rate is adjusted to match carrier rate.
\Kn     Break Processing Control (controls remote modem during MNP mode)
         When received from local DTE & Modem is in Data Transfer Mode:
          \K0,\K2,\K4   Enter command state without sending BREAK to remote
          \K1           Clear Modem & Terminal Buffers & send BREAK to remote
          \K3           Don't clear Buffers, but send BREAK to remote
          \K5(default)  Send BREAK to remote in sequence with any transmitted
                         data (default)
         In Escape (Online Command) mode:
          \K0,\K1           Clear data buffers and sends break to remote modem.
          \K2,\K3           Send break to remote modem immediately.
          \K4,\K5(default)  Send break to remote modem in sequence with data.
         When received from remote modem in non-error correction mode:
          \K0,\K1           Clear data buffers and sends break to DTE
          \K2,\K3           Send break to DTE immediately.
          \K4,\K5(default)  Send break in sequence with received data to DTE.
\Ln     MNP Block Transfer Control
         \L0     Use Stream Mode for MNP Links (default)
         \L1     Use Block Mode for MNP Links
\N      Operating Mode
         \N0     Normal Mode (carrier and port rate may differ - No MNP or V42,
                        forces &Q6)
         \N1     Direct Mode (carrier rate "matches" port rate - No MNP or V42,
                        forces &Q0)
         \N2     Reliable Mode (a V42 or MNP connection must be made or the
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                  modem will hang up, forces &Q5 S36=4 S48=7)
         \N3     AutoReliable Mode (default mode where ALL connection are
                  supported, forces &Q5 S36=7 S48=7)
         \N4     LAPM Mode (a V42 connection must be made or the modem will
                  hang up, forces &Q5 S48=0)
         \N5     MNP Mode (a MNP connection must be made or the modem will
                  hang up, forces &Q5 S36=4 S48=128)
\S      Report Active Configuration
\W      Split-Speed Operation (v.23)
         \W0    Disable split-speed mode (default)
         \W1    Enable split-speed mode v.23 (forces F3)
%Cn     Data Compression Enable/Disable
         %C0     Disabled
         %C1     MNP5 Enabled
         %C2     V.42bis (BTLZ) Enabled
         %C3     MNP5 & V.42bis (BTLZ) Enabled
%En     Auto Retrain & Fallback/Fall Forword based on line quality monitoring
         %E0=Disabled (Default)
         %E1=Enable Auto Retrain based on line quality
         %E2=Enable Fallback/Fall Forward baed on line quality
         %E3=Undefined
%Fn     Split-Speed Direction Select
         %F1    75TX/1200RX
         %F2    1200TX/75RX
         %F3    v.23 Half-Duplex (independant of \W)
%Gn     Rate Renegotiation based on line monitor readings
         %G0=Disabled
         %G1=Enabled (Default)
%L      Reports Received Signal Level (at connection to DSP) nnn in -dBm.
         nnn=9 or stronger       reports as 9
         nnn=10 to 42            reports as value directly
         nnn=43 or weaker        reports as 43
%Q      Report Received signal Quality (nnn range 0 to 127)
         nnn=1 to 8 current signal quality excellent (higher rate may be used)
         nnn=9 to 20 current signal good (best carrier rate for line condition)
         nnn=20 to 30 current signal poor (lower carrier rate should be used)
         nnn=31 to 127 signal very bad (or gone), try forcing a lower rate
         NOTE: Modem uses 8 and 20 as rate renegotiation watermarks.
%TTnn   PTT Testing Utilities
        (Set S10=255 to transmit data in the absence of a received signal)
        00-09   DTMF tone dial digits 0 to 9
        0A      DTMF digit *
        0B      DTMF digit A
        0C      DTMF digit B
        0D      DTMF digit C
        0E      DTMF digit #
        0F      DTMF digit D
        10      v.21 channel #1 mark (originate) symbol
        11      v.21 channel #2 mark symbol
        12      v.23 backward channel mark symbol
        13      v.23 forward channel mark symbol
        14      v.22 originate signalling at 600 bps
        15      v.22 originate signalling at 1200 bps
        16      v.22bis originate signalling at 2400 bps
        17      v.22 answer signalling (guard tone if PTT required)
        18      v.22bis answer signalling (quard tone if required)
        19      v.21 channel #1 space symbol
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        1A      v.21 channel #2 space symbol
        1B      v.23 backward channel space symbol
        1C      v.23 forward channel space symbol
        1D      v.27ter carrier
        1E      v.29 carrier
        20      v.32 @9600 bps
        21      v.32bis @14400 bps
        22      v.17 @14400 bps
        30      Silence (on-line) - i.e. go off-hook
        31      v.25 answer tone
        32      1800 Hz guard tone
        33      v.25 calling tone (1300Hz)
        34      Fax calling tone (1100Hz)
*B      Return Blacklisted Numbers
         Displays a numbered chart of currently BLACKLISTED numbers {Except
         permanently forbidden numbers based on country setting}  "OK" is
         returned if no temporary numbers are BLACKLISTED.
*C      Remote Password Configuration (for MNP connections ONLY)
         Gives ENTER PASSWORD prompt and accepts a 6 to 12 charactor
         alphanumeric string.  (Default is QWERTY)
*D      Return Delayed Numbers
         Displays a numbered chart of DELAYED numbers and the length of delay
         in the format HH:MM:SS  "OK" is returned if no numbers are delayed.
*E      Exit Remote Configuration Mode
*Hn     Link Negotiation Speed (MNP 10)
         *H0    Link negotiation occurs at highest supported rate (Default)
         *H1    Link negotiation occurs at 1200 bps.
         *H2    Link negotiation occurs at 4800 bps.
*L      Display Secure Access Directory
         Displays a numbered chart (0-19) of all secure access (callback)
         directory entries in the following format: #-Password:Callback_Number
         If no callback number is set then the colon is omitted.
*NCnn   Country Select
         Sets country PSTN parameters to the code number specified.
         ERROR is returned if the country selected is not currently supported.
*Px:p:n Store/Delete a Password/Phone Number Pair
        *Px(0-19):p(password of 6 to 12 charactors):n(0 to 40 dialing codes)
         If the last colon and dialing codes are omitted then password check
         occurs, but no call-back occurs.
*R      Request Remote Configuration Mode (during MNP mode connection ONLY)
         If successful, a REMOTE PASSWORD prompt is display, and you should
         issue the 6 to 12 charactor password currently set.  If the password
         is accepted, a !AT prompt will be displayed and a limitted set of
         commands can then be issued with the "AT" header omitted.  Exit this
         mode with the *E command.
*Zn     Change Dialing Codes (Used in countries like NORWAY that support two
                methods of pulse dialing.)
         *Z0    Use dial code 0 (default)
         *Z1    Use dial code 1
#CID?   Displays current CallerID mode (0-2)
#CID=n  Caller ID Mode
         #CID=0 Disable Caller ID (Default)
         #CID=1 Enable Formatted Caller ID Mode
          Result code syntax is as follows:
           DATE=MMDD (where MM is month number 01-12 & DD is day 01-31)
           TIME=HHMM (where HH is hour 00-23 & MM is minute 00-59)
         "Single Page Mode"
```

```
           NMBR= number code or statement*
               * The NUMBER CODE is normally either the subscriber's area code,
                 local exchange, and subscriber loop number, OR a code unique to
                 that individual subscriber. STATEMENTs are used for calls from
                 non Caller ID Areas and subscribers requesting no display.
           NAME= listed subscriber name <this is an option not always supported>
         "Multiple Page Mode"
           MESG= formatted number string * **
               * Here is an example string: 030A35303339363732343030
                 The string uses this code: CCLL#0#1#2#3#4#5#6#7#8#9
                 CC (03) is the code meaning this is "Multiple Page" Caller ID
                 LL is the hexadecimal length of the data in the string.
                    (in this case 0A hex - 10 decimal)
                 #n's are the ASCII digits dialed (in hexadecimal)
                    A neat trick to convert these to decimal is to note that
                    the first digit is always a number "3" and the second digit
                    is the decimal number dialed, so the formatted string:
                    030A35303339363732343030 converts directly to 5039672400
              ** At the time of this printing, conversion of "Multiple Page"
                    Caller ID string coversion is not supported in the modem,
                    so the data is displayed in the raw hexadecimal format.
         #CID=2 Enable Raw (ASCII printable HEX number) Mode
         #CID=? Returns Caller ID Modes supported.
)M      Cellular Power Level Adjustments (MNP 10)
         )M0    Power not adjusted during MNP 10 link negotiation (Default)
         )M1    Power level adjusted during MNP 10 link negotiation.
-Kn     MNP Extended Services (MNP 10)
         -K0    Disable v.42 LAPM to MNP 10 connection
         -K1    Enable v.42 LAPM to MNP 10 connection
-Qn     Fallback to v.22bis/v.22 in MNP10 mode
         -Q0    Disabled (Fallback only allowed to 4800 bps)
         -Q1    Enabled (Fallback allowed to v.22bis/v.22) (Default)

V.25bis Commands / Indications

Commands

CIC     Connect Incoming Call (goes off-hook to answer call, if no call is
                present INV is returned)
CNL     Local Configuration (in Async. mode this command allows AT Command to
                be used - CNLS0=3) {Extended V.25bis}
CRI     Call Request with Number and Indentification (same as CRN, but a ";"
                charactor can be inserted and followed by a code, which the
                modem will ignore.)
CRN     Call Request with Number (goes off-hook and attempts to dial the string
               issued with the command)
        These charactors are accepted in the string:
        0-9     Digits 0-9
        *       "Star" digit (Tone dial only)
        #       "Gate" digit (Tone dial only)
        T       Select TONE dialing
        P       Select PULSE dialing
        <       Pause (Length set via S8)
        =       Pauses for twice the period set in S8
        :       Wait for dialtone
        &       Flash (Goes ON-Hook for the period set in S29)
        ^       Enable calling tone
```

```
CRS     Call Request with Memory Address (same as CRN, but dials string stored
                in dialing memory locations 0-19)
DIC     Disregard Incoming Call (Ignores incoming call, returns INV if no call
                is present or autoanswer is not enabled)
PRI     Program Identification (Just returns VAL)
PRN     Program Number (stores dialing string into the select dialing string
                memory location)  PRN (0-19);(dialing string)
RLD     List Request of Delayed Call Numbers (Display a numbered chart of
                delayed numbers and the delay periods)
RLF     List Request of Forbiden Numbers (Lists numbers blacklisted during
                modem operations according to country setting procedures)
RLI     List Request of Identification Numbers
RLN     List Request of Stored Numbers (Dialing Strings)

Indications

CFI     Call Failure Indication (Sends message followed by coded failure reason)
        AB      No Dialtone or call abort timer expired.
        CB      Local Circuit busy (phone off-hook)
        ET      BUSY (engaged) tone detected
        FC      Requested number on Forbidden call list (no call attempted)
        NT      Ringback detected or stopped & call abort timer expired
        RT      Ringback detected & call abort timer expired
CNX     Connect (maybe be followed by a code to show speed of connection)
DLC     Delayed Call (returns code with length of call delay)
INC     Incoming Call (sent when ring signal is detected)
INV     Invalid Command (issued if command is invalid or unable to be executed)
LSD     List of Delayed Call Numbers (returned in responce to RLD)
LSF     List of Forbidden Numbers (returned in responce to RLF)
LSI     List of Identification Numbers (returned in responce to RLI)
VAL     Valid Command (sent if command is executed & no other responce occurs)


S Registers

S0      Number of Rings to Auto Answer (0 to 255) (0 is disable & default)
S1      Number of Rings before last answer.
S2      Escape Code character (0 to 255) (default is 43 "+")
S3      Carriage Return character (0-127) (default is 13)
S4      Line Feed character (0-127) (default is 10)
S5      Backspace character (0-32) (default is 8)
S6      Time to Wait before Blind Dial (2-255 seconds)  (default is 2)
         (Applies only in X,X1, or X3 dialing mode)
S7      Time to Wait for Carrier (1-255 seconds) (default is 50)
S8      Pause Time for Comma Dial Command (0-255 seconds) (default is 2)
S9      Time to Wait Before Recognizing Carrier (1-255 1/10 seconds)
         (Default is 6)
S10     Delay from Lost Carrier to Hang Up (1-255 1/10 seconds) (Default is 14,
         Modem assumes carrier always present if set to 255)
S11     DTMF Tone Duration/Spacing (35 to 102 1/100 seconds) (Default is 95)
S12     Escape Code Guard Time (0 to 255 1/50 seconds) (0 to disable, the
         default is 50)
S13     Reserved
S14     Bit Mapped Option Status Codes
        Bit(Dec)
         0 (1)   Reserved
         1 (2)   Command echo (En)
```

```
                0 Disabled (E0)
                1 Enabled  (E1 default)
         2 (4)   Quiet Mode (Qn)
                0 Send result codes (Q0 default)
                1 No result codes   (Q1)
         3 (8)   Result codes (Vn)
                0 Numeric (V0)
                1 Verbose (V1 default)
         4 (16)  Reserved
         5 (32)  Dial Mode
                0 Tone  (T default)
                1 Pulse (P)
         6 (64)  Reserved
         7 (128) Carrier Mode
                0 Answer
                1 Originate
S15     Reserved
S16     Diagnostic Test Mode setting -Bit Mapped (default 0)
         0       &T1     0 Disable       1 Enable
         1       Not Used
         2       &T3     0 Disable       1 Enable
         3       &T4/&T5 0 Off           1 In progress
         4       &T6     0 Disable       1 Enable
         5       &T7     0 Disable       1 Enable
         6       &T8     0 Disable       1 Enable
         7       Not Used
S17     Reserved
S18     Test Mode Timer (0-255 seconds, 0=Runs endlessly)
S19     Reserved
S20     Reserved
S21     Bit Mapped Option Status Codes
        Bit(Dec)
         0 (1)   Set by &Jn command but ignored otherwise
                0 &J0 (default)
                1 &J1
         1 (2)   Reserved
         2 (4)   CTS Mode (&Rn)
                0 CTS always on   (&R0)
                1 CTS follows RTS (&R1 default)
         3 (8) & 4 (16) DTR behavior (&Dn)
                0,0 &D0 (default)
                1,0 &D1
                0,1 &D2
                1,1 &D3
         5 (32)  DCD (RLSD) behavior (&Cn)
                0 &C0 (Default)
                1 &C1
         6 (64)  DSR behavior (&Sn)
                0 &S0 (Default)
                1 &S1
         7 (128) Long space diconnect (Yn)
                0 Y0  (Default)
                1 Y1
S22     Bit Mapped Option Status Codes
        Bit(Dec)
         0 (1) & 1 (2)  Speaker volume (Ln)
                0,0 Low    (L0)
```

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                1,0 Low    (L1)
                0,1 Medium (L2 default)
                1,1 High   (L3)
         2 (4) & 3 (8)  Speaker control (Mn)
                0,0 Disabled            (M0)
                1,0 On until carrier    (M1 default)
                0,1 ON Always           (M2)
                1,1 On during handshake (M3)
         4 (16), 5 (32), & 6 (64) Dialing Mode / Result Codes (Xn)
              0,0,0 X0
              1,0,0 Reserved
              0,1,0 Reserved
              1,1,0 Reserved
              0,0,1 X1
              1,0,1 X2
              0,1,1 X3
              1,1,1 X4 (Default)
         7 (128) Reserved
S23     Bit Mapped Option Status Codes
        Bit(Dec)
         0 (1)   Grant RDL
                0 RDL not allowed (&T5)
                1 RDL allowed     (&T4 default)
         1 (2), 2 (4), & 3 (8) Assumed DTE Rate
              0,0,0 0-300 bps
              1,0,0 600 bps
              0,1,0 1200 bps
              1,1,0 2400 bps (Default)
              0,0,1 4800 bps
              1,0,1 9600 bps
              0,1,1 19200 bps
              1,1,1 Reserved
         4 (16) & 5 (32) Assumed DTE parity
                0,0 Even
                1,0 Reserved
                0,1 Odd
                1,1 None (default)
         6 (64) & 7 (128) Guard tone (&Gn)
                0,0 None    (&G0 Default)
                1,0 550 Hz  (&G1)
                0,1 1800 Hz (&G2)
                1,1 Reserved
S24     Sleep Inactivity Timer (0-255 seconds 0 default/disable)
         Number of seconds before modem enters sleep mode without either DTE or
         phone line activity.
S25     Delay to DTR (0-255 1/100 seconds, 5 default)
S26     RTS/CTS Delay (0-255 1/100 seconds, 1 default) (Sync mode only)
S27     Bit Mapped Option Status
        Bit(Dec)
         0 (1), 1 (2), 3 (8) Sync/Async Mode Selection (&Mn/&Qn)
              0,0,0 &M0/&Q0
              1,0,0 &M1/&Q1
              0,1,0 &M2/&Q2
              1,1,0 &M3/&Q3
              0,0,1 &Q4
              1,0,1 &Q5 (Default)
              0,1,1 &Q6
```

```
         2 (4)    Leased line control (&Ln)
                   0 Dial-up line (&L0 default)
                   1 Leased line  (&L1)
         4 (16) & 5 (32) Internal Sync clock select (&Xn)
                   0,0 Internal (&X0 default)
                   1,0 External (&X1)
                   0,1 Slave    (&X2)
         6 (64)  CCITT/Bell Mode (Bn)
                   0 CCITT (B0)
                   1 Bell  (B1 US default)
         7 (128) Reserved
S28     Bit Mapped Options
        Bit(Dec)
         0 (1)    V.23 split screen (\Wn)
                   0 Disabled (\W0 default)
                   1 Enabled  (\W1)
         1 (2)    V.23 split screen direction
                   0 75Tx   (%F0 default)
                   1 1200Tx (%F1 default)
         2 (4)    V.23 half-duplex
                   0 Disabled
                   1 Enabled (%F3)
         3 (8) & 4 (16)
                  Pulse dialing mode (&Pn)
                   0,0 &P0 (Default)
                   1,0 &P1
                   0,1 &P2
                   1,1 &P3
         5 (32)  Reserved
         6 (64)  Reserved
         7 (128) Reserved
S29     Flash Dial Modifier Time
S30     Inactivity Timer (0-255 Unit 10 ms, 0=disable {default})
         In Reliable mode any data transfer resets timer.
         In Normal mode only sent data resets timer.
S31     Bit Mapped Options
        Bit(Dec)
         0 (1)    Reserved
         1 (2)    Auto Mode Selection
                   0 Disabled (N0)
                   1 Enabled  (N1 default)
         2 (4), 3 (8) Error Correction Result Code (Wn)
                   0,0 DTE Speed only (W0 default)
                   1,0 Full Reporting (W1)
                   0,1 DCE Speed only (W2)
         4 (16)  Reserved
         5 (32)  Reserved
         6 (64)  Reserved
         7 (128) Reserved
S32     XON Charactor (0-255, Default 17)
S33     XOFF Charactor (0-255, Default 19)
S36     Negotiation Failure Treatment (0-7  7 is default)
         Fallback options when S48=128 or error correction link fails:
        Bits 0-2
         2 1 0 (Dec)
         0,0,0 (0)    Disconnect
         0,0,1 (1)    Establish Direct connection
```

```
         0,1,0 (2)    Undefined
         0,1,1 (3)    Establish Normal connection
         1,0,0 (4)    Establish MNP connection if possible, else Disconnect
         1,0,1 (5)    Establish MNP connection if possible, else Direct Mode
         1,1,0 (6)    Undefined
         1,1,1 (7)    Establish a MNP connection if possible, else Normal Mode
        Bits 3-5 Reserved
        Bits 6-7 Same as S110 setting
           1 0 (Dec)
           0,0 (0)    V.32 mode
           0,1 (64)   V.32bis mode
           1,0 (128)  V.32bis with fallback
           1,1 (192)  V.32/V.32bis mode forced start at lowest carrier in
                        S109 and fall forward and fall back using rates set
                        in S109.
S37     Forced Single Carrier Rate (0-1,5-12  0 is default)
         0       Carrier Rate at the rate the last AT command was issued.
                 (If rate is above highest carrier rate, then the highest
                 carrier rate the modem supports is used.)
         1       300 bps
         2-4     Undefined
         5       1200 bps
         6       2400 bps
         7       1200/75 bps    (v.23 mode)
         8       4800 bps
         9       9600 bps
         10      12000 bps
         11      14400 bps
         12      7200 bps
S38     Delay Before Forced Disconnect (0-255 seconds, default 20)
         0-254   Delay in seconds from H command, or DTR toggle ON or OFF (if
                 modem is set to follow DTR), before modem disconnects.
         255     Modem send data out of buffer until completed or connection
                 is lost.
S39     Flow Control
         0      None                    &K0
         3      RTS/CTS                 &K3
         4      XON/XOFF                &K4
         5      Transparent XON/XOFF    &K5
         6      RTS/CTS & XON/XOFF      &K6
S40     Bit Mapped Option Status Codes
        Bit(Dec)
         0 (1)   MNP Extended Services (-Kn)
                  0 Disable (-K0)
                  1 Enable  (-K1)
         1 (2)   Power Level Adj. for Cellular Use [)Mn]
                  0 Auto Adj.  [)M0 default
                  1 Force Adj. [)M1]
         2 (4)   MNP Link negotiation speed (*Hn)
                  0 At highest rate (*H0 default)
                  1 At 1200 bps     (*H1)
         3 (8), 4 (16), & 5 (32) Break Handling (\Kn)
                0,0,0 \K0
                1,0,0 \K1
                0,1,0 \K2
                1,1,0 \K3
                0,0,1 \K4
```

```
                1,0,1 \K5
         6 (64) & 7 (128) MNP Block size (\An)
                  0,0 64  (\A0)
                  1,0 128 (\A1)
                  0,1 196 (\A2)
                  1,1 256 (\A3)
S41     Bit Mapped Option Status Codes
        Bit(Dec)
         0 (1) & 1 (2) Compression Selection (%Cn)
                  0,0 Disabled        (%C0)
                  1,0 MNP 5           (%C1)
                  0,1 V.42bis         (%C2)
                  1,1 MNP 5 & V.42bis (%C3)
         2 (4)   Auto Retrain (%En)
                  0 Disable (%E0 default)
                  1 Enable  (%E1)
         3 (8)   Modem to Modem Flow Control (\Gn)
                  0 Disable (\G0 default)
                  1 Enable  (\G1)
         4 (16)  Block mode control (\Ln)
                  0 Stream (\L0 default)
                  1 Block  (\L1)
         5 (32)  Reserved
         6 (64)  Reserved
         7 (128) Reserved
S46     Protocol Selection (136 or 138) (Affects v.42/v.42bis mode)
         136     Disable Compression
         138     Enable Compression (default)
S48     v.42 Negotiation (0,7,128)
         0       Disable Negotiation, proceed with LAPM
         7       Enable Negotiation (default)
         128     Disable Negotiation, fallback per S36 setting
S80     Soft-Switch Functions (Bit Mapped Options)
         Bit 0  V.25bis / AT command mode
                  0 AT
                  1 V.25bis
         Bit 1  Remote Configuration
                 0 Not Permitted
                 1 Permiited
         Bit 2  Call Back Security
                 0 Disabled
                 1 Enabled
         Bit 3  Originate/Answer Mode select
                 0 Originate
                 1 Answer
         Bits 4-7 Reserved
S82     LAPM Break Handling Options (3,7,128)
         3       Expedited: Modem sends break immediately & data integrity is
                         maintained before and after break.
         7       Destructive: Modem sends break immediately & data being
                         processed by each modem at that time is destroyed.
         128     In sequence: Modem sends break in sequence with transmitted
                         data & data integrity is maintained before and after
                         the break
S86     Report Connection Failure Cause Code
         0      Normal disconnect
         1-3    Undefined Error Code
```

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         4      Carrier loss
         5      No error correction at other end
         6      No response to feature negotiation
         7      This modem is ASYNC only, other is SYNC
         8      No framing technique in common
         9      No protocol in common
         10     Bad response to feature negotiation
         11     No sync information from remote
         12     Normal hangup initiated by remote
         13     Retransmission limit reached
         14     Protocol violation occured
         15-255 Undefined Error Code
S95     Extended Result Code Control (default sum is 0)
         Each bit set high in this register enables the corresponding result
         code regardless of the W command setting.
        Bit (Decimal Value)
         0 (1)   CONNECT XXXX result code gives DCE to DCE rate instead of
                 local DTE to DCE rate.
         1 (2)   Append /ARQ to verbose CONNECT result code if protocol is NONE
         2 (4)   Enable CARRIER XXXX result code
         3 (8)   Enable PROTOCOL XXXX result code
         4 (16)  Undefined
         5 (32)  Enable COMPRESSION result code
         6 (64)  Undefined
         7 (128) Undefined
S109    v.32/v.32bis Negotiation Rate Selection (default sum is 62)
         Each bit set high in this register enables the corresponding rate as
         a valid rate to be used during rate negotiation.
        Bit (Decimal Value)
         0 (1)   Unused
         1 (2)   4800 bps
         2 (4)   7200 bps
         3 (8)   9600 bps
         4 (16)  12000 bps
         5 (32)  14400 bps
         6 (64)  Unused
         7 (128) Unused
S110    v.32/v.32bis Mode & Rate Negotiation Control
         0       Normal v.32 mode (no v.32bis support)
         1       Normal v.32bis mode
         2       v.32bis mode with automatic rate renegotiation (default)
         3       v.32bis mode with automatic rate renegotiation starting with
                 the lowest rate set in S109 and working up one defined rate at
                 a time toward the highest rate set in S109 (based on %Q level
                 at each rate prior to stepping up.) (If the modem steps back
                 down, it will also follow the S109 settings.)
S202    Remote Access Escape Character (0-255, Default 170)

SCn=n   BUSY Detect Watermark Controls
         Each register "pair" holds the value for each setting.  To set a value,
         divide the setting by 256.  The integer goes in the second register,
         while the remained goes in the first.  (A setting of 516 would convert
         to 2 Remainder 4, and could be set by sending ATSC0=4SC1=2 to the
         modem.)  Settings are in 1/100ths of a second.
        Default values:
         Minimum BUSY ON Time
          SC0=30
```

```
          SC1=0
         Maximum BUSY ON Time
          SC2=75
          SC3=0
         Minimum BUSY OFF Time
          SC4=30
          SC5=0
         Maximum BUSY OFF Time
          SC6=75
          SC7=0
         (Defaults support FCC Spec. BUSY signal.  Setting SC0=25 & SC4=25
          allows FAST BUSY to also be detected as BUSY.)
SC8=n   Set number of valid BUSY Pulses before reporting BUSY (4 is default)


FAX commands of special interest to Supra Users:
        +FAE=n  (CLASS 1 Only) Adaptive Answer / Silent Answer Mode Control
                 0       Disable Both
                 1       Adaptive Answer ONLY
                 2       Adaptive Answer & Silent Answer
                 3       Silent Answer ONLY
        +FAA=n  (CLASS 2 Only) Adaptive Answer / Silent Answer Mode Control
                 0       Disable Both
                 1       Adaptive Answer ONLY
                 2       Adaptive Answer & Silent Answer
                 3       Silent Answer ONLY

Connection Result Codes:

Numeric Verbose
0       OK
1       CONNECT                   (300 bps)
2       RING
3       NO CARRIER
4       ERROR
5       CONNECT 1200
6       NO DIALTONE
7       BUSY
8       NO ANSWER
9       CONNECT 0600
10      CONNECT 2400
11      CONNECT 4800
12      CONNECT 9600
13      CONNECT 7200
14      CONNECT 12000
15      CONNECT 14400
16      CONNECT 19200
17      CONNECT 38400
18      CONNECT 57600
19      CONNECT 115200            (Not Currently Supported on MOST models)
22      CONNECT 1200/75           (Models with v.23 support only)
23      CONNECT 75/1200           (Models with v.23 support only)

24      DELAYED
32      BLACKLISTED
33      FAX
35      DATA
```

```
40      CARRIER 300
44      CARRIER 1200/75         (Models with v.23 support only)
45      CARRIER 75/1200         (Models with v.23 support only)
46      CARRIER 1200
47      CARRIER 2400
48      CARRIER 4800
49      CARRIER 7200
50      CARRIER 9600
51      CARRIER 12000
52      CARRIER 14400

66      COMPRESSION: CLASS 5    (MNP 5)
67      COMPRESSION: V.42BIS    (BTLZ)
69      COMPRESSION: NONE

70      PROTOCOL: NONE
77      PROTOCOL: LAP-M         (V.42)
80      PROTOCOL: ALT           (MNP)
81      PROTOCOL: ALT - CELLULAR        (MNP 10)
+FC     +FCERROR

V.32 & V.32BIS EXTERNAL DISPLAY CODES

Red LED's

        OH      Off Hook
        RD      Receiving Data
        SD      Sending Data
        TR      Terminal Ready (Follows DTR per &Dn setting)

Green LED Display PANEL

        AA      Auto Answer (RI displayed during ring)
        CD      Carrier Detected
        DC      Data Compression in use
        DI      Dialing
        FX      FAX MODE
        LP      LAPM Error Correction in use.
        M2      MNP2 Error Correction in use.
        M3      MNP3 Error Correction in use.
        M4      MNP4 Error Correction in use.
        M5      MNP5 Data Compression in use.
        OK      Modem Powered Up Correctly and Ready for Use.
        RE      Receive Error while using LAPM or MNP mode.
        RI      Ring Indicator
        RT      Retrain in progress
        TE      Transmit Error while using LPAM or MNP mode.
        TM      Test Mode in use.
        3       300 bps connection
        12      1200 bps connection
        24      2400 bps connection
        48      4800 bps connection
        72      7200 bps connection
        96      9600 bps connection
        120     12000 bps connection
        144     14400 bps connection
```

```
Encoded Optional Feature List (ATi10)

NOTE ->   These codes are being added to SupraFAXModem ROMs, but in some cases
          not all codes have been added that are supported by a given product,
          and codes have been assigned for features not yet available.

        Code    Feature                         Functions/Commands/Codes Added
        101     Fax CLASS 1                     Normal CLASS 1 FAX Command Set
        104     Fax CLASS 2                     Normal CLASS 2 FAX Command Set
        105     Fax CLASS 2.0                   Normal CLASS 2.0 FAX Command Set
        115     CCITT v.17 (14.4 Fax)           Adds 12k & 14.4k fax operation
        120     Worldwide PSTN Support          %TTnn   PTT Cert. Test Signals
                                                *NC?    Display Country Config.
                                                *NCn    Change County Config.
                                                *Zn
        121     CCITT v.23                      %Fn (1-3)
                                                %F1     75T/1200R
                                                %F2     1200R/75T
                                                %F3     v.23 HALF DUPLEX
                                                Adds These Result Codes:
                                                Numeric Verbose
                                                22      CONNECT 1200TX/75RX
                                                23      CONNECT 75TX/1200RX
                                                44      CARRIER 1200/75
                                                45      CARRIER 75/1200
        122     CCITT v.25bis                   See list above
        123     Blacklisting                    *B      Display Blacklisted #'s
                                                *D      Display Delayed #'s
                                                Adds These Result Codes:
                                                24      DELAYED
                                                32      BLACKLISTED
        124     Access Security                 *C      Enb. Sec. Acc. & Req.PW
                                                *E      Exit Sec. Access
                                                *L      List PW & CB directories
                                                *P      Stores PassWords
                                                *R      Request Sec. Acc. Mode
        140     CCITT v.32bis (14.4 Data)       Adds 7200, 12k, & 14.k carriers
        141     Silent Answer                   +FAE=n
                                                +FAA=n  > CLASS 2 units only <
        142     Caller ID                       #CID=n
        143     MNP 10                          -B      Forced FB to 1200
                                                -C      MNP10 Sync Mode
                                                -C1     MNP10 Async Mode
                                                -C2     MNP 2
                                                -C3     MNP 3
                                                -K      No LAPM to MNP10 Conv.
                                                -K1     Conv. LAPM to MNP10
                                                -Q      FB to v.22/v.22bis
                                                -Q1     No FB to v.22/v.22bis
                                                -Un  Tx Level Change during FF
                                                -U0     auto attn to -10dBm
                                                -U1     auto attn to -18dBm
                                                -U2     auto attn to -22dBm
                                                -U3     auto attn to -25dBm
                                                -U4     Force 2400 to -10dBm
                                                -U5     Force 2400 to -18dBm
```

```
                                                    -U6     Force 2400 to -22dBm
                                                    -U7     Force 2400 to -25dBm
                                                    )M      Tx fixed at -10dBm
                                                    )M1     Tx attempt Tx < -10dBm
                                                    *H0     Link Neg. at Top Speed
                                                    *H1     Link Neg. at 1200
                                                    *H2     Link Neg. at 4800
        144     MNP "Cellular"                      In Docs if a Supported Feature
        145     AutoSync                            In Docs if a Supported Feature
        146     Enhanced Configuration Display      \S      Enhanced Display Codes
        160     Programable Voice                   In Docs if a Supported Feature
        161     ADPCM                               In Docs if a Supported Feature
        162     MACE                                In Docs if a Supported Feature
        170     Handset Support                     In Docs if a Supported Feature
        171     Headset Support                     In Docs if a Supported Feature
        180     16b Buffer Emulation Mode           In Docs if a Supported Feature
        181     SupraSmart                          In Docs if a Supported Feature
        182     SupraSmart 16b DMA                  In Docs if a Supported Feature
        190     Flash ROM AMD                       In Docs if a Supported Feature
        191     Flash ROM ATMEL                     In Docs if a Supported Feature
        200     V.FC                                In Docs if a Supported Feature

144PB Current Load

        ON----> @ 150mA  Modem Port is open and modem is activity in use.
        Sleep-> @  55mA  Modem Port is open, but modem is not processing any
                         commands and is not OFF-HOOK.
        OFF--->     0mA  Modem Port is closed.


***    WARNING   ***

The following commands are accepted by some models, but are ONLY for internal
use at Supra.  (Supra's staff cannot assist you in regard to these commands,
and under no case should you attempt use or adjust these settings.):

        ATS91=x
        ATS92=x
        ATS99=x
        AT!(x)

These commands are quite powerful and can cause unpredictable or total lack
of operation.  (In many cases, service at Supra would be required to restore
normal operation.)
```

1.12 Hayes Modem Technical Reference

```
Technical Reference
for
Hayes(TM) Modem Users

2 November 1990
Version 1.0
```

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Note: This version of the "Technical Reference for Hayes Modem Users" is a special version edited for bulletin-board downloading. As a plain ASCII character file, it therefore cannot contain any of the illustrations and graphic elements provided in the printed version.

To highlight the start of Chapters, 1st Level Heads, 2nd Level Heads, 3rd Level Heads and Tables, we’ve used the following scheme:

```
Chapters are preceded by:
============================================================================

1st Level Heads are preceded by:
****************************************************************************

2nd Level Heads are preceded by:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

3rd Level Heads are preceded by:
............................................................................

Table heads are separated from table listings by:
----------------------------------------------------------------------------
```

Document 44-00012 AA K10 (BBS Version)

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       S11 - Multi-Frequency Tone Duration
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       S18 - Modem Test Timer
```

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Introduction

This Technical Reference for Hayes Modem Users offers additional information about the Hayes Standard AT Command Set for users who want to use the command set to control the modem, rather than using full-featured software. To help you do this, the complete command set is defined in greater detail than that provided on the AT Command Set Reference Card that accompanied your modem. All of the commands in the set are included in this document.

You'll also find additional discussions on some of the more complicated options, such as synchronous communications, and the interactions between communication standards, negotiation commands, and modem speeds. In addition, information about the connections between the modem and the DTE (computer or terminal) is included.

With the information provided here, you should be able to configure your modem with AT commands for a variety of communication environments. If you are just starting out with communications programming, this reference should provide you with sufficient tips to address the modem's features through a software program of your own.

If this reference seems more technically oriented than you anticipated, we suggest that you purchase one of Hayes Smartcom Products. Any of these fine programs will fully control the modem for almost any telecommunication requirements.

****
Who Should Use this Reference

Users of full-featured communications software such as Hayes Smartcom Products will not need this reference.

This reference is provided for...

* users of communications software packages which require the user to enter modem configuration strings.

* users who will be installing and operating Hayes modems in a non-PC environment.

* users who control their modems directly with terminal emulation software.

* technical personnel responsible for custom installations and applications.

Additional information is available for communications software developers. If you are, or would like to become, a registered Hayes Software Developer, you may receive additional technical material on Hayes products. For information on qualification and registration procedures, contact your nearest Hayes Customer Service facility. (Refer to the Customer Service Information folder provided with your modem for location and telephone number.)

****

How this Reference is Organized

This reference is divided into two chapters and four appendices:

Chapter One: The Hayes Standard AT Command Set...
includes definitions of the Hayes AT Command Set including the commands, result codes, and S-registers.

Chapter Two: V-series(TM) X.25 Communications...
includes definitions of the commands used for X.25 packet switched communications, PAD and National Parameters, and listings for four PAD profiles.

Appendix A: Communication Options...
describes the various asynchronous and synchronous transmission modes supported by Hayes modems and includes a discussion of the AT commands related to these modes.

Appendix B: Troubleshooting Tips...
provides special environmental considerations and offers suggestions for remedying problems in modem communications.

Appendix C: Modem-to-DTE Interface...
discusses the requirements and capabilities of the modem's data terminal equipment (DTE) interface.

Appendix D: Modem Application Development...
offers suggestions for developing applications software using the AT command set.

****
How to Use this Reference

The commands and procedures described in this reference are intended for use with a program that provides a command line interface to the modem. or if the modem is connected to an asynchronous terminal to which commands can be entered and sent through the serial port to the modem. Although commands are not required when using Hayes Smartcom(TM) products, Smartcom EZ(TM), Smartcom II(TM), and Smartcom III(TM) all support a command line interface to the modem. Refer to the Smartmodem Product User's Reference or V-series System Product User's Reference (depending on the modem you purchased) for descriptions of the features that are enabled by the AT Commands and S-Registers defined here. These user's references both explain how to issue AT Commands, and read and set S-Registers/PAD Parameters.

Please note that this reference is not a list of the features supported by your modem, but a general guide to the Hayes AT Command Set as used to control Hayes modems. For a list of features supported by your modem, refer to the documentation included with your modem. This Modem Technical Reference is a supplement to the documentation provided with your modem, not a replacement.

===

Chapter One:
The Hayes Standard AT Command Set

This chapter is divided into three sections: AT commands, Result Codes, and S-

Registers. The first section defines individual AT commands. Commands are listed in alphabetically for easy reference. The second section defines the Result Codes that can be returned by Hayes modems. These are listed in numeric order. The third section defines Hayes Smartmodem Registers. These, too, are in numeric order. For completeness, definitions of the AT command prefix, the end-of-line character, and other information related to the Hayes Standard AT Command Set are also included.

For the factory setting and available options/ranges for commands and registers, use the AT Command Set Reference Card provided with your modem. Unless a command, register, or result code is listed on this card, it is not supported by your modem, although it appears in this document.

```
*****************************************************************************
```

1.1 AT Command Listing
Each step in the evolution of Hayes modems has added to the feature set that has enhanced the definition of the Hayes standard. The diagram below shows the major steps in the process.

A - Answer Command
The A command instructs the modem to go off hook and respond to an incoming call, then handshake with the remote modem. When the modem returns the RING result code, issue ATA<CR>. The modem will send an answer carrier signal to the originating modem and wait for an originate carrier signal. When the modem receives the carrier from the originating modem, the modems go through a handshaking process then go on-line. The modems return the CONNECT XXXXX result code. If no carrier signal is received within the time specified in Register S7, the modem hangs up, returns the NO CARRIER result code, and enters the command state.

B - Select Communication Standard
The B command is used to specify the desired communications standard setting at a particular modem line speed. Because options can select between groups of options, more than one combination of communication standard and speed can be selected. For example, you can issue B1 and B16; both will be in effect because they do not reference the same line speed. However, choosing B1 then B5 selects B5, and replaces B1 as the standard for 1200 bps communications. The most recent selection chosen from any given group will be in effect for that parameter group.

GROUP 1

Values	Description
0 or none	V.22 when modem is at 1200 bps
1	U. S. Domestic 212A when modem is at 1200 bps
2	V.23 R1200/T75 bps ASB when modem is at T1200/R1200 bps
3	V.23 T1200/R75 bps ASB when modem is at T1200/R1200 bps
4	V.23 T1200/R75 bps split speed when modem is at T1200/R75 bps
5	V.23 1200 bps half duplex when modem is at T1200/R1200 bps

GROUP 2

Values	Description
10	V.23 R1200/T75 bps split speed when modem is at R1200/T75 bps
11	U. S. Domestic 212A when modem is at 1200 bps

```
GROUP 3
-----------------------------------------------------------------------------
Values  Description
15      V.21 when modem is 110/300 bps
16      U. S. Domestic 103 when modem is at 110/300 bps


GROUP 4
-----------------------------------------------------------------------------
Values  Description
20      V.23 R600/T75 bps ASB when modem is T600/R600 bps
21      V.23 T600/R75 bps ASB when modem is T600/R600 bps
22      V.23 T600/R75 bps split speed when modem is T600/R75 bps
23      V.23 600, half duplex when modem is 600 bps


GROUP 5
-----------------------------------------------------------------------------
Values  Description
30      V.22bis when modem is 2400 bps
31      V.27ter when modem is 2400 bps


GROUP 6
-----------------------------------------------------------------------------
Values  Description
40      V.27ter when modem is 4800 bps
41      V.32 full duplex when modem is 4800 bps
42      V.32 half duplex when modem is 4800 bps
44      V.23 half duplex when modem is 4800 bps

GROUP 7
-----------------------------------------------------------------------------
Values  Description
50      V.29 HDX when modem is 7200 bps


GROUP 8
-----------------------------------------------------------------------------
Values  Description
60      V.32 full duplex when modem is 9600 bps
61      V.32 half duplex when modem is 9600 bps
63      V.29 half duplex when modem is 9600 bps

C - Carrier Control Selection
The C command is used by some Hayes modems, such as Smartmodem 1200, to
control the transmit carrier. In these instances, C0 instructs the modem not
to send carrier (i.e., puts modem in a receive-only mode). High-speed modems
(those capable of speeds greater than 1200 bps) accept C1 without error in
order to assure backward compatibility with communications software that
issues C1. However, these modems do not support C0.

C0 - Transmit carrier always off (not supported in high-speed modems)

C1 - Normal transmit carrier switching
```

D - Dial Command
The D command places the modem in originate mode; it then functions as an auto-dialer. Whether the command is issued on a line by itself, or followed immediately by the telephone number, it must be preceded by the AT prefix and terminated with a <CR> The dial string is a combination of dial digits and dial modifiers. If the modem is off hook, it will neither initially wait nor attempt to detect dial tone before proceeding. The D command is not valid when the modem is on-line or if either &Q2 or &Q3 is in effect. Parentheses and hyphens in a dial string are ignored by the auto-dialer, but are counted as characters in the 255-character command buffer.

Result Codes	Description
BUSY	If X3 or X4 are selected or W dial modifier is used and busy is detected
NO DIALTONE	If X2 or X4 are selected and 1 second of dial tone is not detected within 5 seconds If W dial modifier is processes and then 3 seconds of dial tone is not detected within the time specified by S7
ERROR	If the S=n dial modifier is processed and the n value is out of range (refer to the S dial modifier in this section) or if the total number of characters in the command line plus the stored dial string exceeds 255 characters
NO ANSWER	If @ dial modifier is used and then no signal is detected for at least five continuous seconds before the time specified by S7
OK	If aborted by DTR ON-to-OFF whenever certain combinations of &D and &Q are in effect. Refer to the &D command in this chapter for details. If the ; dial modifier is processed in the dial string. If aborted by a character from the DTE during the dialing process

Dial Modifiers
Dial modifiers can be combined with the dial (D) command to perform a series of operations within a single command line. For example, ATDT9W1552368!@#71234; <CR> instructs the modem to use tone dialing to access a number outside a PBX, wait for dial tone, dial the number 1552368, enter a timed break recall, wait for quiet answer, and issue the PBX transfer code #7 before dialing extension number 1234, then return to the command state before initiating the handshake.

0-9 A B C D # * - Digits/Characters for Dialing
The digits/characters 0-9 A B C D # * are used to specify what numbers the modem will dial. The characters A B C D # * represent specific tone pairs and therefore can be used only when tone dialing is selected; these symbols are ignored when pulse dialing is used.

P - Pulse Dialing Method
The P dial modifier selects the pulse method of dialing. The P modifier can be issued with the dial command, or alone, to indicate the method used for subsequent dialings. The factory-set method is pulse. Once this method is

selected, it is used until the other is chosen, or the modem is reset.

T - Tone Dialing Method
The T dial modifier selects the tone method of dialing. The T modifier can be issued with the dial command, or alone, to indicate the method used for subsequent dialings. Once this method is selected, it is used until the other is chosen, or the modem is reset.

W - Wait for Second Dial Tone
The W dial modifier instructs the modem to wait for dial tone before proceeding. If dial tone detection is not completed within the preset time limit, the modem hangs up and returns the NO DIALTONE result code. Some PBXs do not return a secondary proceed indication (second dial tone). The W dial modifier is not effective in such systems and should not be used.

, - Delay Processing of Next Character
The comma (,) dial modifier in a dial string causes the modem to pause before processing the next character or symbol in the command line. The duration of the pause is determined by the value held in Register S8. The comma is frequently inserted after the 9 (digit generally used to gain outside access from a PBX) to allow sufficient time for the dial tone to occur before the modem dials the telephone number.

@ - Wait for Quiet Answer
The @ dial modifier instructs the modem to listen for five seconds silence before continuing. The number of seconds the modem waits for silence is determined by the value held in S7. This modifier is useful when dialing telephone systems that produce no dial tone. If a five-second silence has not been detected within the period set in S7, the modem hangs up and returns the NO ANSWER result code. If it detects the five seconds of silence, the modem processes the remaining characters in the dial string. Note that the modem does not listen for silence until it first detects dial tone and some other signal, such as a ringing signal, that lasts longer than 210 milliseconds. For example, to dial 1552368, wait for a quiet answer, then dial a security code 85939, wait for a second dial tone, and dial extension 423 you would issue the following command: ATDT 1552368 @ 85939 W 423 <CR>.

! - Timed Break Recall (Hookflash)
The ! dial modifier issues a timed break recall signal, which causes the modem to hang up for 75 milliseconds, then reconnect. This feature can be used to access such PBX features as call transfer.

; - Return to Command State after Dialing
The semicolon (;) dial modifier, used only at the end of a command line (just before the <CR>), instructs the modem to return to the command state immediately after dialing, without breaking the connection.

The ; is useful when calling an electronic service, such as that offered by a bank, that permits you to use tones to transmit numbers once a connection has been established. The modem can send tones even if your telephone cannot. The example below illustrates the use of the semicolon modifier in communications with an electronic banking service.

ATDP 1552368; <CR> Dials bank using pulse method

OK Command executed, but keeps the modem in command state (no carrier handshake takes place)

ATDT 4768; <CR> Sends an ID code via tones and maintains modem in command state.

OK Modem in command state; command executed.

In this example, the ; differs from the +++ in that the escape sequence places the modem in the command state only when two modems have completed a handshake. The semicolon keeps the modem in command state; no CONNECT XXXXX result code is displayed.

DS=n - Dialing a Stored Telephone Number
A stored number can be dialed from an asynchronous terminal by following the dial (D) command with the S modifier, an equal sign, and the location of the stored number (see &Zn=x command at the end of this section). The format of the modifier is S=n, where n is location 0-3. If ATDS=2<CR> were issued, for example, the modem would dial the string stored in memory location three of its "telephone book."

R - Originate a Call in Answer Mode
The dial modifier R (Reverse mode) enables the modem to dial an originate-only modem by placing a call in answer mode. This modifier must be entered at the end of the dialling (D) command string, before the <CR>.
The R modifier directs the modem to act as if it had been sent an A command in that part of the command string.

E - Command State Character Echo Selection
The E command determines whether characters are echoed to the DTE from the modem when it is command state. Some computers and terminals do not send the characters you type to the screen; they only transmit them to the remote system through the serial port. In this case, if Command State character echo were not enabled by the modem, you would be unable to see what you type. If the DTE does echo the characters you type in command state, and this function is enabled in the modem, each character typed will appear twice.

E0 Command state character echo disabled

E1 Command state character echo enabled

F - On-line State Character Echo Selection
The F command is used by some Hayes modems, such as Smartmodem 1200, to determine whether characters are echoed to the DTE from the modem when it is in the on-line state. High-speed Hayes modems do not support the F0 option. However, because the F command may be issued by older communications software, F! is supported to assure backwards compatibility.

F0 On-line character echo enabled (where not supported, ERROR result code is returned)

F1 On-line character echo disabled

H - Hook Command Options
The H command provides control over the line relay. Its most common use is with the H0 option to initiate the Hangup Process and place the modem on hook.H1 takes the modem off hook.

H0   Execute the Hangup process if in the "on-line" command state or the local analog loopback and analog loopback selftest conditions

H1   Go off hook; do not execute the Handshake Process

I - Internal Memory Tests
The various forms of the I command instruct the modem to query its memory for information about itself. the results of these tests are frequently used by programmers for the purpose of determining compatibility with software. Because these commands request information about the modem's firmware, they are not run when a connection has been established with a remote modem.

I0 - display product code
This option reports the product code of the modem to the DTE. The modem produces information text dependent upon its highest DCE line speed. The responses below are examples:

```
Result Codes..Description
-----------------------------------------------------------------------------
     300      Smartmodem 300(TM)

     120      Smartmodem 1200(TM), Smartmodem 1200B(TM),
              Smartmodem 1200C(TM), Smartmodem 1200A(TM)

     240      Smartmodem 2400(TM), Smartmodem 2400B(TM),
              Smartmodem 2400P(TM), Smartmodem 2400Q(TM),
              Smartmodem 2400M(TM), V-series Smartmodem 2400,
              V-series Smartmodem 2400B,
              V-series Smartmodem 2400P,
              V-series Smartmodem 2400M

     960      Smartmodem 9600, V-series Smartmodem 9600(TM),
              V-series Smartmodem 9600B(TM),
              V-series Smartmodem 9600P(TM),
              V-Series ULTRA Smartmodem 9600
```

I1- display ROM checksum
The I1 command instructs the modem calculate the value of the ROM checksum. The response is a 3-digit decimal information text, the sum of all of the bytes in ROM.

I2 - perform ROM checksum test
This command instructs the modem to verify the ROM checksums. Depending on whether the ROM checksum has been found to be correct, the modem produces an info text that resembles a verbose result code. The modem memory test compares the ROM checksum and tests it against the correct sum, also stored in ROM. Rather than returning a value in the way the I1 one command does, the I2 command generates a result code. When the checksum is valid, the response is: OK. When the ROM checksum fails, the modem responds with ERROR.

I4 - identify product features
The capabilities and features of the modem are encoded into a string of info-text that consists of several strings that are ASCII character representations of hex numerals which are bit-mapped. The first character of each string identifies which bit maps are in that string. For example, the "a-string" starts with a lower case "a" and identifies most of the basic modem

capabilities such as modulation standards supported and support for AutoSync.

Since the following tables identify features for Hayes modem products, the values included here are subject to change and expansion.

The I4 info-text displayed:

```
a097800C204C264<CR><LF> <CR><LF>bF60410000<CR><LF>
<CR><LF>r1031111111010000<CR><LF> <CR><LF>r3000111010000000
```

surrounded by additional <CR> and <LF> characters as are required by the V command option in effect. According to convention, all <CR> and <LF> characters are defined by S3 and S4, respectively. The meanings of the a, b, r1, and r3 strings currently defined are described below.

I4 "a" String..
The first string, the a-string, is encoded by characters, hex symbols following the "a" character, each of which represents four bits.

a D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18

```
D1, D2 Reserved
D3     Bit 3: Indicates modem based on SM1200FE commands
       Bit 2: Indicates modem based on SM2400 commands
       Bit 1: Indicates that modem supports &J commands
       Bit 0: Indicates that modem supports &L commands
D4     Bit 3: Indicates that modem supports AutoSync (&Q4)
D5     Bit 3: Plug-in board modem product
       Bit 2: Stand alone modem product
       Bit 1: Supports &H0 through &H4
       Bit 0: Supports &I0 through &I4
D7     Bit 3: Supports V.22 at 1200 bps
       Bit 2: Supports Bell 212A
       Bit 1: Supports ASB (&Q6) in V.23 75xmt/1200rcv
       Bit 0: Supports ASB (&Q6) in V.23 1200xmt/75rcv
D8     Bit 3: Supports V.23 1200xmt/75rcv
       Bit 2: Supports V.23 1200 half duplex
       Bit 1: Supports V.23 75xmt/1200rcv
       Bit 0: Supports V.23 75xmt/600rcv
D9     Bit 3: Supports V.21 100/300
       Bit 2: Supports ASB (&Q6) in V.23 75xmt/600rcv
       Bit 1: Supports ASB (&Q6) in V.23 600xmt/75rcv
       Bit 0: Supports V.23 600xmt/75rcv
D10    Bit 2: Supports V.22bis at 2400 bps
       Bit 1: Supports V.27ter at 2400 bps
       Bit 0: Supports V.27ter at 4800 bps
D11    Bit 3: Supports V.32 full duplex at 4800 bps
       Bit 2: Supports V.32 half duplex at 4800 bps
       Bit 1: Supports (Reserved) at 4800 bps
       Bit 0: Supports V.29 half duplex at 4800 bps
D12    Bit 3: Supports V.29 half duplex at 7200 bps
       Bit 2: Supports V.32 full duplex at 9600 bps
       Bit 1: Supports V.32 half duplex at 9600 bps
       Bit 0: Supports (Reserved) at 9600 bps
D13    Bit 3: Supports V.29 half duplex at 9600 bps
       Bit 2: Supports Bell 103 110/300 bps
```

```
D15    Bit 1: Supports S95 Bit 5 for COMPRESSION: result code
       Bit 0: Supports S95 Bit 4 for AUTOSTREAM: result code
D16    Bit 3: Supports S95 Bit 3 PROTOCOL: result code
       Bit 2: Supports S95 Bit 2 CARRIER result code
       Bit 1: Supports S95 Bit 1 CONNECT/ARQ result code
       Bit 0: Supports S95 Bit 0 CONNECT XXXX (for DCE rate)


I4 "b" String
The second string, the b-string, is composed of the ASCII character "b"
followed by nine bytes (D1-D9). The bit map for each byte is defined as
follows:

b D1 D2 D3 D4 D5 D6 D7 D8 D9

D1    V.42 Alternate Protocol Supported
      Bit 4: V.42 LAPM Protocol Supported
      Bit 2: X.25 Protocol Supported
      Bit 1: LAPB (Original V-series Point-to-Point error-control) Protocol
      Supported

D2    Bit 8: Reserved (should be set to zero)
      Bit 4: MNP Class 5 Supported
      Bit 2: V.42bis Supported
      Bit 1: Compression Through the X.25 Network
      Supported

D3/D4 These combine to indicate the number of AutoStream Type A channels which
      are supported. The formula (D3*16 + D4) is used. Zero means AutoStream
      is not supported


I4 "r1" and "r3" strings
These ID strings allow software to determine the available speeds that may be
used to send AT commands. The r1-string contains a bit map that indicates at
which DTE rates the autobaud process is supported.

The r3-string is issued if synchronous DTE speeds are supported. The map
indicates which DTE rates are supported in Synchronous modes. Each r-string
begins with the lower case letter "r" and may be followed by as many as 39
additional characters, not counting <CR><LF>'s that will be used to separate
them from other strings. Those 39 additional characters are limited to the
ASCII-HEX alphabet 0-9 and A-F.

After the two lead-in characters (i.e., r<n>), all subsequent characters
contain the DTE rate maps. All maps have the same mapping for convenience to
software. (Refer to the chart below.) Not all bit assignments are possible:
for example, the split speeds have no meaning in the r3 synchronous map and
are always filled with zeros.

In r1, if the bit is filled with a 1, the corresponding DTE rate is supported
for sending AT commands to the device. A zero indicates that DTE rate is not
supported for AT commands.

In the r3 map, the bits simply indicate which DTE rates are supported for
synchronous operation on-line. This does not indicate, however, the supported
rates for synchronous V.25bis commands.
```

```
Split speeds if available are marked in the r1 string only when the
appropriate B command option has been selected. Future expansion of these
strings may include new speeds that are not in strict ascending order.

DTE Rate Bit Map for r1 and r3 Strings

   Character    Bit #       DTE Rate
-----------------------------------------------------------------------------
      3:1       bit 0       45.45 bps
      3:2       bit 1       50
      3:4       bit 2       75
      3:8       bit 3       75/600 (xmt is 75, rcv is 600)

      4:1       bit 4       75/1200
      4:2       bit 5       110
      4:4       bit 6       134.5
      4:8       bit 7       50

      5:1       bit 8       300
      5:2       bit 9       450
      5:4       bit 10      600
      5:8       bit 11      600/75

      6:1       bit 12      1200
      6:2       bit 13      1200/75
      6:4       bit 14      1800
      6:8       bit 15      2000

      7:1       bit 16      2400
      7:2       bit 17      3000
      7:4       bit 18      3600
      7:8       bit 19      4200

      8:1       bit 20      4800
      8:2       bit 21      5400
      8:4       bit 22      6000
      8:8       bit 23      6600

      9:1       bit 24      7200
      9:2       bit 25      7800
      9:4       bit 26      8400
      9:8       bit 27      9000

      10:1      bit 28      9600
      10:2      bit 29      12000
      10:4      bit 30      14400
      10:8      bit 31      16800

      11:1      bit 32      19200
      11:2      bit 33      21600
      11:4      bit 34      24000
      11:8      bit 35      26400

      12:1      bit 36      28800
      12:2      bit 37      31200
      12:4      bit 38      33600
```

```
12:8      bit 39      36000

13:1      bit 40      38400
13:2      bit 41      43200
13:4      bit 42      48000
13:8      bit 43      52800

14:1      bit 44      56000
14:2      bit 45      57600
14:4      bit 46      62400
14:8      bit 47      64000

15:1      bit 48      67200
15:2      bit 49      72000
15:4      bit 50      76800
15:8      bit 51      81600

16:1      bit 52      86400
16:2      bit 53      91200
16:4      bit 54      96000
16:8      bit 55      100800

17:1      bit 56      105600
17:2      bit 57      110400
17:4      bit 58      115200
17:8      bit 59      reserved ("0")
```

L - Speaker Volume Level Selection
The L command setting determines the volume level of the speaker, when supported by the modem. Some modems use the speaker of the computer in which they are installed. In this case, where supported, the L command adjusts the speaker volume as indicated in the options below for the duration of the communications session.

L0 Low speaker volume

L1 Low speaker volume

L2 Medium speaker volume

L3 High speaker volume

M - Speaker On/Off Selection
The M command setting determines whether the speaker function of the modem is on or off. Some modems use the speaker of the computer in which they are installed. In this case, where supported, the M command turns the speaker on an off as indicated in the options below for the duration of the communications session.

M0   Speaker always off.

M1   Speaker on until carrier detected.

M2   Speaker always on; stays on after carrier is detected.

M3   Speaker off as digits are dialed, but on during ringback and on until carrier signal is detected.

N - Negotiation of Handshake Options
The N command selects whether or not the local modem performs a negotiated handshake with a remote modem when the communications speeds of the two modems are different. The options for this command are useful when a particular speed and communication standard are required. Both symmetrical and asymmetrical protocols can be selected. Note that the options supported by for this command vary significantly between country-specific implementations.

N0 When originating or answering, handshake only at the communication standard specified by S37 and B command

N1 When originating, begin handshake at the communication standard specified by the B command and S37. During handshake fallback to a lower speed may occur When answering, negotiate according to the following sequence of communication standards: V.32, Ping Pong, V.22bis, V.22, and V.21

N2 When originating, begin handshake at the communication standard specified by the B command and S37. During handshake fallback to a lower speed may occur When answering, negotiate according to the following sequence of communication standards: V.32, Ping Pong, V.22bis, V.22, V.23, and V.21

N3 When originating, handshake only at the communication standard specified by S37 and B command. When answering, negotiate according to the following sequence of communication standards: V.32, Ping Pong, V.22bis, V.22, and V.21

N4 When originating, handshake only at the communication standard specified by S37 and B command. When answering, negotiate according to the following sequence of communication standards: V.32, Ping Pong, V.22bis, V.22, V.23, and V.21

N5 When originating, begin handshake at the communication standard specified by B command and S37. During handshake fallback to a lower speed may occur When answering, handshake only at the communication standard specified by S37 and B.

O - On-Line Command
If the modem is in the on-line command state, then the O0 command causes it to go to the on-line state of the previously established connection. If the O1 command is issued (modems supporting 2400 bps and higher), the modem goes to on-line state and retrains its adaptive equalizer.

If the modem is off hook in the idle state, then O0 and O1 (modems supporting 2400 bps and higher) cause it to go to the handshaking state. Originate or answer mode is determined from the last D or A command or R dial modifier that was selected. If the modem is on-hook, idle, or if the modem is in a test condition, a command execution error results. Note that O1 serves a different purpose in lower speed modems (e.g., Smartmodem 1200 and Smartmodem 300).

P - Select Pulse Dialing Method
The P command instructs the modem to use pulse dialing. Dialed digits will be pulse dialed until a T command or dial modifier is received. This command is also discussed under Dial modifiers, in conjunction with the D command.

Q - Result Code Display Options
The Q command controls whether the result codes generated by the modem are displayed to the attached DTE. Some software does not function properly when

modem responses are returned.

Q0 Result codes enabled

Q1 Result codes disabled

Q2 Disables the RING result code. In answer mode, also disables CONNECT and NO CARRIER result codes

Sr - Addresses an S-Register
The Sr command points to a specific S-Register. Subsequent commands, such as ? and =, may read or write to the selected register. Note that S0 is the factory-set pointer for this command, and that the S-address is not stored in a stored profile. Thus, the &F, Z0, and Z1 commands will select S0 and possibly affect subsequent ? and = commands unless they are preceded by an Sr command. Note that the value of S0 is of course storable; it is the pointer to S0 that is not storable.

Sr=n - Write To An S-Register
The Sr=n command is writes a value to a specified register. The value of n is written to the S-Register specified by r, overriding the previous value. If no n suffix is present, the address previously selected via Sr is used. If no n suffix is present, the value 0 is written.

Sr? - Read An S-Register
The contents of S-Register r are sent to the DTE as three decimal digits. This informational text response is formatted with <CR><LF> as determined by the V command currently in effect. If no n (suffix) is present, the last register selection is assumed. (Refer to the Sr command.) On power up, the factory-set selection is 0. Note: ? is interpreted by the modem as Sr?.

T - Select Tone Dialing Method
The T command instructs the modem to send DTMF tones while dialing. Dialed digits will be tone dialed until a P command or dial modifier is received. This command is also discussed under Dial modifiers, in conjunction with the D command.

V - Result Code Format Options
The V command determines whether result codes (including call progress and negotiation progress messages) are displayed as numbers or words.

V0 Result codes displayed in numeric form

V1 Result codes displayed in verbose form

W - Negotiation Progress Message Selection
The W command works in conjunction with S95 (where supported) to determine which result codes will be used to describe the type of connection and protocol, etc., that resulted from handshaking and negotiation.

The W command supports extended result codes in addition to the CONNECT result code. When the modem is operated in error-control mode (&Q5 is in effect), W command and S95 together allow the user to select these additional result codes:

CARRIER
PROTOCOL
AUTOSTREAM
COMPRESSION
CONNECT

Any result codes enabled by the W command and S95 will be generated in the order indicated above. If AutoStream is not being used, no AutoStream result code is returned. Result codes not enabled by the W command option in effect may be turned-on by setting certain bits in S95. The W command options below are available when S95 is configured for any setting other than the factory-setting of 0.

W0 CONNECT result code reports DTE speed, and if S95=0, then disable all extended result codes

W1 CONNECT result code reports DTE speed, and if S95=0, then enable the CARRIER and PROTOCOL extended result codes

W2 CONNECT result code reports DCE speed, and if S95=0, then disable all extended result codes

Refer to the S95 bit map description in the next section. Note that selecting W0 and setting S95=12 is the same as selecting W1; and that selecting W0 and setting S95=1 is the same as selecting W2. S95 cannot be configured to force W2 to report DTE speed in the CONNECT result code; and that there is no setting of S95 that will force W1 not to produce the CARRIER and PROTOCOL result codes. S95 extends the functionality of the W command. The W command with S95=0 (factory setting) maintains backwards compatibility with previous V-Series System Products. However, selecting W0 and setting S95 as required allows you to tailor result codes characteristics to your own requirements.

X - Call Progress Options
The X command enables tone detection options used in the dialing process. As these functions are enabled and disabled, the modem’s result code reporting is also affected. For this reason, this command is frequently used to control the modem’s range of responses; however, its primary function is that of controlling the modem’s call response capabilities. Result code definitions are covered in the next section.

X0 Busy and dial tone detection are disabled. Only result codes 0-4 are enabled. Only the CONNECT result code is permitted, and no indication of the telephone line speed. This setting overrides any other result code selections made with the W command and S95

X1 Busy and dial tone detection are disabled. Result codes 0-5 are enabled and linespeed reporting with CONNECT XXXX messages. W command options and S95 are enabled

X2 Busy detection is disabled. Dial tone detection is enabled. Result codes 0-6 are enabled and linespeed reporting with CONNECT XXXX messages. W command options and S95 are enabled

X3 Busy detection is enabled. Dial tone detection is disabled. Result codes 0-5 and 7 are enabled and linespeed reporting with CONNECT XXXX messages. W command options and S95 are enabled

X4 Busy and dial tone detection are enabled. Result codes 0-7 are enabled and linespeed reporting with CONNECT XXXX messages. W command options and S95 enabled

The @ and W dial modifier result codes are not affected by the X command in effect. The @ dial modifier enables result codes 8 (NO ANSWER) and 7 (BUSY) each time it occurs in the dial string. The W dial modifier enables result codes 6 (NO DIALTONE) and 7 (BUSY) each time it occurs in the dial string.

Y - Long Space Disconnect Options
The Y command determines if the modem will disconnect a call upon receiving a long space (1.6 sec break) signal from the distant end. If Y1 is selected, the modem will send a 4-second break (space) before going on hook when an H0 command is issued or, if &D2 is selected, when DTR goes off. Refer also to register S82 for more information.

Y0 Disable long space disconnect

Y1 Enable long space disconnect

Z - Soft Reset Command
The modem can be reset by issuing the Z. The command tells the modem to go on hook and restore the selected stored profile. Any non-storable parameters previously set by commands are returned to their factory settings. The modem aborts execution of all commands following the Z command on the same command line. Subsequent commands on the same line are ignored. Refer to the &W command for description of which modem parameters are included in a stored profile. Z0 recalls stored user profile 0, stored with &W0; Z1 recalls stored user profile 1, stored with &W1.

Z0 Recall stored profile 0

Z1 Recall stored profile 1

&B - V.32 Auto Retrain Options
The &B command is used to enable and disable auto retrain in V.32 mode. During a V.32 or a V.22bis connection, the modem continually monitors line quality. The &B command determines whether the modem ignores a line quality problem or attempts to correct the situation by retraining. The selection made with this command affects V.32 connections only.

&B and &B0 Disable V.32 Auto Retrain

&B1   Enable V.32 Auto Retrain

&C - Data Carrier Detect Options
The &C command determines how the state of the DCD lead relates to the carrier from the distant end. The command will take effect immediately when issued. The behavior patterns for DCD depend on the specific &C and &Q commands in effect. Also, DCD patterns depend on whether on-line operation is half or full duplex. Finally, if &Q5 is in effect, DCD behavior depends on whether S10=255 or S10<255. DCD circuit operation is according to the descriptions below.

```
DCD Behaviors for Half-Duplex Operation
              &C0  &C1  &C2
----------------------------------------
```

```
&Q1           E    C    C
&Q2           E    C    C
&Q3           E    C    C
&Q4           E    C    C
&Q5           A    E    A
&Q5 (S10=255) A    C    F

DCD Behaviors for Full-Duplex Operation
             &C0   &C1 &C2
----------------------------------------
&QO           A    B    D
&Q1           B    B    B
&Q2           B    B    B
&Q3           B    B    B
&Q4           B    B    B
&Q5           A    E    A
&Q6           A    B    D
&Q5 (S10=255) A    B    D

Table Legend:

A - The DCD circuit is ON at all times

B - DCD=0 in Idle, DCD tracks carrier in On-Line State with S9:
    The DCD circuit is OFF while the connection attempt is being made. It goes
    ON immediately after the CONNECT result code is issued, and goes OFF
    immediately after loss of remote carrier. If the remote carrier is
    restored and the S9 (carrier detect response time) delay is completed
    before the S10 (lost carrier to hang-up) delay expires, then hang-up is
    avoided and the DCD circuit goes ON again as the modem goes on-line.
    Otherwise, DCD remains OFF during the hang-up process prior to the result
    code message. If S10=255, hangup will not occur unless initiated by the
    DTE.

C - DCD=0 in Idle, DCD tracks carrier in On-Line State without S9:
    The DCD circuit is OFF when the modem is idle. It goes ON immediately
    after the CONNECT result code is issued, and goes OFF immediately after
    loss of remote carrier. If the remote carrier is restored, then DCD will
    go ON regardless of the S9 value in effect.

D - DCD=1 in Idle, DCD tracks in On-Line with S9:
    The DCD circuit is normally ON when the modem is idle, and it is ON while
    the remote carrier is present and the modem is on-line. The signal goes
    OFF immediately after loss of remote carrier. If the remote carrier is
    restored, then DCD will go ON again regardless of S9. If the Hangup
    Process is initiated by the DTE using DTR or issuing ATH<CR> from the
    on-line state, then DCD will return ON just prior to the modem issuing the
    OK result code. If S10<255 (lost carrier to hang-up delay) and a timeout
    equal to S10 expires before the remote carrier is restored, then the
    hang-up process begins during which DCD=0. DCD will return ON again just
    prior to the issue of the NO CARRIER result code. If the remote carrier is
    restored and the S9 delay is completed before the S10 delay expires; then
    the modem does not hangup, and DCD will go ON again when the modem returns
    on on-line.

E - DCD=0 in Idle, DCD=1 in On-Line State (no tracking):
    The DCD circuit is OFF when the modem is idle in the command state. DCD
```

goes ON immediately after the CONNECT result code is issued, and it goes OFF when the modem begins the hangup process. DCD does not track the presence of remote carrier energy.

F - DCD=1 in Idle, DCD tracks in On-Line without S9:
This behavior pattern is associated only with (&C2, &Q5, S10=255, half duplex), and it only occurs at 4800 and 9600 bps in Hayes proprietary V.32 half-duplex operation (Ping Pong). The DCD circuit is normally ON when the modem is operating in half duplex and idle in the command state, and it is ON while the remote carrier is present in the on-line state. It goes OFF approximately 3 seconds after loss of remote carrier. If the remote carrier is restored, then DCD will go ON again (regardless of S9). If the hangup process is initiated by the DTE using DTR or escaping to command state and issuing ATH<CR> when on-line, DCD will return ON just prior to the modem issuing the OK result code. The modem will not begin the hangup process if S10=255.

&D - Data Terminal Ready Options
The &D command affects how the modem will respond to the state of the DTR signal and changes to this circuit. The effects of DTR states and changes are also very dependent upon the &Q command that is in effect. The test modes associated with certain &T commands are only affected by DTR changes when &D3 is in effect and are not affected by &Q command options. Below, DTR-related behaviors are defined in relation to the &D and &Q commands in effect in smart mode. In dumb mode, the behavior is as defined below for &D2 regardless of the actual &D command in effect.

DTR Behaviors in Smart Mode

	&D0	&D1	&D2	&D3
&Q0	none	E	I, H	R
&Q1	H	E	I, C, H	R
&Q2	I, D, H	I, D, H	I, D, H	I, D, R
&Q3	I, O, H	I, O, H	I, O, H	I, O, R
&Q4	H	E	I, C, H	R
&Q5	none	E	I, S	R
&Q6	none	E	I, S	R

Legend for Table Above -
Auto-Answer Function
I The DCD circuit is ON at all times.

DTR OFF-to-ON Effects:

D If S1=0 and in the idle condition, DTR OFF-to-ON signals the modem to go off hook and start the dialing process using the dial string stored by the last &Z0= command. S25 does not affect the modem’s reactions to DTR going OFF-to-ON.

O If S1=0 and in the idle condition, DTR OFF-to-ON signals the modem to go off hook and start the originate handshake process. S25 does not affect the modem’s reactions to DTR going OFF-to-ON.

C Following a CONNECT result code, DTR must go ON before the time specified by S25 (in seconds), or CTS will not go ON and the modem will go to the Hangup Process, issue the NO CARRIER result code, at the Response Speed,

```
   and go to the idle condition.

DTR ONðtoðOFF Effects
-----------------------------------------------------------------------------
E  If in the on-line state, DTR ON-to-OFF signals the modem to exit the
   on-line state, issue an OK result code at the response speed, and go to
   command state, while maintaining the connection. DTR transitions to OFF
   that do not persist more than the time specified by S25 will not cause the
   modem to exit the on-line state.

H  If in the on-line state, or in the handshaking, dialing, or answer process,
   DTR ON-to-OFF signals the modem to execute the hangup process, issue an OK
   result code at the response speed, and go to the idle condition. The modem
   is not reset by DTR. This will also abort any dial, handshake, or answer in
   process. DTR transitions to OFF that do not persist more than the time
   specified by S25 will not trigger a transition to the hangup process.

R  DTR ON-to-OFF signals the modem to immediately perform a hard reset
   regardless of state. All processes are aborted. S25 does not affect the
   modem’s reactions to DTR going OFF-to-ON. There is no result code.

S  If in On-Line, or in the Handshaking, dialing processes, or answer process,
   a transition of DTR ON-to-OFF signals the modem to shut down the
   communications link. When the modem has completed transmitting the data
   placed into its buffer by the DTE and has completed sending the received
   data to the DTE, the modem will execute the hangup process, issue an OK
   result code at the response speed, and remain idle in the command state.
   The modem is not reset by DTR. This will also abort any dial, handshake, or
   answer in process. DTR transitions to OFF that do not persist more than the
   time specified by S25 will not trigger a transition to the hangup process.

&F - Recall Factory Profile
The &F command recalls the configuration stored programmed in ROM at the
factory. This operation completely replaces the command options and S-Register
values in the active configuration with those comprising the factory
configuration. For the commands and registers stored and their factory-set
values, see the AT Command Set Reference Card accompanying your modem.

&G - Guard Tone Selection
The &G command tells the modem which guard tone, if any, to transmit while
transmitting in the high band (answer mode). Guard tone is transmitted only
while the modem is in the transmitting in the answer mode and during the
answer handshake.

&G0  Guard tones disabled

&G2  1800 Hz guard tone enabled (V.22,V.22bis only)


&J - Jack Type Selection (Auxiliary Relay Options)
The &J command designates the type of jack with which the modem is connected
to the telephone line. This selection is made by changing the way the
auxiliary relay is controlled. The auxiliary relay connects the A lead to the
A1 lead, but is normally open.

&J0   The auxiliary relay is never closed.(suitable for RJ-11, RJ-41S, or
      RJ-45S type phone jack)
```

&J1 The auxiliary relay is closed while modem is off hook.(suitable for RJ-12 or RJ-13 type phone jack)

&K - Local Flow Control Options
The &Kn command is used to select the local flow control method for use when the modem is operating in error-control mode or asynchronous mode with Automatic Speed Buffering (ASB). ASB is used for communication environments requiring a "Fixed Speed Interface" between the modem and the DTE.

S39 stores the current flow control setting. Flow control is always inhibited in command state and is valid only when on-line in error-control mode. Bi-directional flow control regulates the data stream between the DTE and the modem. Specific functions depending on parameter value is as follows:

&K0 All flow control is disabled. May be selected for use during error-control mode at the risk of overflowing the buffers and losing data

&K1 RTS/CTS flow control is enabled. Note that the DTE-V-series cable must have the supporting wires. The &T19 command may be used by software to determine if the cable is properly wired

&K2 XON/XOFF flow control is enabled. These characters are not programmable and are fixed at DC1 and DC3, respectively. This method should not be used when XON/XOFF characters will be sent as user data or as part of a file transfer protocol

&K3 RTS/CTS flow control is enabled. Note that the DTE-V-series cable must have the supporting wires. The &T19 command may be used by software to determine if the cable is properly wired

&K4 XON/XOFF flow control is enabled. These characters are not programmable and are fixed at DC1 and DC3, respectively. This method should not be used when XON/XOFF characters will be sent as user data or as part of a file transfer protocol

&K5 Transparent XON/XOFF The data stream is controlled by characters DC1 and DC3, The chars DLE, DC1, and DC3 are transparentized by sending DLE followed by the character XORed with 21hex

&L - Line Type Selection (Dialup/Leased)
The &L1 command instructs the modem to alter its function for leased line environments. The modem will act as if S10=255 and M0 are in effect. It will not dial numbers or send answer tone. The modem must receive an X1D or A command to go on-line. The modem will then go to the dialing or answering process, respectively. Once the handshaking process is completed, the modem tries to stay in the on-line state. When it loses carrier, it returns to the dialing or answering process. Carrier level is determined in one of several techniques, depending on the particular modem. See the Installation Guide for information on setting carrier level.

&L0 Select Dial up line operation
&L1 Select Leased line operation

&O - PAD Channel Selection

The &O command instructs the modem to move from AT command state to a PAD waiting state where it is ready to receive X.25 commands. A Reset operation (see Chapter Two: V-series X.25 Communications) is performed on the selected channel. This command can be issued while off-line so that the PADs may be configured prior to making a connection.

&O0 Move to the PAD command state of the last channel accessed (or to channel 1 if no previous channel has been selected)
&O1 Move to the PAD command state for channel 1
&O2 Move to the PAD command state for channel 2
&O3 Move to the PAD command state for channel 3
&Q4 Move to the PAD command state for channel 4

&Q - Communications Mode Options

The &Q command selects the communication mode. The &Q command determines how the modem will treat transmitted and received data while in the on-line state (i.e., asynchronous, synchronous, AutoSync, or error-control) and establishes certain call setup procedures. Refer also to the &C, &D, and &S commands in this section.

Command	On-Line State	Special Features
&Q0	Asynchronous	DCD and DSR behaviors are unique. Refer to &C and &S commands
&Q1	Synchronous	DTR must be ON after CONNECT when timer value in S25 expires
&Q2	Synchronous	DTR OFF-to-ON executes dialing process; the D command invalid DTR ON-to-OFF executes the hangup process; the A command is invalid
&Q3	Synchronous	Dialing and Voice allowed from phone set when DTR is OFF. DTR OFF-to-ON executes the handshaking process (in originate mode); the D command is invalid. DTR ON-to-OFF executes hangup process; the A command invalid
&Q4	Hayes AutoSync	DTR must be ON after CONNECT when timer equal to S25 expires. DTE data speed is 9600 bps which is not equal to response speed or line speed, yet all result codes are at the response speed
&Q5	Error-Control	This enables error-control and is unique to V-series system products. Depending upon which V-series system product is being used, any one of several point to point protocols can be negotiated: LAPB, LAPM, X.25 or MNP. After the modem handshake is complete, feature negotiation (see S48) is used to determine which protocol (see S46) will be used for the communication session. If no common protocol is found between the local and remote modems, the fall back options (see S36) will be used

```
&Q6 Buffered Asynchronous     Automatic Speed Buffering is useful for DTEs
                                that cannot adjust to changing transmission
                                speeds. This mode ensures the DTE-modem speed
                                is set at a constant rate regardless of the
                                line speed determined during the modem
                                handshake. With the exception of flow control
                                (&Kn) between the DTE and the attached modem,
                                this mode is identical to the standard
                                asynchronous mode (&Q0). ASB operation is also
                                a fall back option (see S36) when the modem is
                                set for error-control mode (&Q5. Because the
                                DTE and DCE speeds are different in ASB, a 256
                                byte buffer is provided so that flow control
                                does not occur on every character
                                transmission. Some DTEs are sensitive to the
                                buffer size so S-registers are provided to
                                control the lower (S49) and upper (S50)
                                boundaries

&R - RTS/CTS Options
The functions of CTS and RTS in synchronous modes (&Q1, &Q2, and &Q3) is
determined by the &R command. The &R command has no effect if &Q0, &Q4, &Q5,
or &Q6 is in effect. See also the discussion of the CTS and RTS signals in
Chapter Three. Refer to the &K command for other RTS and CTS functions. Note
when &Q4 is in effect (AutoSync operation), RTS and CTS behaviors are not
unlike those specified by EIA 232-D/CCITT V.24.

In Synchronous Modes (&Q1, &Q2, and &Q3):
-----------------------------------------------------------------------------
&R0  CTS tracks RTS while the modem is in On-Line State and observes the
     RTS-to-CTS delay determined by S26

&R1  CTS is ON while the modem is in the On-Line State, and RTS is ignored.

In Other Modes (&Q0, &Q4, &Q5, and &Q6), the &R option in effect does not
control the RTS and CTS functions.

&S - Data Set Ready Options
The &S command controls the functions of the DSR circuit. The DSR circuit (pin
6 of the EIA 232-D interface) indicates when the modem is connected a
communication channel and is ready.

In synchronous mode, when originating a call, DSR goes high when dialing is
completed and an answer tone is detected from the remote modem. When answering
a synchronous call, DSR goes high when the modem begins transmitting the
answer tone.

In asynchronous or error-control mode, the &S command can be used to configure
the modem to keep the DSR signal high at all times or to have it operate
according to the EIA 232-D specification (as described in Chapter Three).

When &Q0, &Q5, and &Q6 are in effect:
-----------------------------------------------------------------------------
&S0  DSR circuit is always on

&S1  DSR=0 in the Idle State and when in a test mode. DSR circuit is turned ON
     at start of the Handshaking Process. DSR is turned OFF when Hangup
```

```
     Process is started

&S2  DSR=0 in the Idle State and when in a test mode. DSR circuit is turned ON
     at end of handshake prior to issuing of the CONNECT result code. DSR is
     turned OFF when hangup process is started

When &Q1 to &Q4 are in effect:
-----------------------------------------------------------------------------
&S0-1  DSR=0 in the command state and at idle. DSR circuit is turned ON at
       start of the handshaking process. DSR is turned OFF when hangup process
       is started

&S2    &S2- DSR=0 in the command state and at idle. DSR circuit is turned ON
       at end of handshake prior to issuing of the CONNECT result code. DSR is
       turned OFF when Hangup Process is started


&T - Test Options
The following &T command options are used to configure and place the modem in
various test modes as defined by CCITT V.54. These tests can be used to verify
the analog and digital portions of the modem's operation, as well as those of
the remote modem. Some of these tests require a connection be established
before running the procedure. The &T19 command (not a CCITT V.54 test) can be
used to test the RTS/CTS functions of the cable used to attach the modem to
the DTE.

&T0 - Terminate Test In Process
If a V.54 Loopback Test is in process as a result of executing an &Tn command,
then the &T0 command will cause that test to be terminated provided that the
modem is in the command state, or a V.54 state that accepts commands from the
DTE. See specific &T command descriptions for termination actions.

&T1 - Initiate Local Analog Loopback
The modem goes on hook and configures itself for analog loopback (using low
frequency band if no suffix or "O" suffix, and high frequency band if "A"
suffix). DSR is turned off (if &S1 is in effect), the analog loopback state is
entered, and the test timer is set to the value in S18. A CONNECT result code
is sent to the DTE, and the test timer then begins its count down. The test
terminates when the test timer expires. If S18 equals 0, then the test must be
terminated by an &T0, H0, or Z command. While any command may be entered while
the modem is in this test state, the modem response is not specified except
for H0, &T0, and Z - any of which will terminate the test. Upon termination of
the test, the modem enters the command state.

Result Codes:  Description
-----------------------------------------------------------------------------
CONNECT        when local analog loopback state is entered
ERROR          if any other &Tn test is active (except &T0) or if
               in the On-  Line Command State
OK             after test is stopped by test timer, the H0 command,
               or the &T0   command

&T3 - Perform Local Digital Loopback
The modem must be in the command state with a connection established when this
command is issued. Otherwise an ERROR result code occurs. This command
establishes a loopback of received data, after demodulation, and sends it back
to the distant end. The modem is configured for local digital loopback, DSR is
```

turned off (if &S1 is in effect), the test timer is started with the value in S18, and an OK result code is sent to the DTE . If S18 contains a 0, the test must be terminated by a &T0, H0, or Z command. The latter two result in the modem going on hook. If S18 does not contain 0, the test is terminated after the number of seconds stored in S18.

```
Result Codes:  Description
-----------------------------------------------------------------------------
OK             after 2 s delay
ERROR          if any other self test is active (&T1,&T6-&T8)
               or if in Idle State
OK             when test is terminated
```

&T4 - Grant RDL Requests
When in the On-Line State the modem will honor a remote digital loopback request from a distant modem if it occurs. This will result in an ERROR if the command is given while any V.54 test is active (&T1, &T3, &T6, &T7, or &T8).

&T5 - Deny RDL Requests
The modem will not respond to a remote digital loopback request from a distant modem. This will result in an ERROR if the command is given while any V.54 test is active (&T1, &T3, &T6, &T7, or &T8).

&T6 - Initiate Remote Digital Loopback
The command is valid only if the modem is in the command state with a connection at 1200 or 2400 bps. The modem sends the remote digital loopback request signal to the distant modem (see CCITT V.22 and V.54). After the RDL acknowledgment signal is received from the distant modem, DSR is turned off (if &S1 is in effect), the on-line state is entered, a CONNECT result code is sent to the DTE, and the test timer is set to the value in S18. If the modem does not receive the RDL acknowledgment signal from the distant end in three seconds, it sends an ERROR result code to the DTE and returns to the command state. The modem sends the signal specified in CCITT V.22 to release the remote digital loopback when the test is terminated. The test may be terminated by the H0, Z, or &T0 command. The test will also terminate when the test timer expires (sending the modem to the command state) or carrier is lost (causing a NO CARRIER result code and the modem to go on hook in the command state).

```
Result Codes:  Description
-----------------------------------------------------------------------------
CONNECT        when On-Line State is entered
ERROR          if any V.54 test is active (&T1, &T3, &T6-&T8)
ERROR          if not in On-Line Command State
ERROR          if command is issued at other than 1200 or 2400 bps
ERROR          if the RDL signal is not acknowledged
```

&T7 - Initiate RDL With Self Test
The command is only valid if the modem is in the command state with a connection at 1200 or 2400 bps. The modem sends the remote digital loopback request signal to the distant end (see CCITT V.22). After the RDL acknowledgment signal is received from the distant end, DSR is turned off (if &S1 is in effect), the on-line state is entered, an OK result code is sent to the DTE, and the test timer is set to the value in S18. While the test is active the modem sends a test message to the distant end and counts the errors in the received (looped back) signal. The modem stays in the command state during the test. When the test is terminated (except by a loss of carrier),

the modem sends the release signal to the distant end, as in &T6, and reports the three-digit error count to the DTE. The information text is followed by an OK result code. See the V command for formats. The test is terminated by loss of carrier, or an H0, &T0, or Z command, and by the S18 timer running out.

Result Codes:	Description
OK	when command executed is started
OK	after error count is sent to DTE
ERROR	if any other self test is active (&T1,&T3,&T6-&T8)
ERROR	if not in On-Line Command State
ERROR	if command is issued at other than 1200 or 2400 bps
ERROR	if the RDL acknowledgment signal is not received

&T8 - Local Loopback With Self Test
The modem goes on hook and is configured for analog loopback (low frequency band if none or O suffix, high frequency band if A suffix). The test timer is started at the time indicated by S18, DSR is turned off (if &S1 is in effect), A selftest condition is entered, and an OK result code is sent to the DTE. During the test the modem sends a test message and counts errors in the looped back signal. The test is terminated when the timer times out (S18) or the &T0, H0, or Z command is issued. When the test is terminated, the three-digit error count is sent to the DTE. An OK result code follows the error count.

Result Codes:	Description
OK	if AL Selftest state is entered
OK	after error count is sent to DTE
ERROR	if any other V.54 test is active (&T1,&T3,&T6,&T7), or if on-line

&T19 - Perform RTS/CTS Cable Test
This test is used to determine whether the DTE-to-DCE cable supports the RTS and CTS signals necessary for hardware flow control. This procedure should be used by software before RTS/CTS flow control (&K3) is used. The modem takes the following action when the &T19 command is issued:

1. Turns OFF CTS (normally ON) and starts a 500 ms timer.

2. Monitors RTS for ON and OFF states.

3. After the 500 ms timeout or when both level-high and level-low states of RTS are detected, the modem restores CTS to the ON condition and ends the test.

4. If both the on and off conditions of RTS are NOT detected, the modem returns the ERROR result code; otherwise, it issues the OK result code.

&U - Trellis Coding Options
The &U command is used to enable and disable Trellis coding for V.32 connections. This selection affects V.32 9600 bps transmissions only.

&U0   Enable Trellis coding
&U1   Disable Trellis coding

&V - View Configuration Profiles

The &V command is used to display the active and stored profiles (commands and S-Register settings) along with any stored telephone numbers. Input from the DTE is ignored while this view configuration information is being sent to the DTE.

The example below illustrates the &V info-text when the factory profile is loaded and then stored into the stored profiles, and an arbitrary phone number is stored in one of the stored numbers locations.

```
ACTIVE PROFILE:
B0 B41 B60 E1 L2 M1 N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5
&R0 &S0 &T4 &U0 &X0 &Y0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030 S08:002
S09:006
S10:014 S11:070 S12:050 S18:000 S25:005 S26:001 S36:005 S37:000 S38:020
S44:003
S46:002 S48:007 S49:008 S50:016 S95:000

STORED PROFILE 0:
B0 B41 B60 E1 L2 M1 N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5
&R0 &S0 &T4 &U0 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050
S18:000
S25:005 S26:001 S36:005 S37:000 S38:020 S44:003 S46:002 S48:007 S49:008
S50:016

STORED PROFILE 1:
B0 B41 B60 E1 L2 M1 N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5
&R0 &S0 &T4 &U0 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050
S18:000
S25:005 S26:001 S36:005 S37:000 S38:020 S44:003 S46:002 S48:007 S49:008
S50:016

TELEPHONE NUMBERS:
0=
1=T9W14045551212
2=
3=
```

The three-digit numbers after each S-Register number are decimal representations of the S-Register contents.

&W - Write Active Profile to Memory
The &W command stores certain command options and S-Register values into one of the modem's two nonvolatile stored profile memory locations. The command options and register values stored depend on the particular modem. These are indicated on the AT Command Set Reference Card. In addition, the AT speed and parity are stored, according to the values used at the time the command is issued.

&W0 Store the Active Profile into Stored Profile 0
&W1 Store the Active Profile into Stored Profile 1

&X - Synchronous Transmit Clock Source
The &X command determines how the DTE transmit clock is generated while the modem is in the synchronous mode.

```
&X0  Modem generates the transmit clock and applies it to pin 15 (EIA 232-D)

&X1  DTE generates the transmit clock on pin 24 (EIA 232D) and the modem
     applies this clock to pin 15 (EIA 232D). This setting is available for
     external modems only

&X2  Modem derives the transmit clock from the receive carrier signal and
     applies it to pin 15 (EIA 232-D)

&Y - Select Stored Profile For Hard Reset
The &Y command selects which stored profile will be copied into the active
profile subsequent to a hard reset (including power-up). The &Y command
execution is nonvolatile, stored at the time the command is executed, not by
the &W command. The value selected with this command is not affected by the &F
command, although &Y0 is selected as part of the overall factory setup.

&Y0  Select Stored Profile #0 on powerup
&Y1  Select Stored Profile #1 on powerup

&Zn=x - Store Telephone Number
The &Zn=x command is used to store up to four dialing strings in the modem's
nonvolatile memory for later dialing. The format for the command is
&Zn="stored number" where n is the location 0-3 to which the number should be
written. For example, the line AT&Z2=1552368<CR> writes 1552368 as the third
of four possible numbers to the modem's "telephone book" in nonvolatile
memory. The &Zn=x command can be used to store a number with as many as 36
characters.

Any dialing string can be saved except the S dialing modifier (this would
cause a stored dialing string to attempt to dial another stored string), or
the ; modifier if used for automatic dialing in synchronous mode 2. If no dial
string follows the command, the referenced stored number will be cleared.

&Z    <dial string><CR>
&Z=   <dial string><CR>
&Zn=  <dial string><CR>     ... where n=0-3

If the delimiter (=) is not present, the characters following the &Zn=x are
treated as telephone numbers and/or modifiers and are stored in location 0.
For example, in &Znxxxx, the n is a part of the phone number. If the delimiter
is present the characters following it are stored in the location specified by
the character preceding the delimiter (which must be in the range 0-3). If no
character precedes the delimiter, the number is stored in location 0. If an
invalid location is specified (n) the modem sends an ERROR result code.

Characters not listed above as storable are ignored. For example, the command
&Z1=3456H;AX would store 3456;A.

****************************************************************************
1.2  Result Code Listing
This section defines the result codes returned by Hayes modems in response to
commands.

The table below shows the various formats in which modem responses can be
presented. Note that the "text" of the info-text may consist of multiple lines
of text. The formats depicted here only refer to the <CR><LF> characters
```

between info-texts and not within them.

```
                   V0             V1
-------------------------------------------------
Information Text   text           <CR><LF>
                   <CR><LF>       text
                                  <CR><LF>

Result Codes       numeric code   <CR><LF>
                   <CR>           verbose code
                                  <CR><LF>
```

++

1.2.1 Command Response and Call Progress Monitoring

This set of result codes includes responses to commands and call progress monitoring responses. They are available to all modems within the capabilities of the modem. For example, the result code CONNECT 9600 is not available to Smartmodem 2400. The factory setting for all high-speed modems enables the extended set of call progress monitoring (X4). When set up in this way, the modem performs and reports full call progress monitoring (RING, NO CARRIER, NO DIALTONE, and BUSY). It also indicates the speed of the connection (CONNECT 1200 as opposed to simply CONNECT). The factory setting for Smartmodem 300, Smartmodem 1200, and all others whose highest speed is 1200 bps is basic call progress monitoring (X0).

The command response and call progress monitoring result codes are defined below:

0 - OK
This result code indicates that a command or command string was executed. Note that if more than one command were included on a line and an ERROR result code received, this means that one or more of the commands was not processed. If one or more were executed properly, but even one was invalid, no OK will be issued, only the ERROR.

1 - CONNECT
This result code indicates a connection was made between the DTE and the modem. If X4 (extended set of call progress monitoring) were selected, the code indicates that a connection from at 0 to 300 bps was made. However, if X0 (basic set of call progress monitoring) were selected, the connection could be 0-300, 1200, 1200/75, 75/1200, 2400, 4800, 9600,19200, or 38400 bps. If the modem is not operating in error-control mode, this is the same as the line speed. See other CONNECT messages and CARRIER messages.

2 - RING
This result code indicates the modem as detected a ring signal. No distinction can be made as to whether this is a voice call, a modem call, a fax call, or other type.

3 - NO CARRIER
This result code indicates that no carrier signal was detected, or that the signal was lost. This is the response the modem will give when no connection is made; see CONNECT result code. The modem will also return this message when the connection is broken, either intentionally as when the hangup process completes, or if line difficulties break the connection.

4 - ERROR

This result code indicates that an invalid command was issued, or that there was an error in the command line. For example, if the command line exceeds 40 characters for Smartmodem Products or 255 characters for V-series System Products, this result code will be returned. This result code is also returned in response to the I1 command requesting a ROM checksum, if the modem detects an error in the computation.

5 - CONNECT 1200
This result code indicates a connection has been established at 1200 or 1200/75, 75/1200, bps between the modem and the DTE. If the modem is not operating in error-control mode, this is the same as the line speed. This result code is disabled by X0. Only CONNECT is reported.

6 - NO DIALTONE
This result code indicates that no dial tone was detected when the modem went off hook. Dial tone detection and this result code are enabled by X2 or X4, or the W dial modifier.

7 - BUSY
This result code indicates that the modem detected a busy signal when it attempted to connect with the modem at the number dialed. Busy signal detection and this result code are enabled by X3 or X4.

8 - NO ANSWER
This result code indicates no silence was detected when dialing a system not providing a dial tone. Enabled by the @ dial modifier.

10 - CONNECT 2400
This result code indicates a connection has been established at 2400 bps between the modem and the DTE. If the modem is not operating in error-control mode, this is the same as the line speed. This result code is disabled by X0. Only CONNECT is reported.

11 - CONNECT 4800
This result code indicates a connection has been established at 4800 bps between the modem and the DTE. This result code is disabled by X0.

12 - CONNECT 9600
This result code indicates a connection has been established at 9600 bps between the modem and the DTE. This result code is disabled by X0.

14 - CONNECT 19200
This result code indicates a connection has been established at 19200 bps between the modem and the DTE. This result code is disabled by X0.

22 - CONNECT 1200/75
This result code indicates a connection has been established at 1200 bps when transmitting data and 75 bps when receiving data between the modem and the DTE.

23 - CONNECT 75/1200
This result code indicates a connection has been established at 75 bps when transmitting data and 1200 bps when receiving data between the modem and the DTE.

28 - CONNECT 38400
This result code indicates a connection has been established at 38400 bps

between the modem and the DTE. This result code is disabled by X0.

+++

1.2.2 Negotiation Progress Messages

V-series system products report special result codes during error-control negotiation. Whether or not these messages are displayed is selected with the W command (not to be confused with the W dial modifier). The factory setting is messages disabled (W0) to avoid conflict with software programs that do not support this additional level of call progress monitoring.

40 - CARRIER 300
This message indicates that a carrier signal has been detected at 300 bps (modem-to-modem line speed).

44 - CARRIER 1200/75
This message indicates that a carrier signal has been detected at 1200 bps when transmitting and at 75 when receiving (modem-to-modem line speed).

45 - CARRIER 75/1200
This message indicates that a carrier signal has been detected at 75 bps when transmitting and at 1200 bps when receiving (modem-to-modem line speed).

46 - CARRIER 1200
This message indicates that a carrier signal has been detected at 1200 bps (modem-to-modem line speed).

47 - CARRIER 2400
This message indicates that a carrier signal has been detected at 2400 bps (modem-to-modem line speed).

48 - CARRIER 4800
This message indicates that a carrier signal has been detected at 4800 bps (modem-to-modem line speed).

50 - CARRIER 9600
This message indicates that a carrier signal has been detected at 9600 bps (modem-to-modem line speed).

66 - COMPRESSION: CLASS 5
This message indicates that data compression using MNP Class 5 has been negotiated for the connection.

67 - COMPRESSION: V.42BIS
This message indicates that data compression using CCITT V.42bis has been negotiated for the connection.

68 - COMPRESSION: ADC
This message indicates that data compression using Hayes Adaptive Data Compression has been negotiated for the connection.

69 - COMPRESSION: NONE
This message indicates that data compression was not negotiated for the connection.

70 - PROTOCOL: NONE
This message indicates that no protocol was negotiated for the connection. A standard asynchronous connection was made.

```
71 - PROTOCOL: ERROR-CONTROL/LAP-B
This message indicates that an error-control connection was negotiated with
LAPB protocol. This protocol is the one used by the first V-series System
Products.

72 - PROTOCOL: ERROR-CONTROL/ LAP-B/HDX
This message indicates that a half-duplex error-control connection was
negotiated with LAPB protocol. This protocol is the one used by the first V-
series System Products communicating at 9600 bps.

73 - PROTOCOL: ERROR-CONTROL/LAP-B/AFT
This message indicates that an error-control connection was negotiated using
the Hayes Asynchronous Framing Technique. This protocol is used for
connections between modems such as Smartmodem 1200 that do not communicate
synchronously across the telephone line. AFT enables an error-control protocol
to be used.

74 - PROTOCOL: X.25/LAP-B
This message indicates that an error-control connection using the X.25
protocol was established with a carrier speed of 1200, 2400, 4800, or 9600
bps.

75 - PROTOCOL: X.25/LAP-B/HDX
This message indicates that a half-duplex error-control connection using the
X.25 protocol was established with a carrier speed of 4800 or 9600 bps.

76 - PROTOCOL: X.25/LAP-B/AFT
This message indicates that an asynchronous error-control connection using the
X.25 protocol was established with a carrier speed of 1200 bps. The Hayes
Asynchronous Framing Technique was used.

77 - PROTOCOL: LAP-M
This message indicates that an error-control connection using the V.42 LAPM
protocol was established with a carrier speed of 1200, 2400, 4800, or 9600
bps.

78 - PROTOCOL: LAP-M/HDX V.42
This message indicates that a half-duplex error-control connection using the
V.42 LAPM protocol was established with a carrier speed of 4800 or 9600 bps.

79 - PROTOCOL: LAP-M/AFT
This message indicates that an asynchronous error-control connection using the
V.42 LAPM protocol was established with a carrier speed of 1200 bps. The Hayes
Asynchronous Framing Technique was used.

80 - PROTOCOL: ALT
This message indicates that an error-control connection using the V.42 LAPM
alternative protocol was established with a carrier speed of 1200, 2400, 4800,
or 9600 bps. This protocol is MNP Classes 2, 3, and 4 compatible.

91 - AUTOSTREAM: LEVEL 1
This message indicates that Hayes AutoStream Level 1 has been negotiated for
the connection. This technique provides for multiplexing of multiple virtual
channels.

92 - AUTOSTREAM: LEVEL 2
```

This message indicates that Hayes AutoStream Level 2 has been negotiated for the connection. This technique provides for multiplexing of multiple virtual channels, with transparent control of one PAD (non-simultaneous).

93 - AUTOSTREAM: LEVEL 3
This message indicates that Hayes AutoStream Level 3 has been negotiated for the connection. This technique provides for multiplexing of multiple virtual channels, with transparent control of all PADs (simultaneous).

Negotiation progress messages are reported in the following order:

```
CARRIER
PROTOCOL
AUTOSTREAM
COMPRESSION
CONNECT
```

If AutoStream is not used, no message is reported.

++
1.2.3 Information Text (INFO-TEXT)
Some commands, such as &V and Sr? return information text as opposed to numeric or verbose codes. The alpha characters are headings and commands and the numbers are command options, ASCII values, counter values, etc. The example below illustrates a modem response to a command with information text.

```
ACTIVE PROFILE:
B0 B41 B60 E1 L2 M1 N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5
&R0 &S0 &T4 &U0 &X0 &Y0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030 S08:002
S09:006
S10:014 S11:070 S12:050 S18:000 S25:005 S26:001 S36:005 S37:000 S38:020
S44:003
S46:002 S48:007 S49:008 S50:016 S95:000
```

Information Text is always a combination of alpha and numeric. The V command has no effect on the format of this command response.

****
1.3 S-Register Listing
The following definitions include all S-Registers defined for the various families of Hayes modems. Some factory settings and ranges are included here because they are almost universally implemented with these values; however, be sure to consult the AT Command Set Reference Card that came with your modem for the S-Registers and their ranges/factory settings that your modem supports. Note that register numbers not included in this listing are those for which no function has been assigned.

S0 - Ring to Answer
After S0 sets the ring number on which the modem automatically answers a call when auto-answer mode is selected. S0=0, the factory setting, disables auto-answer.

S1 - Ring Count
When the modem is in the command state and set for auto-answer (Register S0>0), the modem automatically tracks the number of times the phone rings,

incrementing and writing the value in S1. The value reverts to 0 if no ring occurs for 8 seconds. Once a connection is made, the modem resets the value of this register to 0. Note that two short ring bursts within a ring cycle are counted as two rings.

S2 - Escape Sequence Character
This register holds the ASCII value of the escape sequence character. The factory-set value is ASCII 43, the plus sign (+). The value for this register can be set to any ASCII value between 0 and 127. Setting S2 to a value greater than 127 disables the escape sequence, preventing the modem from returning to the command state and disabling command recognition.

S3 - Carriage Return Character
This register holds the ASCII value of the line terminating character. The factory-set value is ASCII 13 - carriage return (<CR>) - the range for the register is 0-127. This character is used both as the command line terminator and the result code terminator.

S4 - Line Feed Character
This register holds the ASCII value of the line feed character. The factory setting is 10; the range is 0-127.

S5 - Backspace Character
This register holds the ASCII value of the backspace character. The factory-set value is ASCII 08; the range for the register is 0-32, 127. This character moves the cursor left, removing the previous character. As this value actually represents the combined operation of three characters (a backspace, a space, and another backspace), the time allotted to process the backspace character must not be any less than the time required by the modem to transmit three characters. For this reason, a repeat-key function may not operate properly on backspaces.

S6 - Wait Before Blind Dialing
This register determines how long the modem waits after going off-hook before it dials. This delay allows time for the central telephone office to detect the off-hook condition of the line and apply dial tone. This wait time only applies to the first dial tone. S6 is used only if X0, X1, or X3 is selected. Selecting X3 or X4 enables dial tone (call progress) detection and disables blind dialing, thus making the setting of S6 irrelevant. The value of this register can be set for any number from 4 through 7 seconds. This feature allows you to increase the time delay if you have difficulty obtaining dial tone within 4 seconds.

Note: The Wait Before Blind Dialing call progress monitoring feature (W dial modifier) applies only to detection of a second dial tone and is independent of any S-Register settings.

S7 - Wait for Carrier after Dialing
This register determines the modem’s time delay between dialing and responding to an incoming carrier signal after initial connection. If the modem does not detect a carrier within this time, the modem hangs up and returns the NO CARRIER result code. If the modem detects a carrier within the specified time, it goes on line.

S8 - Duration of Delay for Comma Dial Modifier
This register determines the duration of the delay generated by the comma (,) dial modifier.

S9 - Carrier Detect Response Time
This register determines how many seconds a carrier signal must be present for the modem to recognize it and issue a carrier detect. The value for the register is measured in tenths of a second. The factory setting is 6 (0.6 second); the range is 1 (0.1 second) to 255 (25.5 seconds).

Note: The S9 value affects the time required to recognize the presence of carrier only if X3 or X4 is selected. The modem also ignores the value in register S9 when operating in half-duplex synchronous or asynchronous mode.

S10 - Delay Between Lost Carrier and Hang Up
This register specifies the time between loss of remote carrier and local modem disconnect. The delay permits the carrier to disappear momentarily without causing the modem to hang up. The value for the register is measured in tenths of a second. The range for most modems is 1 (0.1 second) to 255 (25.5 seconds).

The modem recognizes a carrier after the period of time specified in S9. Therefore, if the value of S10 is less than that set for S9, even a momentary loss of carrier will cause the modem to disconnect. Setting the register to 255 causes the modem to ignore actual carrier status and assume a carrier is always present. When operating in half-duplex synchronous mode, the modem ignores the value of this register.

S11 - Multi-Frequency Tone Duration
This register determines the duration and spacing of tones in multi-frequency tone dialing. The value in this register has no effect on the speed of pulse dialing.

S12 - Escape Sequence Guard Time
This register holds the value of the delay required prior to and following the escape sequence. The guard time also dictates how quickly the escape sequence characters must be entered, since the interval between entry of each of the three characters must be of shorter duration than that specified for the guard time. If guard time is set to 0, timing is not a factor.

S18 - Modem Test Timer
This register establishes the duration of the modem’s diagnostic tests. When a test is active for a length of time equal to the value chosen for this register, the modem automatically terminates the test. A setting of zero (0) disables the test timer (factory setting). The range for this register is 0-255 seconds.

S25 - DTR Detection
This register serves two purposes. When the modem is operating in synchronous mode 4, the value assigned to S25 specifies the length of time the modem waits after a connection has been made, before examining the DTR circuit. This allows the modem to ignore an on-to-off transition of DTR and gives the user sufficient time to disconnect the modem from the asynchronous terminal and attach it to a synchronous terminal, without forcing the modem back to the asynchronous command state. During this time, the value of S25 is read in full seconds (e.g., the factory- set value of 5 equals 5 seconds, instead of 0.05 seconds).

In all other modes, and after call establishment in synchronous mode 4, the value is read in 1/100 seconds. In any mode, a change in DTR (on or off) that persists for a period shorter than the value held in S25 is ignored by the modem while it is on-line. The range of values for S25 is 0-255.

S26 - RTS to CTS Interval
This register is used to specify the interval to delay before turning on CTS after an off-to-on transition of RTS. This value takes effect when the &R0 command option has been selected. This setting applies to synchronous modes 1, 2, and 3 only. The factory-set value is 1 (.01 seconds) with a range of 0-255.

S30 - Inactivity Timeout
This register monitors the line to prevent unnecessary connection time. If no data transfer is detected (while the modem is in the on-line state) for a duration specified by this register, the modem hangs up and returns to the idle state. When the value of S30 is set to 0, the timer is disabled. The factory setting is 0 seconds; the range is 0-255 units of 10 seconds. Note that S30 is only effective in &Q0 or &Q6 modes; it is not enabled in any synchronous modes.

S33 - AFT Options
Register S33 applies only to communications using a V-series Modem Enhancer(TM) with a Smartmodem 1200 which has an asynchronous DTE link.

This register selects the options to be used with Hayes Asynchronous Framing Technique (See the description of S44. AFT offers options to prevent certain characters (like XON and XOFF) from being sent. Normally AFT uses all 256 ASCII character codes; that is, it uses characters with 8 data bits. If intervening equipment is limited to 7-bit operation, the Eight-Bit Data Transparency option (S33=4) can be enabled.

With this option, AFT limits itself to using characters with 7 data bits. This pertains only to the communication link between the two modems, not the format of the data. The data itself is unaffected by enabling any AFT transparency options.

0	No transparency options required (factory setting)
1	Flow Control Transparency. AFT transparentizes the XON and XOFF control characters sent from the DTE to the modem. The XON and XOFF characters themselves are not sent over the communication link; characters that substitute for these functions are transmitted, instead
2	Select Control Character Transparency
4	Select Eight-Bit Data Transparency
5	Select both Flow Control Transparency and Eight-Bit Data Transparency
6	Select both Control Character Transparency and Eight-Bit Data Transparency

If feature negotiation is active, the transparency option selected by one modem is used by both modems.

S36 - Negotiation Failure Treatment
When an attempt to make an error-control connection fails, the modem reads this register to determine whether to terminate the connection, make an asynchronous connection (otherwise selected with &Q0), or make an asynchronous connection with ASB (otherwise selected with &Q6). This register is referenced only when the error-control mode has been selected with the &Q5 command (factory setting) and this communication mode cannot be negotiated.

0	Hang up

1 Attempt a standard asynchronous connection (&Q0)
3 Attempt an asynchronous connection using automatic speed buffering (&Q6)
4 Attempt a V.42 Alternative Protocol connection (MNP compatible); if negotiation fails, hang up.
5 Attempt a V.42 Alternative Protocol connection (MNP compatible); if negotiation fails, attempt a standard asynchronous connection
7 Attempt a V.42 Alternative Protocol connection (MNP compatible); if negotiation fails, attempt an asynchronous connection using automatic speed buffering

In asynchronous mode, the CONNECT XXXX message will be returned with a successful connection. This message indicates the speed of the connection, which is also the speed of data transmitted from computer to modem.

Note: The selected fallback option can be initiated immediately with S48. For example, a connection attempt using the Alternative Protocol can be forced by setting S48=128 and S36=5 or 7.

S37 - Desired DCE Line Speed
The modem attempts to connect with a remote modem at the highest supported DCE speed that does not exceed the value specified by this register. If S37 is set to a speed higher than that supported by the modem, it will attempt to connect at its highest capability.

0 Attempt to connect at speed of last AT command issued
1 Attempt to connect at 75 bps
2 Attempt to connect at 110 bps
3 Attempt to connect at 300 bps
4 Reserved
5 Attempt to connect at 1200 bps
6 Attempt to connect at 2400 bps
7 Attempt to connect at 4800 bps
8 Reserved
9 Attempt to connect at 9600 bps

Note that this is the speed of modems across the telephone line, not the speed at which the modem communicates with the attached DTE.

S38 - Delay Before Forced Hang up
This register specifies the delay between the modem’s receipt of the command to hang up (or on-to-off transition of DTR if the modem is configured to follow the signal) and the disconnect operation. This register is useful for error-control communications to ensure that data in the modem buffers is sent before the connection is terminated. The factory setting is 20 (seconds). If this register is set between 0 and 254, the modem will wait that number of seconds for the remote modem to acknowledge receipt of all data in buffers before hanging up. If this timeout occurs before all data can be sent, the NO CARRIER (3) result code will be sent to indicate that data has been lost. If all data is transmitted prior to the timeout, the response to the H0 command will be OK.

If S38 is set to 255, the modem does not timeout, and continues to attempt to deliver data in buffers until the connection is lost, or the data is delivered.

S44 - Asynchronous Framing Technique Selection
S44 sets the use of the Hayes Asynchronous Framing Technique. Connections to a

packet switched network or between two error-control modems using either Error-Control/LAP-B or X.25 protocol are usually synchronous connections, even though the user interface is always asynchronous. Some environments may require asynchronous to synchronous conversion in the protocol because equipment is limited to asynchronous operation, or an asynchronous to synchronous conversion is already in place. For example, most Hayes 1200 bps modems support only asynchronous communication over the telephone line. When one of these modems is connected to a V-series Modem Enhancer, the interface between the two is always asynchronous. A feature provided by the V-series Modem Enhancer called the Asynchronous Framing Technique (AFT) makes this possible. When AFT is enabled, the output of the error-control protocol is asynchronous instead of synchronous.

Register S44 applies only to communications using a V-series Modem Enhancer with a Smartmodem 1200 that connects using an asynchronous link across the telephone line.

2 Use AFT. When AFT is selected, the data output is asynchronous instead of synchronous. AFT is required if the path your call takes passes through asynchronous-only equipment.

3 The modem to automatically selects whether or not to use AFT. V-series Modem Enhancer, when connected to a Smartmodem 1200, automatically uses AFT (factory setting).

If the modem is configured to use feature negotiation, and the other modem is using AFT, both modems automatically select AFT.

S46 - Error-Control Protocol Selection
This register specifies the error-control method used for subsequent connections. A V-series System Product supports at least one additional protocol. Because the factory setting will be a protocol for point-to-point communications, other connections, such as the X.25 protocol must be enabled by setting S46.

Feature negotiation enables two communicating modems to identify the common protocols, and choose one based on the user-configuration for the communication session. For example, if a V-series System Product is configured to use the X.25 protocol, but connects with a V-series System Product without X.25 capability, an error-control protocol is automatically selected because both modems support it. However, if a V-series System Product with X.25 connects with another V-series System Product with X.25, both can use X.25 protocol if configured to do so (S46=6).

When attempting a connection to a packet switched network, automatic feature negotiation is usually disabled because unless an X.25 connection can be made, further network connections cannot be made. To disable automatic feature negotiation and make an X.25 connection or hang up, set S46=134. The options for this register are described below:

0 Either LAPM or fallback to LAPB
1 LAPB only
2 LAPM or fallback to LAPB; use data compression#
3 LAPB with data compression#
6 X.25 or fallback to LAPB; use data compression#
136 LAPM only

138   LAPM with data compression#
134   X.25

      # The technique negotiated is determined by capabilities and configuration of both modems. V.42bis is attempted first, then Hayes Adaptive Data Compression. If neither method is supported by both modems, or if either modem has compression disabled, no compression will be used.

S48 - Enabling/Disabling Feature Negotiation
This register selects how feature negotiation is used when making connections with the remote system. The negotiation process can be tailored to suit a connection, or bypassed altogether. For example, when the capabilities of the remote modem are known, negotiation is unnecessary. The factory setting is 7, negotiation enabled. With feature negotiation disabled, the V-series System Product assumes that the remote modem is configured the same as itself, and proceeds to activate the error-control protocol specified by the S46 (protocol options) setting. Use 128 when calling a packet switched network that does not support feature negotiation.

0   Negotiation disabled; presume the remote modem is configured for and has the capabilities necessary for the connection selected with S46
3   Negotiation enabled, but originating modem remains silent during detection phase. For connections with MNP modems; however, this setting defeats the negotiation sequence with other V.42 modems
7   Negotiation enabled
128   Negotiation disabled; forces fallback options specified in S36 to be taken immediately

S49 - ASB buffer size lower limit
This register sets the lower limit of the modem's buffer when communicating in asynchronous mode with ASB. The range of this register is 1-249. The factory setting is 8 bytes.

S50 - ASB buffer size upper limit
This register sets the upper limit of the modem's buffer when communicating in asynchronous mode with ASB. The range of this register is 2-250 bytes. The factory setting is 16 bytes.

S53 - Global PAD Configuration
S53 defines a set of behavior switches that control the PAD and all four channels in the V-series System Product. This fixed user interface provides software and users with a consistent PAD command interface regardless of current PAD parameter settings. The fixed user interface is effective in all states except the on-line (data transfer) state.

For example, the factory-set value of PAD parameter 2 is zero, which turns off character echo. This is required for a transparent on-line state (e.g., for Smartmodem product emulation). However, since it may be difficult to enter PAD commands without seeing them echoed at your terminal, a method of controlling the PAD despite the parameter settings would be necessary.

The fixed user interface affects the following in all states, except the on-line state:

* Transmission of all PAD result codes, including the prompt PAD result code
* Echo control via the E command

* Fixed editing characters (delete character is defined by S5, delete line character is Control-X, line display character is Control-R)
* Echo mask masks only the editing characters

The fixed PAD control interface affects the following in all states:

* Disables PAD recall using a character (PAD parameter 1) or a break signal
* Disables all PAD flow control (PAD parameters 5, 12)
* Disables carriage return (PAD parameter 9) and line feed (PAD parameter 14) padding
* Disables line folding (PAD parameter 10)
* Existing result codes use result codes for terminal (PAD parameter 19)
* Disables page wait (PAD parameter 22)
* Disables execution of ANS and EXEC strings
* Disables EXEC command

If the value of S53 includes any bit value except 1, the PAD prompt character changes from * to -. The change in the prompt PAD character provides an indication that the PAD is not in CCITT mode. The register's values are provided below:

0 Normal CCITT-compatibility mode
1 Normal CCITT-compatibility mode. PAD prompt is an asterisk (*) and appears with the channel number (e.g., 1*).
2 Fixed user interface. PAD prompt is a hyphen (-)
3 Fixed user interface. PAD prompt is a hyphen and appears with the channel number (e.g., 1-) (factory setting)
4 Fixed control interface. PAD prompt is a hyphen
5 Fixed control interface. PAD prompt is a hyphen and appears with the channel number
6 Fixed user and fixed control interface. PAD prompt is a hyphen
7 Fixed user and fixed control interface. PAD prompt is a hyphen and appears with the channel number

S63 - Leased line carrier level
This register selects the carrier power level in dBm for leased line operation. This register specifies a nominal carrier level value. The range for this register is 0-15 (0 dBm to -15 dBm). The factory setting is 0. Note that for those modems supporting leased line operation, carrier level (if adjustable) may be set by other means. Please refer to the modem's Installation Guide for information.

S69 - Link Layer Window Size
This register sets the number of frames (packets) sent between acknowledgements from the remote system. Each frame is one packet and the window size is how many frames you can send before you must stop and wait for the remote end to send an acknowledgement that it received the frames and is ready to receive more frames. The range is 1-15 with a factory setting of 15. LAPM connections use a window size of 1-15; LAPB connections and X.25 connections use a window size of 1-8. If a LAPB or X.25 connection is made, any value greater than 8 is treated as 8.

Reducing window size can reduce performance. Reduce the window size only when so instructed by the network (this rarely occurs).

S70 - Maximum Number of Retransmissions
S70 limits the number of times the modem will retransmit a frame.

Retransmissions become necessary when data errors introduced by noise disrupt the reception of a frame. When the limit set by S70 is reached, the modem hangs up. Raising this limit may be necessary if, for example, telephone lines are extremely noisy. The retransmission delays may be undesirable, but the modem will not hang up. The range for this register is 0-255, with a factory setting of 10.

S71 - Link Layer Timeout
When the link layer sends a character, it starts a timer referenced in the formula below as "T1." If the remote end does not respond after T1 seconds, the link layer retransmits. The value of T1 is computed automatically based on the connection speed and maximum packet size.

T1 = 2 * (maximum packet size + 11) * (8 Í bits per second) + T2 + 500 msec

The S71 setting is represented by the "T2" in the formula. The setting affords some control over the final value of T1. You can increase T1 by increasing T2. You may want to do this if your communication environment has unusually long delays transmitting information from one end to the another (such as with satellite connections), or if the computer at the other end takes a long time to respond. The range for this register is 1-255 milliseconds, with a factory setting of 20..

S72 - Loss of Flag Idle Timeout
A transmitter not currently sending data to send is described as "idle." Normally, idle transmitters send a repeating pattern called "flag idle." Your modem always monitors the line to make sure the remote end of the communication link is either sending data or a flag idle. This ensures that the modem is operating. S72 determines how long the local modem waits before hanging up when it no longer is receiving data or a flag idle.

In some systems, periods of "mark idle" (periods where all ones are transmitted instead of the flag pattern) are normal. When using such a system, it may be necessary to increase the value in S72. If the register is set to 0, this monitoring function is disabled. The range for this register is 1-255 seconds; the factory setting is 30.

S73 - No Activity Timeout
If your modem is receiving good carrier and flag idle from the remote modem but does not receive any data for the time period specified by S73, it will send a query (called an "RR") to the remote modem to make sure the modem is operating properly.

The range for this register is 1-255 seconds; the factory setting for this register is 5. Decreasing this value causes the modem to test more frequently for malfunctions at the remote end. However, the modem will not hang up for approximately 2 * T1 * N2 seconds because it retransmits the RR query several times.

A Note on Registers S74, S75, S76, S77, S78, and S79
(Logical Channel Number Selectors)
Although V-series System Products supports four virtual channels, numbered 1 through 4, packet switched networks can support up to 4096 channels (numbered 0-4095). Each network has its own channel numbering system to support multiple users. For example, if there are 15 calls, each with four virtual connections, the packet switched network can support all 60 (4*15) virtual calls, but each has to have a different logical channel number.

Networks often set up their system so that all incoming calls are within one range and all outgoing calls are within another range. Logical Channel Numbers are automatically assigned by the V-series System Product, but the ranges need to be configurable in order to be compatible with different network requirements.

S74, S75 - Minimum Incoming Logical Channel Number (LCN)
S74 and S75 combine to specify the lowest incoming Logical Channel Number the packet layer will report or accept. The value used is formed by using S74 as the two high decimal digits and S75 as the two low decimal digits, or the value can be expressed by the formula S74*100+S75.

If the resulting value is outside the range (0-4095), the value is assigned to the appropriate corresponding limit (e.g., if a value of 4099 is used, it is assigned to the upper limit value of 4095).

```
S74=0    Factory setting from a range of 0-40
S75=1    Factory setting from a range of 0-99
```

S76, S77 - Maximum Incoming Logical Channel Number (LCN)
S76 and S77 combine to specify the highest incoming Logical Channel Number the packet layer will report or accept. The value used is formed by using S76 as the high two decimal digits and S77 as the two low decimal digits, or the value can be expressed by the formula S76*100+S77.

If the resulting value is outside the range (0-4095), the value is assigned to the appropriate corresponding limit (e.g., if a value of 4099 is used, it is assigned to the upper limit value of 4095).

```
S76=40    Factory setting from a range of 0-40
S77=95    Factory setting from a range of 0-99
```

S78, S79 - Outgoing Logical Channel Number (LCN)
The setting of registers S78 and S79 should be adjusted if the network requires a range of Logical Channel Numbers outside those specified with the combination of these two registers.

S78 and S79 combine to determine the outgoing Logical Channel Number the packet layer will use to place a call. The value is derived using S78 as the two high decimal digits and S79 as the low two decimal digits, or the value can be expressed by the formula S78 * 100 + S79. If the resulting value is outside the range (4-4095), the value is then assigned to the appropriate limit. The highest Logical Channel Number would be that derived from the above formula, and the lowest would be the value minus the maximum number of channels supported plus one. The user has the ability to override this factory setting and explicitly specify an LCN using the PAD selection command (CALL).

```
S78=0    Factory setting from a range of 0-40
S79=16   Factory setting from a range of 0-99
```

A Note on Registers S80 and S81 (Packet Layer Parameters)
The values in these two registers combine to set time and duration for packet layer restart requests.

S80 - Packet Layer N20 Parameter
This register sets the maximum number of times a restart request can be

retransmitted. The factory setting is 1 (S80=1) from a range of 0-255. Setting this register may be necessary if the network requires a restart attempt to abandon a connection earlier than planned.

S81 - Packet Layer T20 Parameter
This register sets the maximum amount of time the transmitter will wait for acknowledgment of a restart request frame before initiating a recovery procedure, in 10-second increments. The factory setting is 18 from a range of 0-255. Setting this register may be necessary if the network requires a restart attempt to abandon a connection earlier than planned.

S82 - Break Signaling Technique
This register selects a method of break signal handling for V.42 communications: in sequence, expedited, and destructive. Break signals provide a way for you to get the attention of the remote host. The break type used depends on your application.

3	Expedited signaling regardless of its sequence in data sent and received; data integrity maintained
7	Destructive signaling regardless of its sequence in data sent and received; data in process at time is destroyed
128	In sequence signaling as data is sent and received; data integrity maintained ahead of and after break

S84 - Adaptive start up negotiation (ASU)
This register selects the adaptive start up method to be negotiated for subsequent connections.

0	Do not negotiate ASU connection
128	Negotiate ASU with fixed start up
129	Negotiate ASU with fast start up on both sides
130	Negotiate ASU with smooth start up on both sides
131	Negotiate ASU with configuring modem using fast start up and the other modem using smooth start up
132	Negotiate ASU with configuring modem using smooth start up and the other modem using fast start up

S85 - ASU Negotiation Report
This register indicates whether adaptive start up and method were negotiated for the current connection. To read this register, issue the escape sequence to place the modem in the command state, then issue ATS85? <CR>. The modem will report one of the values below.

0	ASU not negotiated; fixed start up in use
128	ASU negotiated with fixed start up
129	ASU negotiated with fast start up on both sides
130	ASU negotiated with smooth start up on both sides
131	ASU negotiated with reporting modem using fast start up and the other modem using smooth start up
132	ASU negotiated with reporting modem using smooth start up and the other modem using fast start up

S86 - Connection Failure Cause
This register can help you determine the cause of a connection failure. When the modem issues a NO CARRIER result code, a value is written to this register. To read this register, following the connection failure, issue ATS86? <CR>. The modem will report one of the values below.

0 Normal hang up; no error occurred
4 Physical carrier loss
5 Feature negotiation failed to detect presence of another error-control modem at the other end
6 Other error-control modem did not respond to feature negotiation message sent by this modem
7 Other modem is synchronous-only; this modem is asynchronous-only
8 Modems could not find a common framing technique
9 Modems could not find a protocol in common
10 Feature negotiation message sent by other modem incorrect
11 Synchronous information (data or flags) not received from other modem. Modem waited 30 seconds before hanging up
12 Normal disconnect initiated by other modem
13 Other modem did not respond after many transmissions of the same message. Modem made 10 attempts then hung up
14 Protocol violation occurred
15 Compression failure

Note: Multiple occurrences may contribute to a NO CARRIER message; S86 records the first event that occurred.

S92 - MI/MIC Options
This register enables (chooses method) or disables the mode indicate/mode indicate common interface. The settings available for this register support various combinations of edge and level detection in either originate or answer mode with ring indicator (RI) pulse enabled or disabled. For particulars as to how the jack setting specified with the &J command interacts with this register, see the modem’s Installation Guide.

0 MI/MIC disabled
1 level triggered, originate mode, RI pulse enabled
3 edge triggered, originate mode, RI pulse enabled
5 level triggered, answer mode, RI pulse enabled
7 edge triggered, answer mode, RI pulse enabled
9 level triggered, originate mode, RI pulse disabled
11 edge triggered, originate mode, RI pulse disabled
13 level triggered, answer mode, RI pulse disabled
15 edge triggered, answer mode, RI pulse disabled

Note that this feature is not available to all modems. Refer to the feature list in the modem’s Installation Guide.

S93 - V.25bis DTE interface speed
This register selects the speed used when the modem is configured for V.25bis mode. When autobauding in any mode other than V.25bis, the modem uses the value held in S37.

3 300 bps
5 1200 bps
6 2400 bps
7 4800 bps
9 9600 bps

Note that the V.25bis feature is not available to all modems. Refer to the feature list in the modem’s Installation Guide.

S94 - Command Mode Selector
This register provides an alternative to setting internal DIP switches when choosing between the AT command mode (factory setting) and the various CCITT V.25bis command modes supported by the modem. To use this register, DIP switches 3 and 4 must both be in the UP position (factory setting).

0	Standard AT command operation (factory setting)
1	Asynchronous V.25bis using addressed access
2	Synchronous V.25bis (HDLC framing) using addressed access
3	Synchronous V.25bis (Character framing) using addressed access
5	Asynchronous V.25bis using direct access
6	Synchronous V.25bis (HDLC framing) using direct access
7	Synchronous V.25bis (Character framing) using direct access
9	Asynchronous V.25bis using addressed access with EBCDIC character set option
10	Synchronous V.25bis (HDLC framing) using addressed access with EBCDIC character set option
11	Synchronous V.25bis (Character framing) using addressed access with EBCDIC character set option
13	Asynchronous V.25bis using direct access with EBCDIC character set option
14	Synchronous V.25bis (HDLC framing) using direct access with EBCDIC character set option
15	Synchronous V.25bis (Character framing) using direct access with EBCDIC character set option

S95 - Negotiation Message Options
This register enables various result codes that indicate the sequence of events in the establishment of an error-control connection. This register does not affect the way in which the modem negotiates the connection; it merely enables message options. The factory setting for this register is value 0, no bits selected. To enable any combination of the bits, add the value(s) to the right of the bit number and set the register to this sum.

Note: The bit values of S95 may be set to override some of the characteristics of the Wn command. Setting any of the S95 bits to "1" enables the corresponding result codes regardless of the Wn command in effect. Changing the Wn command setting does not affect the value set for this register.

Bit	Value	Explanation
0	1	Verbose CONNECT result code indicates the DCE speed (rather than DTE speed). Numeric result codes are also differennt when CONNECT reports DCE speed.
1	2	Append "/ARQ" to CONNECT result code when an error-control connection is made
2	4	Add CARRIER messages
3	8	Add PROTOCOL messages
4	16	Add AUTOSTREAM messages
5	32	Add COMPRESSION messages

For example, if you want to add the compression result code (with W1 selected), you would select bit 5 (value of 32). The command line ATS95=32 <CR> will then enable the COMPRESSION negotiation messages.

Refer to the Wn and Xn commands for additional and related information.

```
***************************************************************************
1.4 Additional Command Set Definitions
The following items are critical parts of the AT Command Set, although they
are not "commands." The AT prefix, the escape sequence, end-of-line character,
and repeat last command function round out the elements of the command set.

AT - Command Prefix
Modem commands begin with an AT prefix that gets the modem's attention. The
speed and character format at which the DTE sends this prefix tells the modem
the speed and format for responding to commands, and at which speed to attempt
the connection. See the Installation Guide for the speeds, formats, and
transmission methods supported by your modem.

+++ - Escape Sequence
The escape sequence is used to take the modem from the on-line state ( or "on-
line" command state) to the  command state without breaking the connection.
This provides a means of changing a setting then going back on-line.

Not actually a command, the escape sequence tells the modem to "escape" or
leave the on-line state and enter the command state. The sequence consists of
a single character issued three times in succession. A one-second "guard time"
interval prevents the modem from mistaking a random occurrence of the same
three characters as the escape sequence. The character used in the sequence
and the duration of the guard time can be changed by writing values to S2 and
S12, respectively.

The escape sequence is issued by typing the plus key three times (+++) in
succession. A pause of at least a second should precede and follow the three
characters. The modem will return the OK result code as an indication it is
ready to accept commands.

<CR> - End-of-line Character
This key terminates the command line. The key enabling this function is
determined by the value stored in S3. The factory setting is ASCII 13, the
carriage return character. When the end-of-line character is entered, the
modem executes the commands that follow the AT prefix. In this reference, this
key is referred to as <CR>. For example, the command line ATV0 <CR> gets the
modem's attention, then instructs the modem to display its responses to
commands (result codes) as numbers.

A/ - Repeat Last Command
A/ re-issues the command string most recently placed in the command buffer.
This keystroke combination can be used to re-issue the command string last
entered. For example, the A/ (if permitted by your local telephone system) is
useful as a re-dial function.


===========================================================================

Chapter Two:
V-series X.25 Communications

This chapter includes information about the use of X.25 communications with V-
series System Products. The command and parameter descriptions are more
detailed than those offered in the V-series System Product User's Reference.
Also included are four recommended PAD profiles that can be recalled from
memory to use with the modem's PAD.
```

The factory settings and available options/ranges for these commands and parameters are provided here because they are the same for all V-series System Products that support the X.25 feature.

****
2.1 Modem Configuration for X.25 Communications
X.25 connections begin the same as point-to-point connections - with a modem call to a remote system. Your modem is configured from the factory to automatically negotiate the best point-to-point error-control connection, if the purpose of the call is to establish a link with an X.25 network, the modem must be re-configured with several S-Registers.

++
2.1.1 Controlling Automatic Feature Negotiation
The S-Registers controlling connection type selection are described in the sections that follow. An overview of the the options that can be set with S-Registers is provided in the chart below.

Communication Environment	&Q	S36	S44	S46	S48
X.25 enabled (Use X.25 if remote system has X.25; otherwise, use LAP-B point-to-point connection)	5	0	3	6	3
X.25 only (Point-to-point connection)	5	0	3	134	3
X.25 network without feature negotiation:	5	0	3	6	0
X.25 network with feature negotiation	5	0	3	6	3
X.25 network with feature negotiation and AFT	5	0	2	6	3

The suggested configuration for establishing a synchronous X.25 connection with a packet switched network or a remote V-series System Product that supports X.25, can be selected with AT&Q5 S44=3 S46=6 S48=0 <CR>. Refer to the S-Register Listing in Chapter One for a description of the registers that can be used to configure the modem.

++
2.1.2 PAD Channel Selection
The &O command is used to move from the AT command state to the PAD command state in order to issue PAD commands. The optional channel number identifies the desired virtual channel number. If the virtual channel number is zero (&O0), or not specified (&O), the last channel number accessed is used. Each time &O is issued, it resets the current PAD before it enters the PAD command state (provided a virtual connection is established).

Once the PAD command state is entered, the CHAN command can be used to switch among the PAD command states of the four virtual channels.

If an X.25 connection has already been established and you have escaped to the AT command state, the PROTOCOL and CONNECT result codes are transmitted to your terminal. The ERROR result code is transmitted if the modem is on-line but not in X.25 mode (e.g., modem is in Error-Control/LAP-B mode).

Example of &O command use:

String Result Code/Explanation

AT&O1 <CR>   OK (PAD channel 1 selected)

AT&O9 <CR>   ERROR (value entered is out of selectable range)

See the description of the &O command in the AT Command Listing in Chapter One.

****
2.2 PAD Configuration
Like your modem, the PAD can be configured according to the communications requirements of the remote systems you call.

Although a small number of S-Registers control some PAD options (packet and window sizes, for example), the PAD is primarily configured with separate memory locations. A set of PAD parameters can be configured for each channel. The set consists of standard X.25 PAD parameters and National parameters.

Although the PAD's factory-set configuration will be suitable for many applications, sets of predefined PAD parameter settings can be defined as profiles to be recalled for use with later.

++
2.2.1 PAD Commands
Each PAD command consists of characters and occasionally symbols that specify the command's action. Like the AT command line, you can place as many as 255 characters on a single line.

The only exception to this format is the EXEC command. This command for storing and executing a series of instructions to configure the PAD uses a plus sign (+) to tie commands together in the command string. When these commands are executed, the plus signs are treated as carriage returns. For more on storing a PAD configuration with the EXEC command, see "PAD Profiles."

Issuing PAD commands
PAD commands are typed at the PAD prompt, then entered with <CR>. This action and most other conventions for editing a line and entering commands are the same as those use when issuing AT commands.

PAD command format
Each PAD command consists of characters and occasionally symbols that specify what the command will do. A PAD command is typed on the command line, then entered using the carriage return key (factory setting for S3).

When you type in a command, the PAD ignores spaces, delete characters, control characters, and upper/lower case. For example, the commands RESET, RE SET, and reset are all interpreted as the same command. The backspace key can be used to correct any mistakes made while entering a command. In this addendum, the following symbols are used when describing PAD commands.

Symbol	Meaning
[ ]	Indicates optional parameters, parameters which can be entered with the PAD command
< >	Indicates a named parameter, such as a user ID requested by the network
...	Indicates a repeated item within brackets, for example the command

PAR? [<parameter>][,<parameter>...]

These symbols represent the kinds of information that can accompany a PAD command. Do not type these symbols when entering a PAD command.

Any characters that appear with a PAD command, other than the symbols mentioned above, are interpreted literally. For example, the command: ACC [R] [<facility> -] is interpreted:

Symbol	Meaning
ACC	Issue the Accept command which indicates that you want to accept a call
[R]	Include an optional parameter (R) instructing network that you will accept charges for the call if requested
[<facility> -]	Include an optional facility parameter, such as your user ID, or some other information required by the network. Several facilities can be strung together, separating each by a comma and ending the string with a hyphen (-)

PAD commands are of two types: those used for call related activities, such as placing a call, answering a call, initializing and changing channels, etc., and those used to configure the PAD. These commands can be used in the following ways:

* place and answer calls (CALL, ACC)
* move between channels (CHAN, EXIT)
* create, save, and execute a PAD command string (EXEC)
* clear and initialize channels (CLR, INT)
* display the current status of a call (STAT)
* display one of several available PAD configuration profiles (PROF)
* display the current settings of the PAD’s parameters (PAR?)
* display the current settings of the remote system’s PAD parameters (RPAR?)
* set and read the value of specific PAD parameters (SET, SET?)
* set and read the value of specific PAD parameters of the remote system (RSET, RSET?)

The commands supported by the PAD are listed in the following sections. Each command is defined with sample formats, allowable parameters, and possible result codes for the command.

ACC - Accept Call Command
When you have established a connection to the network node and a remote system on the network wants to call you, a PAD result code is sent to your computer announcing the incoming call. Enter the ACC command to accept the call and establish a virtual connection.

To configure the PAD to automatically answer incoming calls, use the EXEC command described following this command.

Example Format
ACC [R] [<facility>]

Parameter	Description
[R]	Instructs the network that you will accept charges for the call if requested to do so

<facility> Represents optional call facilities may be entered

Result Codes:	Description
CON	ACC received
ERR	Invalid command format; or command not entered in response to an incoming call; or virtual connection not established

CALL - Call Command
The CALL command is the PAD command you use to make a virtual connection to a remote system. Once the PAD is configured, this is the primary command you will use.

Once a physical connection to the X.25 network has been established, a virtual connection to the remote system is made with the CALL command. If the call is accepted by the remote system, the PAD enters the data transfer state. If the call is not accepted, a "call cleared" response is sent and the PAD remains in the PAD command state.

Example Formats

```
CALL
[CALL] [<facility>] [<called> [,[<calling>] [,<lcn>] ] ]
[CALL] <facility> D <user_data>
[CALL] <called> D <user_data>
[CALL] <facility> <called> [,[<calling>] [,<lcn>] ] D <user_data>
```

Parameter	Description
<facility>	One or more call parameter facilities that can be strung together on a command line and separated by commas; the last facility is followed by a hyphen (-)
<called>	Represents remote system’s address containing up to 15 digits (0-9)
<calling>	Represents source address containing up to 15 digits (0-9)
<lcn>	X.25 logical channel number (1-4095)
<user_data>	Character string containing up to 12 ASCII characters

Result Codes	Description
ERR	Call cannot be placed due to call in progress; or virtual connection not established
CLR	Remote PAD cleared virtual connection; may be followed by a string of diagnostic characters
CON	Call connected; may be followed by a string of diagnostic characters

Call Facilities
In the above CALL command formats, notice the <facility> field. This field is provided to specify "call facilities." A call facility is an optional parameter that can be specified to meet a network’s requirements, such as entering a network user ID (NUI), or indicating that charges are to be reversed (R).

When subscribing to a packet switched network, you are informed of the required or permitted call facilities. In order to respond to your CALL command, different networks may require specific call facilities.

Any of the following call facilities with the CALL command. When two or more facilities are entered on a line, they are separated by commas. A hyphen (-) terminates the string. For example: CALL R,N, -

The table below provides a description of the available call facilities.

Call Facility	Description
R	Instructs network that you will accept charges for the call if requested to do so
N <NUI>	Provides network with network user ID, identifying the caller to the network
T <RPOA>	Specifies which networks the data packets take to their destination. Any number of addresses may be specified; each address is four digits (0-9). RPOA stands for "Recognized Private Operating Agencies"
P <num>	Requested maximum packet size according to the following packet size-to-bytes conversions: P4=16, P5=32, P6=64, P7=128, P8=256, P9=512. If P is not specified, the default value (128) of National Parameter 100 is used
W <num>	Requested maximum window size (2-7). If W is not specified, the default value (2) of National parameter 101 is used
X <hex>	Hexadecimal data (0-9, A-F). Caution: Putting data directly into the facilities field of the call packet, specifies facility codes not directly supported by the modem

CHAN - Channel Selection Command
Use the CHAN command to switch from one virtual channel to another. The modem remains in the PAD command state.

Example Format
CHAN <channel>

Parameter	Description
<channel>	Specifies which virtual channel to switch to, indicated by an ASCII digit (1-4)

Result Codes:	Description
ERR	Invalid <channel> specified

CLR - Clear Channel Command
After a virtual connection has been established, the CLR command can be used to clear (disconnect) a call on a virtual channel and place that channel in the PAD command state.

Example Format
CLR [X <extended_codes> -] [<diagnostic_code>]

Parameters	Description
<extended_codes>	Hexadecimal data (0-9, A-F) supporting facilities not supported by the V-series X.25 product
<diagnostic_code>	String of up to three digits from a range of 1-255, indicating the error that has occurred

Result Codes Description

```
-----------------------------------------------------------------------------
ERR           Virtual connection not established on this channel; or invalid
              parameter entered
```

EXEC - Execute String Command
The EXEC command is used to define and save a PAD command and then automatically execute it when a physical connection to a network node is established. EXEC is commonly used to define the CALL command. Another common use of EXEC is to automatically answer an incoming call.

The string stored in each virtual channel as the factory setting is ANS+ACC, which instructs the PAD to answer and accept incoming calls to the channel. To display the string currently stored, you can issue EXEC? <CR>.

Sample EXEC sequence:
To use the EXEC command, from the PAD command state type EXEC <CR>. The PAD will display the prompt: EXEC>. After the prompt, enter the PAD command you wish to save. For example:

EXEC> CALL R- 3110 20200202 <CR>

This stores a CALL command for connecting to a packet switched network. As soon as the modem establishes a physical connection to the network node, the EXEC string is processed, placing the call.

In the EXEC string that you define, plus signs can be used to separate multiple commands. When the EXEC string is executed, the plus signs are treated like carriage returns. For example, the following EXEC string defines how the PAD will respond to an incoming call from remote system:

EXEC> ANS+PROF VSM+SET 0:0,74:1+ACC <CR>

In this EXEC string, the PAD is instructed to:

```
ANS         Respond to an incoming call request
PROF VSM    Load the V-series emulation PAD profile
SET 0:0     Set the National marker in order to change a National parameter
74:1        Change National parameter 74 to 1
ACC         Accept the call
```

In another example:

EXEC>ANS+ACC+Welcome to Hayes/M/JX.25//dial-up!/M/J <CR>

the PAD is instructed to:

```
ANS    Respond to an incoming call request.
ACC    Accept the call.
```

Welcome to Hayes/M/JX.25//dial-up!/M/J is sent to the remote system.

"/M" means "control M," a carriage return;
"/J" means "control J," a line feed.

This message is received by the remote system as:

Welcome to Hayes

X.25/dial-up!

To display the current EXEC string (if any) stored in memory, type EXEC? <CR>.

EXIT - Exit PAD Command
Use the EXIT command to leave the PAD command state and enter the modem's AT command state. For example, if you are in the PAD command state (of any virtual channel) and you want to hang up the phone, first type:

EXIT <CR> the OK result code is sent from the modem to the attached computer

then type:

ATH0 <CR> This AT command hangs up the modem, breaking the physical connection to network; the OK result code is returned if the modem hangs up before the network; if the network hangs up first, the NO CARRIER result code is returned). Hanging up clears all virtual connections still engaged.

INT - Interrupt Command
During a virtual connection, the INT command can be issued to send an interrupt, placing the PAD in the on-line state. Networks respond to interrupts differently, however. This command can result in lost data. It should not be used unless its use has been cleared through the network.

Example Format
INT

Result Codes:	Description
<CR/LF>	The remote host has acknowledged the interrupt
ERR	Virtual connection not established on this channel

PAR? - Read Parameter Command
The PAR? command displays the current settings of the local PAD. Settings for selected PAD parameters can be requested or if the command is issued with no parameters, the settings for all twenty-two PAD parameters are requested.

Note: To display the settings for the National PAD parameters, enter a zero (0) after the command (PAR?0).

Example Format
PAR? [<parameter>] [,<parameter>...]

Parameter	Description
<parameter>	Number of specific PAD parameter setting to display. If no PAD parameters are specified, the settings for all 22 PAD parameters are displayed. Enter a zero (0) to display the settings for all of the National PAD parameters.

Result Codes	Description
ERR	Invalid command format
<parameter>:INV	Invalid parameter entered. For example, if PAR?40 were typed, PAR 40:INV would be displayed since 40 is out of the range 1-22

For example, issuing PAR? 1,4,0,70,71 displays the current settings for the specified parameters (1,4,0,70, 71) of the local PAD: PAR 1:0, 4:0, 0:0, 70:1, 71:0

If no parameters are specified: PAR? the settings for all twenty-two PAD parameters are displayed:
PAR 1:0, 2:0, 3:0, 4:0, 5:0, 6:5, 7:5, 8:0, 9:0, 10:0, 11:14,12:0, 13:0, 14:0, 15:0, 16:8, 17:24, 18:18, 19:1, 20:65, 21:0,22:0

PROF - PAD Profile Command
A "profile" is a predefined collection of PAD parameter settings used for a virtual connection, similar to the profiles that can be defined for the modem's general configuration. With the PROF command, one of four standard profiles can be selected, or a particular configuration can be defined and saved as a profile in nonvolatile memory.

Example Format
PROF <identifier>

```
Parameter    Description
-----------------------------------------------------------------------------
<identifier> Enter the alphanumeric characters that specify the profile to
             be recalled for the current channel. Possible identifiers are:

DEF          Selects the factory default profile

SIM        Selects CCITT simple standard profile

TRA        Selects CCITT transparent standard profile

VSM        Selects V-series Error-Control/LAP-B emulation profile
NVM        Selects the profile saved in nonvolatile memory

SAV          Saves the current PAD configuration profile in nonvolatile
             memory


Result Codes:  Description
---------------------------------------
ERR            Invalid <identifier>
```

The V-series Emulation Profile (VSM) is automatically set if feature negotiation results in an Error-Control/LAP-B connection on virtual channel 1 (Error-Control/LAP-B connections always use virtual channel 1). The configuration profile is automatically restored to its factory setting when the the modem hangs up.

To create a profile, use the CHAN command to move to the desired channel. For example, issue CHAN3 <CR> to move to channel 3. At the prompt, type in the PAD parameters you want to adjust and store, issuing them with <CR>. To save the settings as a profile, issue PROF SAV <CR>.

RESET - PAD Reset Command
The RESET command resets the virtual channel. If your system locks up unexpectedly, or data transfer has stopped, or you are unable to reach the remote system, you may wish to reset the virtual channel and start over.

```
Issuing the RESET command may result in lost data.

Example Format
RESET [ <diagnostic> ]

Parameter     Description
-----------------------------------------------------------------------------
<diagnostic>  String of up to three numeric digits from a range of 0-255
              indicating an error has occurred

Result Codes:   Description
-----------------------------------------------------------------------------
ERR             Virtual connection not established on this channel

RPAR? - Read Remote PAD Parameter Command
To display the current settings of the remote system's PAD parameters, use the
RPAR? command. If no parameters are specified, the settings for all of the
remote system's PAD parameters are displayed.

Example Format
RPAR? [<parameter>] [,<parameter>...]

Parameter    Description
-----------------------------------------------------------------------------
<parameter>  Specifies the remote system's PAD parameter(s) to display

Result Codes     Description
ERR              Invalid command format; or virtual connection not
                 established on this channel
<parameter>:INV  Invalid parameter entered; or remote system does not support
                 parameter specified

For example, issuing RPAR? 1,4,0,70,71 <CR>

displays the current settings for the specified parameters of the remote
system's PAD. The string: RPAR 1:0, 4:0, 0:0, 70:1, 71:0 is displayed.

If no parameters are specified: RPAR? the settings for all of the remote
system's PAD parameters are displayed.

RSET - Set Remote PAD Parameter Command
To set and display the remote system's PAD parameters, use the RSET command.

Example Format
RSET [?] [<parameter>:<value>] [,<parameter>:<value>] [, ...]

Parameter    Description
<parameter>  Specifies the number of the remote system's PAD parameter you
             want to set/display
<value>      Value that you want to set for the specified PAD parameter

Result Codes     Description
-----------------------------------------------------------------------------
ERR              Invalid command format
<parameter>:INV  Invalid parameter or value

For example, entering RSET 2:1 <CR> sets the remote system's PAD parameter 2
```

```
to a value of 1.

To display the setting, type: RSET? 2:1<CR>. The new parameter setting will be
displayed: RPAR 2:1

STAT - Status of Current Channel Command
The STAT command displays the current status of a virtual connection.

Example Format
STAT

Result Codes:  Description
------------------------------------
FREE           No call in progress
ENGAGED        Call in progress

SET - Set PAD Parameter Command
To set (and display) the local PAD's parameters, use the SET command.

Example Format
SET [?] [<parameter>:<value>] [,<parameter>:<value>] [, ...]

Parameter    Description
-----------------------------------------------------------------------------
<parameter>  Specifies the number of the PAD parameter to set/display
<value>      Value that you want to set for the specified PAD parameter

Result Codes     Description
-----------------------------------------------------------------------------
ERR              Invalid command format
<parameter>:INV  Invalid parameter or value

For example, issuing SET 2:1 <CR> sets PAD parameter 2 to a value of 1.

To display the setting, type: SET? 2:1 <CR>. The new parameter setting will be
displayed: PAR 2:1

+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2.2.2 PAD Parameters
PAD parameters are used to control the display and transmission of data over
the packet switched network.

Parameters are of two types: PAD Parameters and National Parameters. Twenty-
two PAD parameters (1-22) and an additional set of "National Parameters" offer
configuration options. National Parameters (numbers starting at 70) are used
to support and control the enhanced functionality provided by the Hayes X.25
feature. All parameters are set and read the same way.

Values for some parameters are calculated by adding the bit values of the
options you want active. For example, in PAD parameter 3, if you want the
character set to include A-Z, a-z, 0-9 (bit value=1) and CR (bit value=2), you
would set the PAD parameter 3 to 3.

A marker (0:0), called a "National Marker," is used to separate the National
PAD Parameters from the PAD parameters. For example, in the PAD command: SET
1:1, 2:0, 0:0, 70:1, the characters to the right of the marker refer to
National PAD parameters. Characters to the left of the National marker refer
```

to PAD parameters.

Parameter 1 - PAD Recall Using a Character
PAD recall defines the character that will force the PAD to escape from the PAD on-line state and return to the PAD command state. When the PAD receives this character, the PAD prompt (- or *) is displayed on the user's terminal monitor.

```
Values  Description
-----------------------------------------------------------------------------
0       PAD cannot be recalled using a character (factory setting)
32-126  ASCII graphic character
```

To send the PAD recall character as data, enter it twice. The PAD will remain in the on-line state.

Parameter 2 - Echo
When parameter 2 is set, all characters received from the terminal are echoed, excluding those specified by parameter 20 (echo mask), parameter 5 (ancillary device control), parameter 12 (flow control of the PAD by the terminal) and parameter 22 (page wait). Setting parameters 12 or 22 to non-zero values causes the echo of characters DC1 and DC3 (XON and XOFF) to be suppressed, even if parameter 2 is set to value 1.

```
Values   Description
------------------------------------
0        No echo (factory setting)
1        Echo
```

Parameter 3 - Selection of Data Forwarding Signal
The value of parameter 3 is bit-mapped; the binary bit values represent the character sets listed below. If the character(s) set by the combination of binary bit values of this parameter is received from your terminal, the current packet (including this character) is forwarded.

```
Values  Description
---------------------------------------------------
0-127   sum of bits for selected characters
0       No data forwarding signal (factory setting)

Bit Value  Description
-----------------------------------------------------------------------------
1          A-Z, a-z, 0-9
2          CR
4          ESC, BEL, ENQ, ACK
8          DEL, CAN, DC2
16         ETX, EOT
32         HT, LF, VT, FF
64         NUL, SOH, STX, BS, SO, SI, DLE, DC1, DC3, DC4, NAK,
           SYN, ETB, EM, SUB, FS, GS, RS, US, DEL
```

Parameter 4 - Selection of Idle Timer Delay
In addition to character forwarding, this parameter provides the capability to forward data to the host based on an idle time. If data is in the buffer and no additional characters have been received for the specified period, the buffer contents are sent to the host. Parameter 4 is ignored if National Parameter 70 (streaming data forwarding) is set to 1, or if parameter 15 is

```
set to 1.

Values   Description
-----------------------------------------------------------------------------
0        No data forwarding on timeout
1 - 255  Data forwarding on timeout of <value> multiplied by 0.05 seconds
50       50 msec. timeout (factory setting)

Parameter 5 - Ancillary Device Control
This parameter specifies whether or not the PAD transmits XON-XOFF characters
to the DTE. If flow control is disabled, the user must be careful not to
overflow the PAD’s buffer in order to prevent data loss. Local flow control is
also enabled by the &K command.

Values  Description
-----------------------------------------------------------------------------
0       No XON/ XOFF flow control (factory setting)
1       XON/XOFF flow control in data transfer state
2       XON/XOFF flow control in both data transfer and PAD command states

Parameter 6 - Control of PAD Result Codes
Parameter 6 controls how PAD result codes (those generated by the PAD) are to
be transmitted to your terminal.

Values  Description
-----------------------------------------------------------------------------
0       No PAD result codes are sent to your terminal
1       PAD result codes are sent in their standard formats. The prompt
        PAD result code is not sent
4       Only the prompt PAD result code is sent
5       All PAD result codes, including the prompt PAD result code, are
        sent in the standard format (factory setting)

Parameter 7 - Action on Receipt of Break from Terminal
Parameter 7 is bit-mapped; binary bit values represent the following actions
when the break signal is received by the PAD.

Values            0-31
Factory Setting:  5 (send interrupt and indication of break)

Bit Values  Description
-----------------------------------------------------------------------------
1           Send an X.25 interrupt packet to the remote system
2           Send an X.25 reset packet to the remote system
4           Send an X.25 indication of break packet to the remote system
8           Escape from the data transfer state to the PAD command state
16          Set PAD parameter 8 to 1 (discard output)

Note: If bit 2 of S53 is set, escape from the data transfer state using the
break signal is not possible.

Parameter 8 - Discard Output
This parameter is set if the user wishes to abort a process running on the
remote system by pressing the break key. When the break key is used, incoming
data is discarded until the remote system reacts to the break signal, and sets
parameter 8 back to 0.
```

Values	Description
0	Normal data delivery to your terminal (factory setting)
1	Discard output destined to your terminal

Note: Parameter 8 cannot be set using the SET command; only the remote PAD can set it.

Parameter 9 - Padding after Carriage Return
Parameter 9 specifies the number of ASCII NUL characters to transmit after a carriage return. This may be necessary to allow time for mechanical devices to return to a home position after a carriage return has been sent.

Values	Description
0	No padding characters sent after carriage return (factory setting)
1	Number of padding characters (NUL) sent after carriage return

Parameter 10 - Line Folding
This parameter specifies line length. When the specified number of displayable characters have been sent to the terminal, a carriage return/line feed sequence is transmitted. Normally, this function is disabled.

Values	Description
0	No line folding (factory setting)
1 -255	Number of graphic characters per line sent by the PAD before a CR/LF is inserted. Special cases include the backspace character which decreases the count of graphic characters, and HT that follows the convention of tab stops every eighth column for display terminals, if parameter 19 = 2

Parameter 11 - Terminal Speed
This parameter reflects the current speed of the DTE. It is automatically set by the PAD using the last AT command and may not be updated by the user or remote system (read only).

Values READ ONLY; no factory setting

Value	Bit Rate
0	110 bps
2	300 bps
3	1200 bps
4	600 bps
5	75 bps
12	2400 bps
13	4800 bps
14	7200 or 9600 bps
15	14400 or 19200 bps
16	38400 bps

Parameter 12 - Flow Control of the PAD by Local Terminal
Parameter 12 determines whether or not the PAD recognizes flow control characters issued from the DTE. If the DTE transmits an XOFF (Ctrl-S), no further data is delivered to the DTE until the PAD receives an XON (Ctrl-Q). Flow control is also enabled by the &K command.

```
Values  Description
-------------------------------------------------------------------------------
0       No XON / XOFF flow control (factory setting)
1       Use of XON / XOFF flow control
```

Parameter 13 - Line Feed Insertion after Carriage Return
This parameter specifies whether or not the PAD will insert a line feed character after carriage returns. This function applies only in the PAD on-line state.

```
Values  Description
-------------------------------------------------------------------------------
0      No line feed inserted (factory setting)
1      Insert line feed after carriage return in the incoming data stream
2      Insert line feed after carriage return in the outgoing data stream
3      Insert line feed after carriage return in the data stream
4      Insert line feed after echo of carriage return
5      Insert line feed after carriage return in incoming data stream and
       also after carriage return echo
6      Insert line feed after carriage return in the outgoing data stream and
       also after carriage return echo; if editing enabled (parameter 15=1),
       insert line feed in the next editing buffer and make available for
       editing
7      Insert line feed after carriage return in the incoming and the outgoing
       data stream, also after carriage return echo; if editing is enabled
       (parameter 15=1), insert line feed in the next editing buffer and make
       available for editing
```

Parameter 14 - Line Feed Padding
In the on-line data transfer state only, parameter 14 specifies the number of ASCII NUL characters to transmit after a LINE FEED. This parameter is required by some devices to allow sufficient time to move the platen after receiving a line feed character.

```
Values  Description
-------------------------------------------------------------------------------
0       No padding after line feed (factory setting)
1-255   Number of padding characters inserted after line feed
```

Parameter 15 - Editing
Parameter 15 specifies whether or not editing is used in the PAD on-line state. Parameters 16, 17, 18, and 19 describe the available editing functions. If editing is enabled, parameter 4 (forward timing) and National Parameter 70 are ignored.

```
Values  Description
-------------------------------------------------------------------------------
0       Editing disabled (factory setting)
1       Editing enabled. Data forwarding is suspended until the editing buffer
        is full, or until the character defined by parameter 3 is received
```

Whenever more data is received than can be held by the editing buffer, one full packet will be forwarded. The remaining characters are placed in the beginning of the editing buffer, and can still be edited.

Parameter 16 - Character Delete

The defined delete character deletes the last character in the editing buffer. After deleting the character, the PAD sends either a backslash (\) or <BS> <SP> <BS> to the DTE (depending on the setting of parameter 19. If the editing buffer is empty, then no response is sent.

Values	Description
0-127	Selects which ASCII value functions as the delete character
8	Backspace character (factory setting)

Parameter 17 - Line Delete
This parameter defines the line delete function. When the line delete character is entered, the contents of the editing buffer are deleted. Unless the editing buffer is empty, the PAD sends a result code (XXX for printing terminals) to acknowledge the line delete function.

Values	Description
0-127	ASCII value for delete character
24	Control-X (factory setting)

Parameter 18 - Line Display
This parameter defines the line display function. If the user enters the character specified by this parameter and editing is enabled, the contents of the editing buffer will be displayed.

Values	Description
0	Line display disabled
1-127	ASCII value of line display character
18	Control-R (factory setting)

Parameter 19 - Editing PAD result codes
Parameter 19 provides the PAD information about the attached DTE (terminal or printer). This ensures that the PAD sends the proper editing character sequences. For example, on a printer, the character delete function simply prints a backslash (\) for each printable character that is deleted, while a terminal is sent a BS-SP-BS sequence to backspace the cursor and erase the deleted character from the screen.

The PAD uses editing PAD result codes for display terminals regardless of the value of parameter 19 when bit 2 of S53 is set.

Values	Description
0	Editing PAD result codes function disabled
1	Editing PAD result codes for printers
2	Editing PAD result codes for computers (factory setting)
8, 32-126	Editing PAD result codes using the character represented by the ASCII value

Parameter 20 - Echo Mask
Parameter 20 is bit-mapped and defines the set of characters that are to be excluded from the echo function. Characters specified by bit value 64 are masked only when editing is active.

Values Description

64	all characters, except editing characters, are echoed (factory setting)
0-255	sum of bits selecting characters to be echoed

Bit Values	Description
1	CR
2	LF
4	VT, HT, FF
8	BEL, BS
16	ESC, ENQ
32	ACK, NAK, STX, SOH, EOT, ETB, ETX
64	Parameters 16, 17, 18 (editing characters)
128	NUL, SO, SI, DLE, DC1, DC2, DC3, DC4, SYN, CAN, EM, SUB, FS, GS, RS, US

Parameter 21 - Parity Treatment
This parameter controls the parity and character format used by the terminal.

Values	Description
0	No parity checking or generation (factory setting)
2	Parity is applied to data sent to the terminal according to the parity specified by National parameter 71

Parameter 22 - Page Wait
Parameter 22 defines the number of lines (text separated by line feeds) that are displayed before "PAGE" is displayed. No further data is transmitted to the terminal until the user sends an XON character, sets parameter 22 to zero, or escapes from the data transfer state (PAD recall).

Values	Description
0	Page wait disabled (factory setting)
1-255	Number of line feed characters sent to the terminal before the page wait condition

National Parameter 70 - Streaming Data Forwarding
National Parameter 70 affects PAD data forwarding timing. When set to value 0, the data forwarding timing is controlled by PAD parameter 4. When set to value 1, "streaming mode" is set. This parameter, among others, may be set to configure a "streaming mode PAD" identical to that used in Error-Control/LAP-B connections.

In streaming mode, a character received by the PAD is placed in a packet immediately, instead of being buffered until a timeout occurs. For example, assuming the modem transmitter is idle, a character received by the PAD is forwarded immediately. This packet remains "open" in case another character is received by the PAD. The additional character can be added while the packet is actually transmitting.

The result is "instantaneous" forwarding, which generally results in the best interactive performance. This may cause more packet traffic. This is no problem in point-to-point connections, but may be of some concern for networks that charge by the packet.

```
Values  Description
--------------------------------------------------------------------------------
0       PAD Parameter 4 controls data forwarding timeout (factory setting)
1       Streaming data forwarding timeout
```

National Parameter 71 - Character Format
This parameter specifies the character format (number of data bits and parity) required by the network for the PAD, and is used to generate the proper parity on all PAD result codes and data delivered to the terminal.

Individual networks specify particular settings for this parameter. Parameter 71 also determines whether or not all 8 data bits or only 7 data bits are examined when testing characters for specific values (e.g., for CR or XOFF).

```
Values  Description
--------------------------------------------------------------------------------
0       Format/parity used on last AT command (factory setting)
1       8 data bits, no parity
2       7 data bits, odd parity
3       7 data bits, even parity
4       7 data bits, mark parity
5       7 data bits, space parity
```

National Parameter 72 - Break Signal Timing
National Parameter 72 is used to control whether or not break timing information via National Parameter 73 is sent with the indication of break PAD message.

In most PADs, when a break signal is received from the terminal, the PAD sends an X.25 interrupt packet, followed by an indication of break PAD message. The remote PAD will usually ignore the interrupt packet, and will transmit a break signal to the remote system when the indication of break PAD message is received.

The duration of the break signal is normally fixed. National Parameter 73 specifies the duration of the break signal transmitted by the PAD. If National Parameter 72 is set to value 0, the indication of break PAD message is sent normally, and will be compatible with all networks.

If National Parameter 72 is set to value 1, break timing information is sent along with the indication of break PAD message, by adding a parameter/value field to the indication of break PAD message. This sets the remote PAD’s National Parameter 73 to a value that corresponds to the length of break as timed by the local PAD, so the break signal transmitted by the local PAD is very close to the length of the break signal received by the remote PAD.

Setting National Parameter 72 to value 1 could possibly confuse some networks, and should be used only in cases where you know that the remote PAD supports National Parameter 73.

```
Values  Description
--------------------------------------------------------------------------------
0       No break timing information sent with signal (factory setting)
1       Break timing information is sent with the break signal
```

National Parameter 73 - Break Signal Duration
This parameter is used to set the duration of a break signal transmitted by

```
the PAD in increments of 10 milliseconds. The factory setting is 18 (180
msec.). National Parameter 73 is usually set by the remote PAD, if the remote
PAD supports National Parameter 72.

Values:           0-255
----------------------------------
Factory Setting:  18 (180 msec)

National Parameter 74 - Disable PAD Parameter Setting by the Remote PAD
The remote system may try to re-configure the parameter settings of the local
PAD (capability also available to the local modem user with the RSET command)
to facilitate communications. However, doing this may not be the best
configuration for your terminal. Register S57 allows you to disable the remote
PAD's ability to change your PAD parameter settings.

Values  Description
-----------------------------------------------------------------------------
0       Remote PAD can reset your PAD parameters (factory setting)
1       All set or set and read PAD messages return the INV result code to
        the remote system indicating that the parameter value cannot be
        altered from the current setting.

National Parameter 100 - Default Maximum Packet Size
This parameter sets the default maximum packet size according to the following
parameter value-to-packet size (in bytes) conversions:

Values  Description
------------------------------------
4       16 bytes
5       32 bytes
6       64 bytes
7       128 bytes (factory setting)
8       256 bytes
9       512 bytes

National Parameter 101 - Default Maximum Window Size
This parameter sets the default maximum window size.

Values:           2-7
Factory Setting:  2

National Parameter 102 - Call Request Response Timer
This parameter sets the maximum amount of time the transmitter should wait for
acknowledgment to a call request packet before initiating recovery procedure,
in 10-second increments.

Values:           1-255
Factory Setting:  20 (200 seconds)

National Parameter 103 - Reset Request Response Timer
This parameter sets the maximum amount of time the transmitter should wait for
acknowledgment to a reset request packet before initiating recovery procedure,
in 10-second increments.

Values:           1-255
Factory Setting:  18 (180 seconds)
```

```
National Parameter 104 - Clear Request Response Timer
This parameter sets the maximum amount of time the transmitter should wait for
acknowledgment to a clear request packet before initiating recovery procedure,
in 10-second increments.

Values:           1-255
Factory Setting:  18 (180 seconds)

National Parameter 105 - Interrupt Response Time
This parameter sets the maximum amount of time the transmitter should wait for
acknowledgment to an interrupt packet before initiating recovery procedure, in
10-second increments.

Values:           1-255
Factory Setting:  18 (180 seconds)

National Parameter 106 - Reset Request Retransmission Counter
This parameter defines the maximum number of times a reset request packet
should be retransmitted.

Values:           0-255
Factory Setting:  1 retransmission

National Parameter 107 - Clear Request Retransmission Counter
This parameter defines the maximum number of times a clear request packet
should be retransmitted.

Values:           0-255
Factory Setting:  1 retransmission

National Parameter 108 - Channel Allocation Parameter
This parameter is used to inform the PAD how the application software or user
intends to use the current PAD channel. There are four possible settings.

Values  Description
-----------------------------------------------------------------------------
0       Unavailable - the PAD channel will not be used; outgoing calls are not
        allowed, and incoming calls will be directed to incoming or free
        channels, or cleared
1       Outgoing - the PAD channel will be used for an outgoing call; incoming
        calls will be directed to incoming or free channels, or cleared
2       Incoming - the PAD channel will be used for an incoming call; outgoing
        calls are not allowed; the PAD will assign an incoming call to PAD
        channels assigned as incoming before those assigned as bi-directional
3       Bi-directional - the PAD channel can be used for incoming or outgoing
        calls; incoming calls will be directed to free channels if no incoming
        channels are available (factory setting)


*****************************************************************************
2.3  PAD Profiles
For many X.25 connections, the PAD can be used without any changes to its
factory configuration. For information on creating, saving, and recalling PAD
profiles, see the PROF command. The four standard profiles are listed below.

Factory-Set Profile
```

```
PAD   Values       Description                          Default
Param.
-----------------------------------------------------------------------------
1     0-126        PAD recall using a character         0 (disabled)
2     0,1          Echo                                 0 (disabled)
3     0-127        Selection of data forwarding signal  0 (disabled)
4     0-255        Selection of idle timer delay        1 (50 msec timeout)
5     0,1,2        Ancillary device control             0 (XON/XOFF disabled)
6     0,1,4,5      Control of PAD result codes          5 (standard PAD result)
7     1,2,4,8,16   Response to break from terminal      15 (send interrupt and
                                                        break indication)
8     0,1          Discard output                       0 (normal delivery)
9     0-255        Padding after carriage return        0 (disabled)
10    0-255        Line folding                         0 (disabled)
11    0,2-5,12-16  Terminal speed                       (speed of terminal
                                                        indicated)
12    0,1          Flow control of PAD by terminal      0 (XON/XOFF disabled)
13    0-7          Linefeed insertion after CR          0 (disabled)
14    0-255        Linefeed padding                     0 (disabled)
15    0,1          Editing                              0 (disabled)
16    0-127        Character delete                     8 (BS)
17    0-127        Line delete                          24 (CAN, ^X)
18    0-127        Line display                         18 (DC2, ^R)
19    0,1,2,8,
      32-126       Editing PAD result codes             2 (display terminals)
20    0-255        Echo mask                            64 (echo all characters
                                                        except editing
                                                        characters)
21    0,2          Parity treatment                     0 (disabled)
22    0-255        Page wait                            0 (disabled)
70*   0,1          Streaming data forwarding            0 (disabled)
71*   0,5          Character format                     0 (set by AT autobaud)
72*   0,1          Break signal timing                  0 (disabled)
73*   0-255        Break signal duration                18 (180 msec)
74*   0,1          Disable PAD parameter settings by    0 (parameters set
                   remote PAD                           by remote PAD)
100*  4-9          Default packet size                  7 (128 bytes)
101*  2-7          Default window size                  2 (2 outstanding
                                                        packets)
102*  1-255        T21 call request response timer     20 (200 seconds)
103*  1-255        T22 reset request response timer    18 (180 seconds)
104*  1-255        T23 clear request response timer    18 (180 seconds)
105*  1-255        T26 interrupt response timer        18 (180 seconds)
106*  0-255        R22 reset request retransmission    1 retransmission
107*  0-255        R23 clear request retransmission    1 retransmission
108*  0-3          Channel allocation parameter        3 (normal channel
                                                       allocation)

*National Parameters

CCITT Simple Standard Profile

PAD   Values       Description                        Default
Param.
-----------------------------------------------------------------------------
1     0-126        PAD recall using a character       1 (DLE character)
2     0,1          Echo                               1 (echo on)
```

3	0-127	Selection of data forwarding	126 (forward on control signal characters and DEL)
4	0-255	Selection of idle timer delay	0 (no timeout)
5	0,1,2	Ancillary device control	1 (XON/XOFF enabled)
6	0,1,4,5	Control of PAD result codes	1 (standard PAD result codes enabled, no prompt)
7	1,2,4,8,16	Response to break from terminal	2 (send reset packet)
8	0,1	Discard output	0 (normal delivery)
9	0-255	Padding after carriage return	0 (disabled)
10	0-255	Line folding	0 (disabled)
11	0,2-5,12-16	Terminal speed	(speed of terminal indicated)
12	0,1	Flow control of PAD by terminal	1 (XON/XOFF disabled)
13	0-7	Linefeed insertion after CR	0 (disabled)
14	0-255	Linefeed padding	0 (disabled)
15	0,1	Editing	0 (disabled)
16	0-127	Character delete	127 (DEL character)
17	0-127	Line delete	24 (CAN, ^X)
18	0-127	Line display	18 (DC2, ^R)
19	0,1,2,8, 32-126	Editing PAD result codes	1 (printing terminals)
20	0-255	Echo mask	0 (echo all characters)
21	0,2	Parity treatment	0 (disabled)
22	0-255	Page wait	0 (disabled)
70*	0,1	Streaming data forwarding	0 (disabled)
71*	0,5	Character format	0 (set by AT autobaud)
72*	0,1	Break signal timing	0 (disabled)
73*	0-255	Break signal duration	18 (180 msec.)
74*	0,1	Disable PAD parameter settings remote PAD	0 (parameters set by by remote PAD)
100*	4-9	Default packet size	7 (128 bytes)
101*	2-7	Default window size	2 (2 outstanding packets)
102*	1-255	T21 call request response timer	20 (200 seconds)
103*	1-255	T22 reset request response timer	18 (180 seconds)
104*	1-255	T23 clear request response timer	18 (180 seconds)
105*	1-255	T26 interrupt response timer	18 (180 seconds)
106*	0-255	R22 reset request retransmission	1 retransmission
107*	0-255	R23 clear request retransmission	1 retransmission
108*	0-3	Channel allocation parameter	3 (normal channel allocation)

*National Parameters

CCITT Transparent Standard Profile

PAD Param.	Values	Description	Default
1	0-126	PAD recall using a character	0 (disabled)
2	0,1	Echo	0 (disabled)
3	0-127	Selection of data forwarding signal	0 (disabled)
4	0-255	Selection of idle timer delay	20 (1 sec.timeout)
5	0,1,2	Ancillary device control	0 (XON/XOFF disabled)
6	0,1,4,5	Control of PAD result codes	0 (disabled)
7	1,2,4,8,16	Response to break from terminal	2 (send reset packet)
8	0,1	Discard output	0 (normal delivery)

9	0-255	Padding after carriage return	0 (disabled)
10	0-255	Line folding	0 (disabled)
11	0,2-5,12-16	Terminal speed	(speed of terminal indicated)
12	0,1	Flow control of PAD by terminal	0 (XON/XOFF disabled)
13	0-7	Linefeed insertion after CR	0 (disabled)
14	0-255	Linefeed padding	0 (disabled)
15	0,1	Editing	0 (disabled)
16	0-127	Character delete	127 (DEL)
17	0-127	Line delete	24 (CAN, ^X)
18	0-127	Line display	18 (DC2, ^R)
19	0,1,2,8, 32-126	Editing PAD result codes	1 (printing terminals)
20	0-255	Echo mask	0 (echo all characters)
21	0,2	Parity treatment	0 (disabled)
22	0-255	Page wait	0 (disabled)
70*	0,1	Streaming data forwarding	0 (disabled)
71*	0,5	Character format	0 (set by AT autobaud)
72*	0,1	Break signal timing	0 (disabled)
73*	0-255	Break signal duration	18 (180 msec.)
74*	0,1	Disable PAD parameter settings by remote PAD	0 (parameters set by remote PAD)
100*	4-9	Default packet size	7 (128 bytes)
101*	2-7	Default window size	2 (2 outstanding packets)
102*	1-255	T21 call request response timer	20 (200 seconds)
103*	1-255	T22 reset request response timer	18 (180 seconds)
104*	1-255	T23 clear request response timer	18 (180 seconds)
105*	1-255	T26 interrupt response timer	18 (180 seconds)
106*	0-255	R22 reset request retransmission	1 retransmission
107*	0-255	R23 clear request retransmission	1 retransmission
108*	0-3	Channel allocation parameter	3 (normal channel allocation)

*National Parameters

Error-Control/LAP-B Profile

PAD Param.	Values	Description	Default
1	0-126	PAD recall using a character	0 (disabled)
2	0,1	Echo	0 (disabled)
3	0-127	Selection of data forwarding signal	0 (disabled)
4	0-255	Selection of idle timer delay	0 (no timeout)
5	0,1,2	Ancillary device control	0 (XON/XOFF disabled)
6	0,1,4,5	Control of PAD result codes	0 (no PAD result codes)
7	1,2,4,8,16	Response to break from terminal	5 (send interrupt and break indication)
8	0,1	Discard output	0 (normal delivery)
9	0-255	Padding after carriage return	0 (disabled)
10	0-255	Line folding	0 (disabled)
11	0,2-5,12-16	Terminal speed	ð (speed of terminal indicated)
12	0,1	Flow control of PAD by terminal	0 (XON/XOFF disabled)

13	0-7	Linefeed insertion after CR	0 (disabled)
14	0-255	Linefeed padding	0 (disabled)
15	0,1	Editing	0 (disabled)
16	0-127	Character delete	8 (BS)
17	0-127	Line delete	24 (CAN, ^X)
18	0-127	Line display	18 (DC2, ^R)
19	0,1,2,8, 32-126	Editing PAD result codes	2 (display terminals)
20	0-255	Echo mask	64 (echo all characters except editing characters)
21	0,2	Parity treatment	0 (disabled)
22	0-255	Page wait	0 (disabled)
70*	0,1	Streaming data forwarding	1 (streaming mode selected)
71*	0,5	Character format	0 (set by AT autobaud)
72*	0,1	Break signal timing	1 (time break signal)
73*	0-255	Break signal duration	18 (180 msec)
74*	0,1	Disable PAD parameter settings by remote PAD	0 (parameters set by remote PAD)
100*	4-9	Default packet size	7 (128 bytes)
101*	2-7	Default window size	2 (2 outstanding packets)
102*	1-255	T21 call request response timer	20 (200 seconds)
103*	1-255	T22 reset request response timer	18 (180 seconds)
104*	1-255	T23 clear request response timer	18 (180 seconds)
105*	1-255	T26 interrupt response timer	18 (180 seconds)
106*	0-255	R22 reset request retransmission	1 retransmission
107*	0-255	R23 clear request retransmission	1 retransmission
108*	0-3	Channel allocation parameter	3 (normal channel allocation)

*National Parameters

****

2.4 Typical X.25 Scenarios

The examples below provide scenarios of typical activities you might perform and/or experience with X.25 connections. Each one provides the "Activity," a reference to a command description within this document for further discussion, the "Result" of the "Activity," and an "Example Log-on" when applicable. These examples may be helpful as reference when you are writing sequences for users, or when developing software.

Synopsis of a Communication Session with a Packet Switched Network
The events in a typical X.25 communication session are detailed below.

Establishing a Network Connection...
X.25 connections begin the same as point-to-point connections - with a modem call to a remote system. Once connected to the network, however, you use the PAD to make one or more virtual connections to other nodes on the network.

Making a Virtual Connection...
The following procedure explains the steps for the major activities in X.25 communications.

Step 1: Configuring the modem for X.25.
Before placing a call to the network, you must configure the modem to make an

X.25 connection. First, enter the modem’s command state

Issue AT&Q5S44=3S46=6S48=0 <CR>. This command string verifies that the modem is in the error-control mode (&Q5) and sets the values of three S-Registers that control the modem’s feature negotiation. S48=0 controls the negotiation process; S46=6 stipulates an X.25 connection. Now, instead of negotiating a V.42 connection, the modem attempts connections using the X.25 protocol.

Step 2: Calling the network.
Next, dial the number of the network to which you subscribe. This is a standard modem call made with the D command: ATDT9,555-1234 <CR> (for example). If the call is successful, the modem will connect and issue a result code sequence. The carrier and connect messages you receive depend on the connection. If you want to see the extended messages, you must issue the W1 command. With this feature enabled, for a 2400 bps connection, the messages will be CARRIER 2400 PROTOCOL: X.25/LAP-B CONNECT 4800. The PAD automatically enters the command state for channel 1.

Step 3: Making a virtual connection to the remote system.
To establish a virtual call to a user on the network, you must have the network address of the other node to which you wish to connect and any other information required by the network. For example, to connect to a service on the network, you would issue: CALL R-3110 20200202 <CR> - CALL is the command for initiating connections with a remote system. The (R) command permits reverse charging if the user at the other end of the virtual connection requests it. 3110 is a network ID code and 20200202 is the destination address. If the call is accepted by the remote system, the network will return the result code sequence: CON COM: W2:2,P7:7,X0277 COM. The PAD then enters the data transfer state. If the call is not accepted, the network returns a response such as CLR DTE 157 FAC: (followed by network information as alphanumeric characters X000...). The PAD remains in the PAD command state.

Step 4: Performing on-line activities
Once connected, you can perform desired communications - file transfers, interactive typing, etc.

Step 5: Clearing the call
When ready to end the session, issue CTRL-P to return to the channel’s command state. Then issue CLR <CR>. This clears the current virtual connection. The network responds with CLR CONF FAC: (followed by network information as alphanumeric characters X000...).

Note: All virtual calls should be cleared before returning to the AT command state.

Step 6: Exiting the PAD
EXIT <CR> - Leaves PAD command state and enters the AT command state.

Step 7: Terminating the network connection
ATH0 <CR> - Breaks the physical connection to the network node. This action hangs up the telephone, in the same way other communication sessions are terminated.

Establishing a Virtual Connection
The example log-on and results below illustrate a successful attempt to establish a virtual connection.

Activity: User dials CompuServe(TM), connects, then issues CALL command to establish a virtual connection. Call is accepted

Refer to: CALL command description

Result: Call is accepted. Depending on the network requirements, the modem sends back the following:

CON <address> <facility_codes> COM <user_data>

Note: The data in capital letters is sent to you; the data in angle brackets may or may not be sent to you.

Example Log-on: User calls Telenet(TM) and issues CALL command to go on-line with CompuServe:

```
Enter    AT&Q5 S44=3 S46=6 S48=0 W1 DT 9,5550123 <CR>
Result   CARRIER 2400
         PROTOCOL: X.25/LAP-B
         CONNECT 2400

Enter    CALL R-311020200202 <CR>
Result   CON COM: W2:2,P7:7,X 0277 COM
```

Attempting a Virtual Connection that is not Accepted

This scenario depicts an unsuccessful attempt at establishing a virtual connection. For various reasons, the connection may not be completed. The reason(s) will be provided in result codes generated by the PAD.

Activity: User dials packet-switched network, connects, then issues CALL command to establish a virtual connection, but call is not accepted.

Refer to: CALL command description.

Result: Call is not accepted. Depending on the network requirements, the modem returns the following result codes:

CLR <clear_cause_codes> <diagnostic_codes> <address> <facility_codes>

Example Log-on: User calls Telenet and issues CALL command to go on-line with CompuServe:

```
Enter   AT&Q5 S44=3 S46=6 S48=0 W1 DT 9,5550123 <CR>
Result  CARRIER 2400
        PROTOCOL: X.25/LAP-B
        CONNECT 2400

Enter   CALL R-311020200202 <CR>
Result  CLR DTE 157 FAC:
        X0000C10400000000C2080800000000100000062
```

Resetting a Virtual Channel

While on-line to another user on the network, if the escape sequence is used to return to the PAD command state, the channel will be reset.

Activity: User is connected to an packet-switched network, has established a virtual connection, then escapes to the PAD command state and resets the virtual channel

Refer to: RESET command description

Result: The PAD resets the virtual channel and returns the following information to the user:

RESET <reset_cause_codes>

```
Example Log-on:   n/a


Resetting a Virtual Channel a by Remote PAD
As a result of network activity, the remote PAD may reset a virtual channel.
If this occurs, data may be lost. The call must also be re-established.

Activity:    User is connected to a packet-switched network, has established a
             virtual connection, and the network resets the virtual channel
Refer to:    RESET command description
Result:      The PAD resets the virtual channel and returns the following
             information to the user:
             RESET <reset_cause_codes> <diagnostic_codes>

Example Log-on:   n/a


Clearing a Virtual Channel
This scenario is the typical way to end a virtual call following a session.
This is also the process to use when other calls are to be maintained.

Activity:    User is connected to a packet-switched network, has established a
             virtual connection, escapes to PAD command state, and clears the
             call.
Refer to:    CLR command description.
Result:      The PAD clears the call, sets all PAD parameters back to their
             values prior to establishing the virtual connection, and returns
             the following result codes:
             CLR CONF FAC: X 00 00 C1 04 00 00 01 03 C2 08 00 00 00
             08 80 00 00 04

Example Log-on:   User calls Telenet and issues CALL command to go on-line
                  with CompuServe:

                  Enter     AT&Q5 S44=3 S46=6 S48=0 W1 DT 9,5550123 <CR>
                  Result    CARRIER 2400
                  PROTOCOL: /X.25
                  CONNECT 2400

                  Enter     CALL R-311020200202 <CR>
                  Result    CON W2:2,P7:7,X 0277, COM

                  Enter     User ID: <CR>
                  Result    *

                  Enter     Ctrl-P to return to the PAD command state
                  Result    CLR CONF FAC:
                            X0000C104000000103C208000000008800000004

Accepting a Request from Remote PAD to Establish Virtual Connection
A request from a remote PAD to establish a virtual connection will be received
when another network user is attempting to make a connection with you.
Although the standard response is to accept, be aware that accepting the
request, you may be accepting certain network charges other than packet
transmission fees.
```

```
Activity:    User using modem and receives request from remote unit to
             establish a virtual connection
Refer to:    ACC command description
Result:      The remote PAD sends the following result code to the user
             IC <facility_codes> COM <user_data>

Example Log-on:   n/a


Clear Command Failed
This scenario describes a request to clear a channel denied by the PAD. This
may occur because the modem is transferring data.

Activity:    User is connected to a packet-switched network, has established a
             virtual connection, escapes to PAD command state, but call fails
             to be cleared
Refer to:    CLR command description
Result:      The PAD sends the following result code: CLR FAILED

Example Log-on:   n/a


Link Restart Occurs
The example result code below indicates that the virtual links have been
dropped. The connections must be re-established.

Activity:    A "link restart" is a major error condition in which all  virtual
             calls are disconnected and the virtual channels return to "start"
             mode
Example:     LINK RESTARTED <restart_cause_codes>


==============================================================================
Appendix A:
Communication Options
This appendix describes the various methods of communication supported by
Hayes modems. Set up recommendations for each of these modes are provided.
Flow diagrams illustrate the states and conditions through which the modem
passes in each mode. Setup examples and environment descriptions are also
included.


*****************************************************************************
A.1 Transmission and DTE Types
Modems communicate over the telephone line by converting data from analog to
digital form and vice versa. The techniques used are fundamentally the same
whether the data transmission mode is synchronous or asynchronous.

In most cases, communications over the telephone lines will be synchronous,
regardless of the mode selected. The interface between the modem and the DTE
will depend on the mode selected. 300 bps communications (for example when on-
line with a Smartmodem 300) are always asynchronous between modems. At speeds
of 1200 bps and higher, the modem-to-modem links are always synchronous.

However, between the DTE and the modem, synchronous and asynchronous
communication differ significantly. The DTE hardware and software are usually
different as well. A modem operating with a synchronous DTE could connect to
```

another modem operating with an asynchronous DTE, as the carrier signals are no different. But the data passed over the link might not be intelligible to their respective computers.

The interface between the modem and the DTE is generally asynchronous for all personal computer-to-modem communications. When the modem-to-DTE link is synchronous, the DTE must be a synchronous device such as a synchronous adapter card installed within the computer. The two types of transmission differ in the techniques used to separate the characters that are transmitted. Asynchronous transmissions use bits to indicate the start and stop of the character. Synchronous transmissions use clocking signals.

Hayes modems provide several communication modes to adapt to a variety of environments and operating demands. When a communications mode is selected that supports an asynchronous DTE at 1200 bps or greater, the modem converts the asynchronous data into synchronous data that is compatible with the modem-to-modem carrier signals. In some of the communications modes that support asynchronous DTEs, the start and stop bits are also converted to synchronous data over the modem-to-modem link. Naturally, the modems on both ends of the link must be in a compatible communications mode if the data is to be restored at the receiving DTE. For this reason, communications modes that support asynchronous DTEs and which actually send the start and stop bits over the modem-to-modem link are often referred to as asynchronous connections.

The communications mode is controlled by the &Q command, except for Smartmodem 300 and those Smartmodem 1200s that support only asynchronous mode. This command is discussed fully in the next section.

++
A.1.1 Asynchronous Transmissions
Most communications between PCs are asynchronous. Asynchronous transmissions pass data between the modems as characters. Data is then transmitted as character bits framed by start, stop, and parity bits to mark the beginning and end of character units.

The use of parity bits is optional depending on the asynchronous character format selected.

When sending and receiving data, the modem supports the following asynchronous character formats:

Start Bits	Data Bits	Parity	Stop Bits
1	7	even/odd	1 or more
1	7	none	2
1	7	mark/space	1 or more
1	8	none	1 or more

At speeds of 1200 bps or higher, the modem always generates data in a 10-bit format, including the start bit. In the modem command state, information exchanged between the DTE and modem consists of commands and responses that are not transmitted or received over the phone line. The character formats supported by a particular modem are provided in the Installation Guide accompanying the modem, under the feature list.

++
A.1.2 Synchronous Transmissions

Synchronous communication is a specialized form of data transmission and generally requires special hardware and software combinations. When operating in a synchronous mode, the modem functions as a pipeline, sending bits across the link between modems according to uniform blocks of time.

Communication is managed through special protocols. Though techniques differ slightly, synchronous protocols assemble data in frames prior to transmission and disassemble the frames on arrival. If the communication environment supports synchronous communication, the framing - data formatting - is performed by the communications software. No data format selection is required of the modem for synchronous operation.

Synchronous modes 1, 2, 3, and 4 are supported by standalone (external) modems. Hayes boardlevel (internal) modems support synchronous communications with mode 4, Hayes AutoSync. The only exceptions are the modems designed for the Apple(TM) Macintosh(TM) II family: Smartmodem 2400M and V-series Smartmodem 2400M. The Macintosh II, unlike other personal computers, supports both asynchronous and synchronous communications without an adapter card. If a personal computer (an IBM(TM) PC XT(TM), for example) has a synchronous adapter card installed, then a Hayes standalone Smartmodem or V-series System Products that support modes 1, 2, or 3, may be used for synchronous communications.

****

A.2 Communication Modes - &Q

The requirements of the communication link - including the software that addresses the modem and the capabilities of the local and remote modems - determine the mode to be used. For example, there are three modes for asynchronous DTEs (&Q0, &Q5, and &Q6) and three modes for synchronous DTEs (&Q1, &Q2, and &Q3). Most PC communications are performed in the asynchronous mode. Unless the modem is installed on a terminal, or computer with synchronous capability, or connected to a mainframe, communication will most likely be asynchronous.

For those situations such as mainframe connections, the modem can be configured for synchronous modes. Synchronous communication requires special hardware in all but Mode 4. In all synchronous modes, special software that provides the necessary protocol is required. Synchronous communication requires that the DTE (either the personal computer/data terminal or the port on the host computer) be able to exercise some degree of control over DTR. When the modem is operating in synchronous modes 1, 2, or 3, the modem’s response to DTR transitions as specified by the &D command are significantly different than responses to changes in DTR when the modem is in asynchronous modes 0, 5, or 6. Modes 1, 2, and 3 are based on the 108.1 application of the CCITT Recommendation V.24 that specifies series interchange circuit designations. This alternative, "Connect Data Set (modem) To Line," is very similar to EIA/TIA-232-D (a revised version of RS 232-C).

Mode 4: AutoSync is the Hayes alternative for synchronous communication from a personal computer. Originally developed to afford Hayes internal modems for IBM PC XTs a means of communicating with synchronous computers (mainframes such as IBM 3090 models), this feature was added to standalone modems as well. Using a personal computer and software incorporating the Hayes Synchronous Interface (HSI) software, the modem can be used synchronously from most asynchronous serial computer ports.

The factory default setting is &Q0 (asynchronous mode) for Smartmodem Products, and &Q5 (error-control mode) for V-series System Products. When a Hayes V-series System Product attempts an error-control connection with a remote modem that cannot perform error-control, the V-series System Product can either fall back to a connection supported by the other modem or hangup, depending on the value of S36. When the use of &Q5 results in an error-control connection, the DTE asynchronous data is converted to synchronous data. The start and stop bits are discarded over the modem-to-modem link where the data is encapsulated by a synchronous framing protocol that the DTE cannot see. The specific type of synchronous framing (error-control protocol) that is used is determined by registers S36, S46, and S48. When a V-series System Product connects to a Smartmodem 1200 attached to a V-series Modem Enhancer, a special Asynchronous Framing Technique (AFT) is used when an error-control link is established (AFT preserves the start and stop bits in the modem-to-modem link.)

The &Q0 and &Q6 modes also convert the asynchronous DTE’s start and stop bits to synchronous data in the modem-to-modem link, so that those modes are compatible at each end of the same modem connection. The &Q6 mode, however, permits the DTE to operate at a faster speed than the modem link by using buffers in the modem and bi-directional local flow control between the modem and the DTE. The &Q0 mode utilizes the CCITT V.14 standard stop bit manipulation feature to accommodate the slight speed discrepancies that can occur between a modem and a DTE that are operating at the same nominal speed.

The chart below lists the &Q command options currently defined for selection of communication mode. Details on these modes are provided in subsequent sections.

```
Command  Definition
-----------------------------------------------------------------------------
&Q0   Asynchronous mode - standard personal computer connection; call
      placement and connection are both asynchronous. Basic setup
      permitting interaction with the modem in either the command or the
      on-line states.

&Q1   Synchronous Mode 1 - call placement takes place using asynchronous
      DTE, then modem switches to synchronous DTE when the connection is
      fully established. The switchover time is controlled by register S25.

&Q2   Synchronous Mode 2 - dial stored number under control of the DTR
      interface circuit of a synchronous DTE. The use of an asynchronous
      DTE in command state is optional.

&Q3   Synchronous Mode 3 - dial manually using the DTR (V.24 108.2)
      interchange circuit to switch between voice and data modes.
      Requires telephone to dial while in the voice mode. The use of an
      asynchronous DTE in command state is optional.

&Q4   Hayes AutoSync - call placement takes place using asynchronous DTE,
      then modem switches to a special mode that makes an asynchronous port
      appear to operate synchronously after the connection is established.
      This mode requires software addressing the Hayes Synchronous Interface
      (HSI).

&Q5   Error-control mode - call  establishment and data transfer use an
      asynchronous DTE. Negotiation of error-control and compression
```

features with other modem is controlled by registers S36, S46, and S48. With factory default settings, modem in &Q5 mode attempts the most compressed error-free connection features that the other modem will support. Modem may "fall back" to &Q6 or to &Q0 modes during the connection negotiation if the remote modem does not support an error-control protocol.

&Q6 Asynchronous mode with speed buffering enabled. In addition to the features provided by &Q0, this mode allows for a DTE speed that is faster than the modem-to-modem link. Modem buffers and local flow control are used.

Note: In addition to the modes selected and initiated with AT commands, some V-series System Products capable of 9600 bps line speeds (ULTRA(TM) 96, for example) also support CCITT V.25bis as an alternate method of controlling the modem. This method of modem control is discussed following the descriptions of the individual communication modes.

++
A.2.1 Asynchronous Mode - &Q0
In this mode, the modem transmits and receives characters asynchronously to and from the local data terminal at the same nominal speed as the modem connection. Asynchronous mode can be selected with the &Q0 command option.

The asynchronous mode supports both the on-line and the "on-line" command states. When connected to an asynchronous data terminal, the modem can be configured, used as a dialer, and placed on-line for data communications. A complete explanation of communications in this mode is provided in both the Smartmodem Product User’s Reference and the V-series System Product User’s Reference.

If the modem receives a character while dialing the telephone number, it aborts the call and sends the OK result code; if a character is received after dialing but prior to the completion of the connection, it aborts the call and sends the NO CARRIER result code.

The modem exits the on-line state and returns to the command state when a loss of carrier exceeding the time interval stored in S10 is detected. For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

++
A.2.2 Synchronous Mode 1: sync/async - &Q1
Synchronous mode 1 is intended to support terminals capable of communicating both synchronously and asynchronously over the same V.24/EIA 232-D port. In synchronous mode 1, a call may be completed using asynchronous methods from the command state with the D or A command. The modem automatically switches to the synchronous on-line state when the CONNECT XXXXX result code is delivered to the terminal. Because call establishment in this mode is initiated from the asynchronous command state, the modem must be attached to a computer port with both synchronous and asynchronous capabilities.

If the modem receives a character while dialing the telephone number, it aborts the call and sends the OK result code; if a character is received after dialing but prior to the completion of the connection, it aborts the call and sends the NO CARRIER result code.

The data terminal must apply an ON condition to DTR before on-line data transfer can begin. Once the CONNECT XXXXX result code is received, the modem delays a period of time determined by S25 before examining the condition of the DTR signal. If DTR is ON, the modem enters the synchronous on-line state. If DTR is OFF, the modem hangs up and returns to the asynchronous command state. For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

The modem exits the synchronous on-line state and returns to the asynchronous command state when a loss of carrier exceeding the time interval stored in S10 is detected.

If DTR is OFF and &D2 is selected, the auto-answer feature is disabled regardless of the value of register S0.

+++
A.2.3 Synchronous Mode 2: stored number dial - &Q2
In this mode, the modem supports a synchronous-only data terminal or a computer with a synchronous adapter card. In synchronous mode 2, the modem automatically dials a number stored in location 0 (see the &Zn=x command) when the modem detects an off-to-on transition on DTR (when it is turned on). When configuring the modem for this mode, result codes should usually be turned off (the Q1 command option) as some computers do not interpret responses from the modem correctly. The modem can be configured in the asynchronous command state while &Q2 is in effect, but the D and A commands are disabled.

The modem exits the synchronous on-line state and returns to the asynchronous command state when a loss of carrier exceeding the time interval stored in S10 is detected. An on-to-off transition of DTR causes the modem to hang up and return to the asynchronous command state. For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

Synchronous mode 2 is similar to the CCITT Recommendation V.25bis ("Direct call and/or answer controlled by the DTE").

Once this mode has been selected, the modem may go off-hook and begin dialing the stored number as soon as the modem is connected to the terminal. To delay this transition, turn the modem off (place the power switch in the down position) before connecting the devices. When the connection is completed, turn the modem back on. Note that when DTR is off, auto-answer is disabled - regardless of the &D option selected.

+++
A.2.4 Synchronous Mode 3: manual dial with data/talk switch - &Q3
In synchronous mode 3, the DTR interchange circuit serves as a data/talk switch. This mode supports a synchronous-only data terminal or a personal computer with a synchronous adapter card installed. A telephone set must be attached to the PHONE connector on the rear of the modem or directly to the telephone line. This mode permits the data terminal operator to initiate a call using the telephone with the modem in "talk mode," and to complete the call by switching the modem to the "data mode" by turning on the DTR interchange circuit. When configuring the modem for this mode, result codes should be turned off using the Q1 command option. The modem can be configured in the asynchronous command state while &Q3 is in effect, but the D and A commands are disabled.

To originate a call in synchronous mode 3, the DTR interchange circuit must be off. This places the modem in talk mode. When the modem has been configured for this mode with the &Q3 command, the terminal operator can lift the receiver and dial the number. When the last character of the dial string has been dialed, the modem can be switched to data mode by causing the data terminal equipment to turn on the DTR signal. The operator should then hang up the receiver. When the data terminal equipment turns on DTR, the TR indicator (on the front panel of external Smartmodem and V-series System Products) lights up. For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

The modem exits the synchronous on-line state and returns to the asynchronous command state when a loss of carrier exceeding the time interval stored in S10 is detected.

If the connection fails, the modem automatically hangs up and switches from data to talk mode. To re-initiate the call, DTR must again be turned off.

++
A.2.5 Synchronous Mode 4: Hayes AutoSync - &Q4
With communication software incorporating the Hayes Synchronous Interface (HSI), the modem can communicate synchronously without a synchronous interface adapter card. In AutoSync mode, the modem places the call asynchronously then automatically switches to synchronous operation once the telephone connection is fully established.

If the modem receives a character while dialing the telephone number, the modem aborts the call and sends the OK result code; if a character is received after dialing but prior to the completion of the connection, it aborts the call and sends the NO CARRIER result code.

The data terminal must apply an ON condition to DTR before data transfer can begin. Once the CONNECT XXXXX result code is received by the DTE, the modem delays for a period of time determined by S25 before examining the condition of the DTR signal. If DTR is ON, the modem enters the synchronous operation state. If DTR is OFF, the modem hangs up and returns to the asynchronous command state.

The modem exits the synchronous on-line state and returns to the asynchronous command state when a loss of carrier exceeding the time interval stored in S10 is detected. For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

++
A.2.6 Error-Control Mode - &Q5
The error-control mode is a feature available only between Hayes V-series System Products, and other modems supporting particular protocols (e.g., CCITT V.42). This mode provides a means of controlling errors that may occur during transmission. When operating in this mode, the modem implements one of the error-control protocols that can be negotiated with the remote modem.

If the modem receives a character while dialing the telephone number, it aborts the call and sends the OK result code; if a character is received after dialing but prior to the completion of the connection, it aborts the call and sends the NO CARRIER result code. For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

Error-control mode is automatically selected in &Q5 communication mode (factory setting) for V-series System Products.

++
A.2.7 Asynchronous Mode with Automatic Speed Buffering - &Q6
Automatic Speed Buffering (ASB) is useful for computers and communication programs that do not automatically adjust to changing transmission speeds. ASB enables computer equipment to send and receive data to and from the attached modem at one particular transmission speed, regardless of the speed of the modem-to-modem connection. (If using a Hayes Smartcom Product, ASB is unnecessary; Hayes communications software adjusts to changing speeds and connection types.)

When a V-series System Product cannot complete an eror-control connection, it attempts to establish an asynchronous connection (if in factory configuration). When this occurs, the modem-to-computer (DTE) transmission speed may change, however. To accommodate computers or computers running software that cannot adjust to such a change, the local V-series System Product can be configured to enable Automatic Speed Buffering when it has to fall back to asynchronous communication. For negotiation failure treatments, see the description of S36 in Chapter One, and the modem's Installation Guide for the options available to the specific modem.

ASB buffers (stores) data temporarily, using local flow-control to parcel it from the computer as the modem is ready to receive it. The modem must be set with the &K command to use the appropriate DTE flow-control method. When using ASB, the modem signals the local computer when to start and stop sending data, depending on how full the modem's 256-byte buffer is. The factory setting for flow-control is appropriate for most computers. However, in rare instances, you may need to select another flow-control method. For example, if using XON/XOFF flow control (&K4 setting) results in undesirable interactions with the user's application software, then RTS/CTS (&K3) or transparentized XON/XOFF (&K5) are available.

To increase buffer size, change its "upper limit" by changing the setting of S50 from its factory setting of 16 bytes to a higher number in its range of 2-250 bytes. The value of the register reflects the number of bytes that can be stored in the buffer before the modem signals the computer to stop sending data. It is unlikely that the buffer's "lower limit," the level at which the modem signals the local computer to resume sending data, would ever need to be changed. However, this setting can be changed by writing to S49. The factory setting is 8 bytes with a range of 1-249 bytes. If these register values are set incorrectly or outside the acceptable range, they are automatically adjusted by the modem for ASB to work.

If the modem receives a character while dialing the telephone number, it aborts the call and sends the OK result code; if a character is received after dialing but prior to the completion of the connection, it aborts the call and sends the NO CARRIER result code.

For the responses associated with transitions of the DTR signal for this mode, refer to the discussions of the &D command in Chapter One.

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Appendix B:

Troubleshooting Tips

This appendix offers suggestions for remedying problems in modem communications. The first sections discuss setup and configuration issues. The last sections describe the tests that can be run using AT commands.

When problems first occur, the natural response is to question the operation of the modem on one end or the other. However, as well as the modem, problems might involve cabling (where appropriate), the computer, the communications software, and the telephone lines. All of these components are potential problem areas that should be considered before assuming the difficulty lies with the modem.

The first section of the appendix covers the following topics:

* Problems in Getting Started - the computer cannot communicate with the modem, or the connection is inconsistent or otherwise substandard

* Problems in Establishing Communications - DTE can communicate with the modem, but cannot make the connection with the remote system

* Problems Encountered while On-line - high error rate, dropped connections, scrambled data, and locked systems are among the difficulties that may be experienced

The discussions on these areas will help in setting up and maintaining communications. In addition, the test procedures outlined in this section are useful in determining the source of a problem with modem use.

The second part of the appendix describes testing that can be performed using AT commands.

****

B.1 The Communication Link

Because there is more to the connection than the modem, all of the components should be verified. The diagram below depicts the components in a communication link with two computers, two modems, and a dial-up telephone circuit. The installation may include a dedicated leased line rather than a switched central-office connection, or a mainframe host with an asynchronous or synchronous front-end processor at one end or the other. The general principles, however, are the same.

The configuration above is the context of modem use in which the communication link is discussed in this section. Although your modem may be an internal one, that is, installed inside the computer, the operational concepts are still the same.

The suggestions provided in the user documentation accompanying each Hayes modem will clear up the majority of problems in an installation. Most difficulties arise from simple causes - improper or loose connections or software incompatibility. Be sure to review the scenarios and tips before assuming the problem is something more. The suggestions in this section require some familiarity with the AT Command Set, DTE requirements, EIA 232-D/CCITT V.24 signals, and the telephone system.

A communication link problem may simply be due to a bad switchboard connection. Before calling the local telephone system, however, you should make sure the problem is not being caused by faulty or improperly connected equipment at either end. Telephone service can be very expensive, especially if the problem is not really with the phone lines.

****
B.2 Troubleshooting the Process
Troubleshooting the communications is best handled by analyzing the entire process. The failure is typically in only one area. This section looks at the causes and solutions to problems in the three main areas: getting started with the modem, making the connection, and the on-line connection.

+++
B.2.1 Problems in Getting Started
If a newly-installed modem does not work properly, here some likely causes:

* Improper physical connection (data cables not plugged in, etc.)

* Power supply not plugged into receptacle and modem therefore not powered up

* Parameters set for the DTE or software preventing communication between the DTE and modem

It is uncommon for the modem itself to fail, although this does occur. Checking modem operation is fairly simple when the modem is an external device. Generally, if the modem failed its self tests on powerup, the front panel lights will indicate a problem. For example, if the MR (modem ready) light does not come on, the modem may have a problem. Or if the HS light (external Smartmodem and V-series System Products) does not come on, the modem may be improperly configured.

Some cases of apparent modem failure may be caused by a power surge; changed parameters in your software that prevent it from finding the modem; an incompatible component in the communication link; an improper connection; or simply a device that is not plugged in or turned on. Before initiating the V.54 tests described in this chapter, re-examine the communications equipment to make sure none of the above conditions could be causing the difficulty.

....
B.2.1.1 Verifying the DTE-to-Modem Connection
The first interface to verify is the one between the DTE and the modem. This involves the cable, the modem, the software, and the DTE.

Cable Requirements
When a cable is used to carry signals between the DTE and the modem (external modem) any cable with transmit, receive, and ground will support standard asynchronous communications. To make sure that communications are performed properly, all other transmission modes require additional signals. For example, synchronous communication requires timing signals. Error-control communication with hardware local flow control requires RTS and CTS signals. For pinouts and descriptions of these signals, see the end of this chapter. To determine the signal capabilities of a cable, you can issue the &T19 command (supported only by V-series System Products). The &T19 command is discussed later in this section.

Another cabling factor that can influence communications is shielding. If any of the cables that are connected to the DTE (not just the one connecting the modem to the computer) is not shielded, interference can occur that may result in data errors. In all cases, the connector and the cable wires themselves should be shielded to reduce the possibility of interference.

DTE Port or Slot
Although it may seem obvious, not every computer has a serial port (the kind necessary for modem communications). Also, that port may already be taken up by a printer. Some computers support a parallel printer, instead. If the modem is an internal modem, and it has been installed correctly, this should not be a problem. However, selection of the port is important, no matter whether it is an internal or external modem. In fact, improper port selection is one of the most frequently diagnosed problems discovered by Hayes Customer Service.

Modem’s Command Processor and the Software
The process below may be useful for troubleshooting an unfamiliar modem/software combination. This could be either for a new program or the addition of a new modem to an existing installation. The process is oriented toward asynchronous operation. However, if troubleshooting a synchronous connection, you will need to verify the asynchronous portion of the modem’s operation anyway. The steps below help verify that command information is getting from the DTE to the modem and that its command processor is operating properly.

Process: If using communications software (and not a terminal), consult its user’s guide for suggestions and the proper procedure for issuing command interface with the modem. It is essential that you be able to establish a direct connection between the DTE and the modem, so that what you type is transmitted through the computer directly to the modem.

Step 1: Try issuing AT<CR>. The OK result code should be returned by the modem. The modem should be receiving your commands and be responding with a result code. If commands don’t seem to be reaching the modem, check the cable connection. Make sure you are addressing the desired communication port (COM1 or COM2). This option is set either with a software option or with an operating system command. For example, the Chooser is used to select the COM port for the Macintosh. The DOS SET command is used for IBM PCs and compatibles. The physical connection of the modem to a terminal determines the port.

Step 2: If you can’t see anything you type, or if for any other reason, you suspect that the modem’s settings may be preventing the connection, issue AT&F<CR> to restore the modem’s factory configuration. If the modem is a V-series System Product, try issuing AT&Q0<CR> to put it into normal asynchronous mode. In this mode, any software should talk to the modem. For example, local flow control will not be an issue if it is configured for standard asynchronous mode.

Step 3: Try issuing commands to the modem. For example, try the I commands used to identify the modem. If OK or the expected results (see the I command descriptions in Chapter Five) are returned, the modem is operating as it should. Try changing a few configuration settings, then resetting the modem with ATZ<CR>. If OK is returned, this part of the modem’s command processor is functioning properly. If no responses are returned from the modem, try issuing ATE1<CR> to enable command state echo. If characters are double, issue ATE0<CR> to disable command state echo, as the software is providing that echo already. Then try issuing some commands or reading some S-Registers.

Analysis: If using different communications software before running this procedure, either that software is not compatible with the modem, or an incorrect setting (e.g., communication port) that prevented the connection was corrected with the software used to make the direct connection. This setting should be changed in the original software.

If the connection were made with the same software that previously exhibited a problem, but no problem occurred when in direct connect mode, check the settings used in the command-oriented process above to make sure that the standard software interface (probably menu-driven) is storing settings such as COM port selection, speed, and character format. This may all seem too rudimentary, but a simple conflict of modem and software settings typically causes the problem.

If the process works in asynchronous mode, but does not in error-control or ASB mode, you may have cabling and/or local flow control problems.

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B.2.1.2 Checking the Dialer and the Telephone Lines

Once you are certain that the modem is receiving and responding to commands from the DTE, you can verify the modem’s dialing capabilities by attempting a call. This will also test the telephone lines.

Process: As described in the previous section, check your communications software for the procedure to issue commands directly to the modem. The steps below explain how to place a call using the D command and various dialing modifiers.

Step 1: If you receive an OK result code, instruct the modem to dial an actual telephone number (using the D command). If calling out of a PBX, remember to include the 9 or other outside access code in the phone number. Listen for a dial tone, followed by the tone dialing beeps. When these occur, they ensure you’ve entered the phone number correctly, and the local phone line is responding properly. If there is no dial tone, check the phone line by dialing with an ordinary phone. Note that some PBX systems must be modified to produce at least 48 volts DC for the modem to work.

Step 2: If you hear the phone on the other end ringing, then the remote phone is responding properly. Press any key to hang up.

Step 3: Try dialing another modem to see if you make a connection. A connection is indicated by two whistling sounds of different tones (the carriers), followed by a hissing sound. The modem should respond with a CONNECT XXXXX result code.

Analysis: When you have reached this point successfully, both modems are performing correctly. If no errors occurred with these steps, the problem is related to software, user error, or improper modem installation/setup. If this procedure indicated a problem with the modems or the communication link, go on to the next section. A common setting that might need to be changed is the software’s or modem’s response to the DTR signal (controlled by &D options).

You can check the modem’s answer capabilities (or when serving as the remote modem in the process above) by issuing the A command when the phone rings. The incoming call must be from a modem, however, not a voice call. The same sequence of carrier exchange will be made.

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B.2.2 Problems Encountered During Communications

Another set of problems can follow establishment of a data connection. These may range from loss of carrier to data loss. The sections below discuss these situations.

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B.2.2.1 Data Loss or Corruption

A typical complaint regarding connections is that of lost or corrupted data. A number of factors can affect the transmission of data.

Modem Settings

"Garbled," or otherwise faulty data can occur from the time the connection is made or just a momentary problem. If all the data that comes across is incorrect, or if the modems handshake with each other successfully but not data can be transferred, suspect an error in the setting of some communications parameter. For example, both systems must use the same asynchronous character format or synchronous framing and clocking scheme. Even if the local system is operating properly, if the remote system uses a different format, the garbled data may be exactly what is sent and not the result of any modem or transmission error.

Line Noise

Occasional garbling or loss may be the result of noise or otherwise poor quality of the telephone line. If a dial-up connection is too noisy, the connection should be broken, and the connection re-attempted; you get a different circuit each time. One that is acceptable for voice may not be for data. With a leased line, the circuit is always the same. If you experience line noise or line drops, you should contact (or the software should recommend that the user contact) the vendor of the leased line.

Transmit and Receive Levels

Other factors that affect both leased and dial-up lines are the transmit and receive levels. These settings determine the signal levels used by the modem in each direction. Some Hayes modems permit these levels to be adjusted. The range and availability of these adjustments is in large part controlled by the local telephone system. For example, the recommended settings and ranges are different for modems sold in the U.K. than for those sold in the U.S. See the documentation accompanying the modem to determine whether this capability is supported.

DTE Processor Restrictions

Some multi-tasking operating systems can occasionally lose small amounts of data if the computer is heavily loaded and cannot allocate processing time to the communications task frequently enough. In this case, the data is corrupted by the DTE itself. This could also cause incomplete data transmission to the remote system. DTE processor capabilities should be a concern when developing software for data communications when the line speed is greater than 9600 bps and the modem-to-DTE connection is 19200 bps or higher (for example, when data compression is used). The modem will provide exact transmission of the data it receives, but if the DTE cannot "keep up" with the modem because of other tasks or speed restrictions, precautions should be taken when writing software or when adding modems with extra high speed capabilities into a link.

One way to avoid the problem of data loss caused by the DTE is the use of an upgraded serial port such as Hayes Enhanced Serial Port(TM) (ESP(TM)) card.

This card replaces the existing serial card, providing two ports, data buffering, and a communications co-processor to take some of the load off of the DTE processor. For information regarding this product line, contact Hayes Customer Service.

Buffer Overflow
Hayes V-series System Products provide a data buffer for overflow when the modem is transmitting data to the DTE faster than it can process it, or vice versa. The upper and lower limits of the buffer can be adjusted with S-Registers 49 and 50, although the factory settings suit most situations.

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B.2.2.2 Dropped or Lost Connections
Phone line quality or features such as call waiting can cause lost connections. As described above, if the connection keeps dropping, you might want to contact the telephone company. However, you may first want to try a connection with another remote system and/or try using the modem from a different phone connection altogether. In addition to phone line problems, two other things might cause loss of connection.

Call Waiting
The call waiting feature available on some dial-up lines momentarily interrupts a call, causing a click, to inform voice call users that another call is coming through. This process effectively interrupts the carrier signal and may cause some modems to drop the connection.

One way around this is to set S10 to a higher value so the modem tolerates a fairly long loss of carrier signal. Data loss may still occur, but the connection will not drop. Of course, the remote modem must be similarly configured. When originating the call, a special prefix can be issued as part of the dialing string to disable call waiting for the duration of the call. The exact procedure varies from area to area; contact the local telephone system for details.

Automatic Timeout
Some Hayes modems offer an automatic timeout feature, to prevent an inactive connection from being maintained. This inactivity delay can be set or disabled with S30. This "watchdog" feature prevents occurrences such as undesired long distance charges for a connection that was unintentionally maintained.

System Lock up
There are situations in which systems do lock up, but in many cases it is simply that one or the other of the DTEs has been "flowed off," that is, the character that stops data transfer has been inadvertently sent. This can happen during error-control connections if the wrong kind of local flow control has been selected. For an explanation of local flow control options, see the &K command definition in Chapter One. In addition, the problem could be the result of incompatible EIA 232-D/CCITT V.24 signaling. The section below provides some situations and tips that will help if the communication link seems to lock up.

****
B.3 Special Environment Considerations
The charts below provide some hints for custom setups to remedy problems for DTE and telephone line peculiarities. Because Hayes modems can be configured to suit almost any combination of components in a communication link, you can

adjust to compensate for limitations in almost any computer or telephone system (within the limits imposed by the local telephone authorities).

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B.3.1 Custom Modem Setup for Mainframe or Minicomputer Host

Check the following host symptom/limitation situations for a solution involving modem re-configuration.

Host Limitation	Hayes Solution
Can't control DTR or issue escape sequence	Select &D0 : Modem ignores changes in DTR status (factory setting)
Can reset itself but not the modem	Select &D1 : Modem enters command state when on-to-off transition of DTR is detected.
DTR timing is not adjustable	Adjust register S25 delay time
Unable to monitor carrier (older IBM Hosts)	Select &S1: Handshake asserted prior to handshake negotiation
Must see DSR at all times (VAX systems)	Select &S0: DSR always asserted
Timing will not support lengthy handshakes (re-associated with some high-speed modems)	Select &S2: DSR asserted after handshake negotiation, but before CONNECT result code is sent to DTE. Also select a specific negotiation handshake option (N command option.) which specifically matches the modem combinations.
Must see CTS to be able to talk to modem	Select &R: ignore RTS; always assume presence of CTS.
RTS/CTS timing not adjustable	Adjust S26 RTS-to-CTS delay time
Not able to recognize FDX modem on 2-wire telephone line	Adjust S26 RTS-to-CTS delay time

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B.3.2 Custom Modem Setup for Telephone System Requirements

Check the following telephone system symptom/limitation situations for a solution involving modem re-configuration.

Telephone System Limitation or Problem	Hayes Solution
Noise on telephone line causes modem to falsely detect carrier on line	Increase S9 setting: Carrier Recovery Time
Modem connection broken due to noise spikes on the telephone line	Increase S10 setting: Lost Carrier-to-Hang-UP Delay
Security problems with incoming calls connecting onto prior host sessions - indicating that host can't reset soon enough	Decrease S10 setting; if S10 is set to 255, the modem will not hang up when carrier is lost.

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System needs to be able to originate calls     Issue the R command within a
in answer mode for call-back security          dial string (Reverse mode)

Telephone system is too slow to be able to     Increase register S11 setting:
 respond to auto-dial DTMF (tone dialing)      Tone dialing speed
pulses

Business telephones (multi-line key systems)   Check setting of &J command;
exhibit false "busy" light indications         use the &J1 setting with RJ-12
                                               and RJ13 type phone jacks.

System must be able to call past               After accessing the PBX, issue
unattended operator positions                  the following dialing command
                                               modifiers: !(*;#)


*****************************************************************************
B.4 Using AT Commands to Test Modem Circuits
In addition to the powerup tests the modem performs, you can also use AT
commands to check the modem’s functions. This section describes the tests that
can be performed, provides a procedure for each test, and the explains the
results that can be expected.

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B.4.1 Available Tests
As part of the modem’s operation, it can be placed in several loopback
conditions. These conditions are primarily for the purpose of testing the
digital and analog capabilities of the modem by simulating the activities
performed by these functions during the communication process.

These loopback patterns can serve as diagnostics to help in determining
whether the source of a communication problem is a local modem, a remote
modem, or connections in between. Although these tests are oriented toward
problems in a new installation, they are also useful if a previously working
modem suddenly fails. Refer to the troubleshooting information provided in the
documentation accompanying the modem(s) for suggestions on remedying a
communications problem.

Failures in a point-to-point communication link, usually characterized by
unacceptably high error rates or total inability to communicate, may be the
fault of either the local or remote computer, the local or remote modem, or
the telephone company circuit. The modem’s diagnostic and test facilities
enable you to determine the source of the problem:

*  Local Analog Loopback: Tests the path that includes the local modem and
local computer

*  Local Analog Loopback with Self Test: Checks the operation of the local
modem with an internally generated test pattern

*  Remote Digital Loopback: Verifies the path that includes the local
computer, local modem, remote modem, and telephone circuit

*  Remote Digital Loopback with Self Test: Tests the path that includes the
local modem, remote modem, and telephone circuit with an internally generated
test pattern. This test requires a CCITT compatible modem.
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* Local Digital Loopback: Tests the communication link, the local modem, and the remote modem (permits a non-CCITT compatible, remote modem to engage in a digital loopback test with the local modem)

All digital loopback tests must be performed while the modem is configured for asynchronous operation. Before beginning, place the modem in the asynchronous mode with the &Q0 command.

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B.4.2.Performing a Test

Tests are performed by issuing AT commands to the modem. Some tests require a connection be established. Others, like the internal memory diagnostics and analogue loopback tests, check the local modem only and therefore do not require a link with a remote modem. The procedures below explain how to initiate and terminate tests.

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B.4.2.1.Initiating a Test

All of the diagnostic tests must be initiated from the asynchronous command state (&Q0). To use the loopback tests:

* establish a connection (except when running Analog Loopback L3 test)), and return to the command state by issuing the escape sequence (+++), or if the &D1 DTR option is selected, by generating an on-to-off transition on DTR

* issue the appropriate &T command once in the command state.

These tests are performed from the asynchronous command state. The results of these tests may be will help check out the modem’s function and the quality of the communications link.

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B.4.2.2 Terminating a Test in Progress - &T0

A test may be terminated from the command state at any time by issuing the &T0 command to the modem. If the local analogue loopback or remote digital loopback tests are being performed, it is necessary to issue the escape sequence to return to the command state before sending the &T0 command. Commands that follow &T0 in a command line are ignored.

Entering the H0 command will terminate a test, leaving the value of S18 at its current value; resetting with the Z command terminates the test, resetting the value of S18 to 0. A soft reset with the Z command re-configures the modem with the selected user profile. Both techniques break the connection.

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B.4.2.3 Setting the Test Timer - S18=

The test timer determines the duration of a test. S18, when set to a non-zero value, establishes the duration of the modem’s diagnostic tests. When a test has been active for a period equal to the value chosen for this register (from 1 to 255 seconds), the modem will automatically stop the test and return to the command state.

For example, if the register is set to 10 (ATS18=10<CR>), a test, when initiated, will continue for 10 seconds. Setting S18 to zero (ATS18=0<CR>) disables the test timer (factory setting). Tests are then terminated with the &T0 command or by resetting the modem.

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B.4.3.Testing with Analog Loopback
Use the analog loopback tests if you suspect the modem is causing errors in
data transmission. The local analog loopback test will verify both the local
modem and the local data terminal equipment. If this test fails, the data
terminal equipment rather than the modem may be at fault. The local analog
loopback with self test will verify the integrity of the local modem only. If
this test fails, the local modem is at fault. If the modem passes both of
these tests, attempt the remote digital loopback with self test to verify the
modem-to-modem communication path.

............................................................................
B.4.3.1.Local Analog Loopback L3 - &T1
Use the analog loopback test if you suspect the modem is causing errors in
data transmission. The local analog loopback test will verify both the modem
and the local computer. If the local analog loopback test fails, the local
computer may be at fault.

Note: This test may be performed with a V.21, V.22, V.22bis, or V.23
connection.

Set the local computer to echo characters and the local modem to echo commands
received from the local computer (the E1 option selected). Initiate the test
with &T1. Type a few sentences; they will be looped back to the local
computer.

If the modem echoes your keyboard input to the screen as you typed it, the
modem is operating correctly. If not, the modem may be faulty. To end the
test, enter the command state (+++) and issue the &T0 command.

............................................................................
B.4.3.2 Local Analog Loopback with Self Test - &T8
This test is used to verify the integrity of the local modem's transmit and
receive circuits. During this test, an internally generated test pattern is
transmitted from the modem, looped back into the receiver circuit, and
compared with the original pattern for any errors.

Note: This test may be performed with a V.22 or V.22bis connection (&Q0 and B0
selected).

Set the computer to echo characters and the local modem to echo commands
received from the computer (the E1 command selected). Initiate the test with
&T8. When the test is terminated, with the &T0 command, the modem will return
a three-digit test result (e.g., 000=no errors, 012=12 errors). If the error
count reported is 000, the local modem passed the test. An error count of 255
indicates that 255 or more errors were detected.

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B.4.4 Testing with Digital Loopback
Local digital loopback and remote digital loopback together test all of the
components in the communication link, including the modems. Data sent from one
modem is looped back to it by the other modem without going through the other
modem's computer. Local digital loopback tests the communication link from the
remote modem; remote digital loopback tests the communication link from the
local modem.
```

When local and remote digital loopback indicate a modem problem rather than a communication link problem, both parties should run local analogue loopback to test the modems. If both modems test good but problems persist, disconnect and place another call. If the problem still exists, the phone line or another component in the communication link is faulty.

....

B.4.4.1 Remote Digital Loopback L2 - &T6

Remote digital loopback verifies the operation of both modems, the local computer, and the telephone circuit, by commanding the remote modem to loop data sent to the remote system back to the local modem.

Note: This test may be performed with a V.22 or V.22bis connection and &Q0 mode selected.

Before initiating remote digital loopback, establish a connection with a remote modem. Then, enter the command state and issue the &T6 command to begin the test.

Type a few sentences; they will be looped back to the local computer without appearing on the remote screen. If the modem echoes your keyboard input to the screen as you typed it, the modem is operating correctly. If the received data does not match what you typed, one of the modems or the local communication link is not functioning properly. To end the test, enter the command state and issue the &T0 command.

Note: The local modem requests a digital loopback with the remote modem through a special CCITT standard handshake sequence. The remote modem automatically acknowledges the request if it has been conditioned to do so with the &T4 command. (See the discussions on the &T4 and &T5 commands.) If the remote modem is not Hayes-compatible, it may not permit this test to be executed from the local modem (response will be ERROR). However, if the remote user can put the modem into local digital loopback or an equivalent state, the test can be performed from the local modem.

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B.4.4.2 Remote Digital Loopback with Self Test - &T7

This test verifies operation of the local modem, the remote modem, and the telephone circuit. The local modem sends a self test pattern to the remote station. The remote modem, when configured to grant remote digital loopback (with &T4), loops its receive data stream back to the local system. The local modem examines the receive pattern and increments an internal error counter each time an error is detected.

Note: This test may be performed with a V.22 or V.22bis connection and &Q0 mode selected.

Before beginning the test, establish a connection with a remote modem. Then, enter the command state and initiate the remote digital loopback by issuing &T7. When the test is terminated with the &T0 command, the modem will return a three-digit test result (e.g., 000=no errors; 012=12 errors). If the error count reported is 000, the local and remote modems and the telephone circuit passed the test. If errors were encountered, initiating a local analogue loopback test will further isolate the source of the problem. An error count of 255 indicates that 255 errors or more errors were detected.

....

B.4.4.3 Local Digital Loopback - &T3
Local digital loopback tests the communication link and the remote modem. During this test, the local modem loops incoming data directly back to the remote modem.

To begin local digital loopback, establish a connection with a remote modem, then enter the command state and issue the &T3 command.

The operator at the remote system should type in a few sentences. They will be looped back to the remote computer. When the operator at the remote system indicates that the test is complete, issue the &T0 command to end the test. If the operator at the remote system reports that the data came back without errors, the remote modem and the communication link are functioning properly.

....
B.4.4.4 Grant RDL Request from Remote System - &T4
This command configures the local modem to grant a request from the remote modem for a remote digital loopback test (factory setting).

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B.4.4.5 Deny RDL Request from Remote System - &T5
This command prohibits the local modem from granting a request from the remote modem for a remote digital loopback test.

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B.4.5 Testing the Tone Dialer - &T2
This command allows testing of the modem's multi-frequency tone dialer by sending out continuous tones of the keypad characters (0-9, A-D, *, #).

To generate any tone combination, type:

AT X1 &T2 DT (followed by one of the keypad characters: 0-9, A-D) <CR>

The modem will transmit a continuous tone pair until the <CR> key is pressed or &T0 is entered to terminate the test.

****
B.5 Testing the Cable
The cable (If used to connect the modem to the DTE, rather than through an internal slot) is an integral part of the communication link. Even if the DTE, serial card, and modem support all of the signals necessary for full communications, if the cable supports only transmit and receive signals, communication may be limited.

+++
B.5.1 Cable Quality
High-speed and lengthy distances between the modem and the DTE are two reasons to make sure of characteristics like shielding that quality of the cable is full pinning should be used according to the EIA232-D/CCITT V.24 standards descriptions at the end of this chapter.

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B.5.2 Checking Cable Signals - &T19
The &T19 command was created to provide a way for software to test the capabilities of the cable between the DTE and the modem, instead of assuming that the RTS/CTS lines (used for hardware local flow control) were supported

in a cable. This command is implemented in Hayes Smartcom Products; when setting up the modem, one of its initial operations is issuing this command. The command is fully documented in Chapter One. The signals tested by this command are according to the EIA 232-D/CCITT V.24 standards described in the next section.

****
B.6 Testing Internal Memory
The various forms of the I command instruct the modem to query its memory for information about itself. Although the results of these test are most frequently used by Hayes Customer Service, some software also uses the responses when determining how to set up the modem prior to communication. These tests request information about the modem’s firmware; therefore, it is unnecessary to connect with a remote system before issuing the I command. The various options for this command are explained fully in Chapter One.

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Appendix C:
Modem-to-DTE Interface

This appendix discusses the requirements and capabilities of the modem’s interfaces to the DTE line. External modems interface to the DTE according to the EIA 232-D standard. The particulars of this interface for Smartmodem 300, Smartmodem 1200, Smartmodem 2400, Smartmodem 9600, V-series Smartmodem 2400, and V-series Smartmodem 9600 are described. Hayes internal modems use the EIA 232-D signals, although the specific use of these circuits is determined by the bus interface of the computer.

****
C.1 EIA 232-D/CCITT V.24 Interfaces
EIA 232-D is the EIA (Electronic Industries Association) definition of the electrical interface used for connections of data terminal equipment (DTE) to data circuit terminating equipment (DCE). This standard has typically been referred to as RS 232-C; however, when it became an accepted standard (EIA) rather than a recommended standard (RS), the Association revised the version "D."

Although not exactly the same, EIA 232-D is compatible with CCITT V.24, V.28, and ISO IS2110 standards. This standard prescribes the interface to the local DTE and normally uses a DB-25 connector with 13 pins in one row and 12 in the other. EIA 232-D supports speeds up to 20 Kbps at a distance of 50 feet. EIA 232-D falls under layer one (physical layer) of the OSI (Open Systems Interconnection) model.

Hayes modems support the electrical portion of the EIA 232-D standard completely. However, signal definition varies from modem to modem.

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C.2 Signals Used in the EIA 232-D Interface

The following signal types are used in the EIA 232-D interface. All of these types are not required for all communications. Their corresponding CCITT V.24

equivalents are also provided.

Ground signals are present for protection and signal reference. These signals are present on pins 1 and 7 of the interface. (7 always needed)

Data signals are used to transmit and receive data across the interface. The pins used are 2 for transmit and 3 for receive. (always needed)

Control signals are used to ensure that both the DTE and DCE are ready before any information is transmitted. These signals are also used for flow control during the transfer of data. Pins 4, 5, 6, 8, 20, and 22 are control signals. (need depends on the application)

Timing signals control the rate at which data is transmitted and received across the interface. These signals are only used for synchronous transmission and are located on pins 15, 17, and 24.

The EIA 232-D signals and their CCITT equivalents are outlined below:

Inter-change circuit	CCITT equiva-lent	Description	Pin	To DTE	To DCE
AA	101	Protective Ground	1		
AB	102	Signal Ground	7		
BA	103	Transmitted Data	2		*
BB	104	Received Data	3	*	
CA	105	Request to Send (RTS)	4		*
CB	106	Clear to Send (CTS)	5	*	
CC	107	Data Set Ready (DSR)	6	*	
CD	108.2	Data Terminal Ready (DTR)	20		*
CE	125	Ring Indicator (RI)	22	*	
CF	109	RLSD (DCD)	8	*	
CG	110	Signal Quality Detector	21	*	
CH	111	Data Signal Rate Detect DTE	23		*
CI	112	Data Signal Rate Detect DCE	12	*	
DA	113	Transmitter Signal Element	24		*
DB	114	Transmitter Signal Element	15	*	
DD	115	Receiver Signal Timing	17	*	
SBA	118	Secondary Transmit	14		*
SBB	119	Secondary Receive	16	*	
SCA	120	Secondary RTS	19		*
SCB	121	Secondary CTS	13	*	
SCF	122	Secondary DCD	12	*	

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C.3 EIA 232-D Signal Definitions

This section provides definitions of the signals used for modem operation. The circuit is first defined according to EIA 232-D, then its use explained according to the way it is used by Hayes modems.

Protective Ground (pin 1) is connected to the equipment frame. The ground pin is electronically bonded to the the modem case for external Smartmodem and V-series System Products, and to the computer's housing through the particular bus for internal modems. Hayes Personal Modem Products do not use this signal.

Transmit Data (pin 2) is data that is transmitted from the DTE to the DCE device. Data should not be placed on this pin unless the RTS, CTS, DSR, and DTR signals are on. This is the circuit that carries the data from the attached computer or terminal to the modem for transmission across the telephone lines.

Receive Data (pin 3) is data that is transmitted from the DCE to DTE. This circuit carries the data from the modem to the attached computer or terminal.

Request To Send (pin 4) requests the channel for data transmission and is usually ignored during asynchronous operation. It is also used to control the direction of transmission on a half-duplex link. This signal indicates whether the attached DTE is ready to receive data. When the modem is operating asynchronously, this signal is always on, indicating that the modem can send at any time. The circuit functions the same way in error-control mode, unless the RTS/CTS local flow control method has been selected. In this case, the modem uses this signal to determine when the DTE is ready to receive data. In synchronous, on-line operation, the modem can be configured to ignore RTS or respond to RTS by turning on CTS after the delay specified by S26. The modem's use of this signal is controlled by the &R command. When in command state, the modem always ignores RTS.

Clear To Send (pin 5) An ON condition of this signal indicates that the modem is ready to transmit data. This signal comes high after both DSR and DCD go high. This signal indicates whether the modem is ready to accept data, from the attached DTE for transmission. When the modem is operating asynchronously, this signal is always on, indicating that the modem can receive data at any time. In error-control mode, the signal is maintained on unless RTS/CTS local flow control has been selected. In this case, the modem uses this signal to indicate to the DTE that the modem is ready to receive data. When operating synchronously, but in the asynchronous command state, the modem also maintains the CTS signal on. The modem turns CTS off immediately upon going off-hook, and maintains CTS off until both DSR and DCD are on and the modem is fully prepared to transmit and receive synchronous data. The modem can also be configured to turn CTS on in response to an off-to-on transition of RTS (see discussion of &R command).

Data Set Ready (pin 6) An ON condition indicates that the modem is off hook and is not in test mode. The signal normally goes high as soon as a remote carrier is detected. This signal indicates whether the modem is connected to a communication channel and is ready to exchange control characters to initiate data transmission. In asynchronous or error-control mode, the modem can be configured to maintain this signal on at all times or have it reflect the actual state of the DSR circuit.

Signal Ground (pin 7) establishes a common ground reference potential for all signal circuits.

Data Carrier Detect - RLSD (pin 8) is turned on when the modem receives a signal from the remote modem that meets the criteria for demodulation. This signal indicates whether the receiver section of the modem is or is not accepting transmitted data. In asynchronous or error-control mode, the modem can be configured to maintain this circuit on at all times, or to track the presence of a data carrier from the remote modem. In synchronous mode, this circuit always tracks the presence of data carrier. See the discussion of the &C command.

Transmitter Clock (pin 15) provides the DTE with bit timing clock in synchronous mode of operation. This signal synchronizes the local modem transmitter with the receiver of the remote modem receiver. The clocking for this signal can be sourced from the local modem, the receive carrier, or the attached computer (from pin 24). Selection is made with the &X command. Regardless of the source of this clock, this signal is applied by the modem to pin 15 of the RS-232 connector and is used by the DTE to time the transmission of serial data on the TD circuit (pin 2). This signal pertains to synchronous communications only.

Receive Clock (pin 17) provides the DTE with receive bit timing clock in synchronous mode of operation. This signal provides the receiver section of the modem with timing information. The modem always derives this signal from the receive carrier, and applies it to pin 17. This signal is used by the data terminal to time the incoming bit stream from the local modem (RD - pin 3). This signal pertains to synchronous communications only.

Data Terminal Ready (pin 20) indicates to the DCE that the DTE is ready for transmission. It may also be used for call termination. This signal prepares and maintains the connection to a remote system. The modem can be configured for a variety of responses to the DTR signal, as required for the communication mode (asynchronous versus synchronous) or communication environment (attached DTE or software). See the &D command discussion.

Ring Indicator (pin 22) gives an indication of a ring being received on the telephone line. This circuit carriers signal information to indicate the modem is receiving call signals (ring/tones). The modem turns on this signal whenever an incoming ring is detected. When the modem is configured for AutoSync, this pin carries a signal to indicate the end of a synchronous frame, and does not monitor incoming rings.

Transmitter Clock (pin 24) provides the modem with transmit signal element timing information (optional). If the DTE sources the transmit signal element timing on this pin, the modem can be configured to use this clock signal rather than its own internal clock. This signal pertains to synchronous communications only.

Alternate Rate Select (pins 12 and 23) The modem turns on this signal on either of these pins to indicate the selection of the current line speed.

****
C.4 Modem Interface Connector
External modems typically interface to the attached computer or other DTE through a serial port connector. The connector used on external Smartmodem Products and V-series System Products as the modem-to-DTE interface, is a male DB-25 connector. Personal Modem Products use an eight-pin DIN connector. Internal modems interface according to the bus structure of the computer in which the modem is installed. For specific information on a particular bus

structure, see the owner’s manual or reference guides for that computer.

The table below indicates the way Hayes modems with this type of connector use the pins to carry EIA 232-D and CCITT V.24 signals. The DTE may use certain signals differently, or may not use them at all.

Pin	Signal Name
1	Protective Ground - PG
2	Send Data - SD
3	Receive Data - RD
4	Request to Send - RTS
5	Clear to Send - CTS
6	Data Set Readey - DSR
7	Signal Ground - SG
8	Carrier Detect - CD
9	Reserved for Test
10	Reserved for Test
11	Unassigned
12	Secondary Carrier Detect
13	Secondary Clear to Send
14	Secondary Transmitted Data
15	Transmit Timing - TT
16	Secondary Received Data
17	Receiver Timing - RT
18	Unassigned
19	Secondary Request to Send
20	Data Termfifnal Ready - DTR
21	Signal Quality Detect
22	Ring Indicate - RI
23	Data Signal Rate Select
24	Transmit Timing TT
25	Unassigned

The physical connector as well as the pin numbers of the end of the cable on the DTE side will vary according to the DTE’s serial port.

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Appendix D:
Modem Application Development

This appendix offers suggestions for developing applications software using the AT command set. The techniques described apply to Hayes modems in general except where specifically indicated. Although provided here, this information is intended for experienced programmers who want assistance in modem application development.

****

D.1 Modem Identification

The initial concern for most communications software is modem identification. Before the software determines the type of modem (e.g., is it a Hayes modem, a high-speed modem, what features does it support - error-control or compression?). If the AT command controller portion of the software will be designed to work with a known set of modems, the controller can be much simpler as the variables it must address are fewer as the predictable behavior of the modems within the given feature set that will be addressed by the software.

Because the type of modem that will be present, certain assumptions can be made regarding modem characteristics, such as maximum transmission rate, support of V-series AT commands or specific commands such as L or X. If a more general application is being designed for an environment about which assumptions cannot be made regarding type or brand of modem that might be used, the software’s first task should be to identify the modem.

The I0 and I4 command options make this process simple. In the initial versions of Smartmodem 1200, I0 returned the three digit response: 120. Since then, responses have been extended for several groups identifying modem supporting 2400 bps, 9600 bps, and other products. The I0 response simply indicates the speed category of the modem.

The result of the I0 command is a three digit number which identifies the category of modem product. Some unique I0 values can be used to identify a unique product which has specific behaviors. 960, for example, identifies a V-series System Product capable of 9600 bps, which has additional commands and behaviors.

The I4 command option was added when the V-series System Products were introduced. This option provides a reliable means of communicating specific features and modulation protocols to software. The responses to the I4 command are strings delimited by <CR> and beginning with a lowercase letter and typically followed by a hex-character bit-map. The I0 and I4 responses currently defined are detailed in the description of the I4 command in Chapter One. The tables show the decoding of the hex-map returned in the "a" (Smartmodem features), and "b" (V-series features) bit-mapped strings. If I4 is used to identify features of the modem, consider that new result strings are periodically defined that may be returned in addition to those expected. Fields once designated as "reserved" that held a zero may now have values assigned. The strings themselves may also be different of lengths than previously implemented.

In spite of the modifications to this command necessary to maintain currency with new modems, the I4 command is the best way for software to determine the modem type and capability, if the guidelines below are considered:

* I0 or I4 commands should be issued at 1200 bps. All Hayes products (including the Smartmodem 300) respond to AT commands at 1200 bps. Most other brands also respond at 1200 bps. You can switch to a higher transmission rate once the modem has been identified.

* Result codes should be parsed as strings surrounded by <CR><LF>. The string will begin with a lower-case letter followed by up to 39 additional characters.

----

* After all result strings have been sent, an OK result is returned that obeys the V and Q command settings.

* ERROR, OK, or a three digit result in response to the I4 command should be

expected. These results may be returned by products shipped before the I4 command was introduced, or by non-Hayes products.

* The length of the strings may be different than anticipated If shorter than expected, empty positions should be presumed zeros. If longer than expected, extra characters should be ignored.

* Some non-Hayes brand modems return unpredictable results in response to I0 or I4 commands. One brand of modem actually responds with its configuration when the I4 command is sent.

An example I4 command and response is shown below:

AT E0 V1 Q0 S0=0 I4 <CR>

response:

<CR><LF>a087840C004424<CR><LF>
<CR><LF>bF60410000<CR><LF>
<CR><LF>cUS<CR><LF>
<CR><LF>m0000000001001FFFF<CR><LF>
<CR><LF>OK<CR><LF>

Note: each I4 result is surrounded by <CR><LF>, not all responses are hex-strings, and some responses may not be expected at all.

****
D.2 Result Code Recognition
Hayes-compatible modems support verbose and numeric forms of result codes. Unless echo may be a problem and will be installing the controller in a limited-growth environment, verbose results rather than numeric results are preferable. Numeric result codes were originally intended to make it easier for software to control the modem, but there are two primary reasons they should not be used:

Software can be confused by a command echo. For example, if the following command were sent with echo on (E1) and numeric results (V0):

AT ... S9=20 <CR>

The resulting data, echoed by the modem, would be followed by the numeric result code zero, meaning OK:

AT ... S9=20<CR>0 <CR>

Software may become confused by seeing a 0<CR> result which is actually part of the command echo, then another 0<CR> which is the numeric result. A program can become out of synchronization with the command processor in the modem.

Turning off echo mode (E0) in the initial setup string would solve this problem; however, do not end that command with any digits (simply E).

Another shortcoming of numeric results is that the software must anticipate all possible responses. This requires updating of controller software whenever new result codes are added. For example, suppose a CONNECT 115200 result were added with a numeric value of 31. If verbose results were used instead, and the controller directed to interpret the number after the CONNECT result as simply the connection speed in bits per second, no changes to the driver are necessitated by the new result code. If, however, numeric result codes were used, the result code 31 must be added to the table, and the controller modified to interpret it appropriately.

As characters are received, they should be processed through a state machine providing the functionality of the one outlined below. This state machine recognizes strings surrounded by <CR><LF> characters and store the string in a character array. <CR><LF> are defined by the S3 and S4 registers.

Sample State Machine

Initialize with: state = 1 ;

```
ch = <next character from the input>
switch( state )
{
case 1:     /*-- Scanning for leading CR --*/
               if( ch == CR ) state = 2 ;
               i = 0 ;
               break ;
case 2:     /*-- Scanning for leading LF --*/
               if( ch == LF ) state = 3 ;
               else if( ch == CR ) state = 2 ;
               else state = 1 ;
               break ;
case 3:     /*-- Buffer result, watch for trailing CR --*/
               if( ch == CR ) state = 4 ;
               else buf[ i++ ] = ch ;
               if( i > LIMIT ) state = 1 ;
               break ;
case 4:     /*-- Scanning for trailing LF --*/
               if( ch == LF ) state = 5 ;
               else if( ch == CR ) state = 2 ;
               else state = 1 ;
               break ;
}
if( state == 5 )
{
     buf[ i ] = 0 ; /* Null terminate buffer */
     <process result in 'buf'>
     state = 1 ;
}
```

This state machine can be imbedded within a loop that reads all received data one character at a time, checks for a timeout, and also checks for user abort. Once a result is recognized, that loop can be exited or continued if additional results are expected.

Once a result code string is returned, it can be compared against the known result code strings. Some strings may incorporate wild-card suffixes. For example CONNECT followed by any numeric value indicates a successful connection at the indicated transmission rate. Even if a result such as CONNECT 38400 is not anticipated, if the controller has been coded for wild-card recognition, the controller will be capable of interpreting such responses correctly. This practice also facilitates interpretation of connection failed messages that are preceded by NO followed by any other character string such as DIALTONE, CARRIER, or ANSWER.

****

D.3 Modem Preparation

Once the modem has been identified, the controller can continue to program any registers or user-defined values into the modem necessary prior to initiating the connection process. Typically, the setup operation is separated from the connection processing because it is performed independently of whether the call establishment will be in the originating or answering mode.

Setup commands can be issued at the highest transmission rate the modem supports as determined from the identification process or it may be fixed at a certain value if the modem is not identified.

++

D.3.1 Reset

Before issuing any other commands to the modem, it is advisable to issue a Z or &F command to the modem before the identification or setup process. No specific response should be anticipated. The modem may be setup to return numeric, or no result codes. If a reset will be used, the following points should be considered:

* Even if a recognizable result within 2.6 seconds, the program should continue. (Some modems do a lengthy reset process before responding with a result; others may be in Q1 or V0 mode).

* Following an OK result, an additional 600ms delay should be imposed. Some modems will respond with an OK then do lengthy reset processing, in which case they are unable to accept additional commands.

After the modem is reset, the first setup string (e.g., verbose rather than numeric result codes) should be issued, then the identification command.

++

D.3.2 Setup

Software should generally provide some modem setup. However, the software can be written to rely on modem configuration via a stored profile recalled on reset, or by DIP switches set depending on the product. In this case, any unique settings must have been setup prior to running the software, and all the program does is send the Z command to recall the the desired profile. Even more basically, software can assume the is in the power-up state. However, unless the software will be used within a very predictable environment, these assumptions may result in failures with the controller software.

Some commands will always be overridden by the controller in order to ensure its proper functioning. Other commands options should either default to the factory setting, or simply act as the "transfer agent" for the commands specified by the user. Menus and dialogs can be provided to prompt the user for specific activities; the program can then interpret these requests and configure the modem accordingly, as Hayes Smartcom Products do, or provide the user opportunity to enter AT command strings.

Commands frequently set by a modem controller:

E0 - Turn off echo mode to avoid having command echoes pass through the result code scanner

Q1 - Enable result codes to ensure that commands are being processed, and to synchronize with the modem command processor (except for synchronous communications where result codes may cause the DTE confusion)

V0 or V1 - Use either verbose (recommended) or numeric result codes

S0=0 Disable auto-answer during the setup process to avoid inadvertent disruption by an incoming call

H0 - Ensure modem is on hook before continuing to the answer or originate step

S12=10 Set the escape guard time to 200ms to hasten the escape for hang-up process. Also reduces the probability of inadvertent user escapes

S2=* Change the escape character for two reasons: To avoid inadvertent user escapes, and to provide different escape characters for answer and originate sides. This prevents inadvertent escaping when data is echoed

S4=* Modify the linefeed character to make the <CR><LF>NO CARRIER<CR><LF> result code more unique if you scan for it to detect carrier loss

A typical setup sequence using these recommendations is shown below:

AT E Q V S0=0 H S12=10 S2=28 S4=31 <CR>

Note that where the zero suffix is used, it is omitted. Spaces are shown above for readability, but the use of spaces between commands is not recommended.

Once this setup command has been sent, and the OK response returned, the controller can continue to the originate or answer processing.

If user-programmed settings are included in additional setup strings, or the user is permitted to enter AT setup strings, the software should anticipate ERROR result codes. If an ERROR is returned in response to such a command, the result does not have to be reported to the user, but the controller should not be prevented from continuing in either case. Many times a connection can be made even though some setting is in error or is inappropriate for the class of modem being addressed.

****
D.4 Connect Processing
Once the setup operation has been completed , the commands to establish the connection can be issued. The instruction can be either to originate (using the D command), or to answer (using the A or S0 commands).

++
D.4.1 Originating a Call
If the D command is issued with the desired phone number, several possible result codes can be returned. The list below outlines some results to expect:

Result Code	Meaning
NO CARRIER	Connection failed
NO ANSWER	No response to ’@’ dial modifier

```
NO DIALTONE         No dial tone in X4 mode
NO ____             Connection failed for some other reason
BUSY                Busy signal detected
CONNECT ____        Connection successful, change DTE speed to the indicated
baud rate.
CARRIER ____        * DCE carrier speed (information only)
PROTOCOL: ____      * V-Series protocol being used
```

Ignore other responses, but continue to wait for CONNECT ___ or NO ___ responses.

The CARRIER and PROTOCOL results are intermediate results and precede either a CONNECT ____ or NO ____ result. These results are only returned by V-series modems when configured to use an error-correcting protocol.

If you recognize any numeric value for the baud rate after the CONNECT result, you will have a much more robust controller able to handle many situations.

You can use the PROTOCOL result to determine if the flow control requested by the &K command is in effect for V-Series System Products.

++

D.4.2 Answering a Call

The simplest technique for answering an incoming call is to set S0 and wait for a CONNECT ___ result. You may get several RING results, and possibly a NO CARRIER result if the caller hangs up before connecting. These results should not cause your controller to abort. Continue to wait for a CONNECT result code.

If you set S0, you may want to set it back to zero after your controller finishes the call to prevent inadvertent answering when your software is not running.By setting S0 to the number of rings you desire before the modem answers, you utilize the ring detection technology already built-in to the modem.

You should not use the A command to answer after counting RING results because the command may collide with another RING result from the modem and be missed. The RING results may be generated in pairs depending on the ringing cadence of the phone system.

++

D.4.3 Using the CD Line

Monitoring the Carrier Detect (CD) line of the EIA 232-D interface is another technique for carrier detection in answer or originate mode. This assumes that &C1 or the corresponding DIP-switch has been set and the cable is wired properly. Both are risky assumptions. You will have a more robust controller if you use result code scanning rather than the EIA 232-D lines.

If you use CD, you do not know when the modem has given up waiting for the carrier, or why. If the line is busy, you may want to re-try the dial operation. If there is no dial tone, the user needs to know this.

++

D.4.4 Aborting a Connect Request

Once the D or S0 command has been issued, the modem goes off hook (or may be off hook for S0) and it must be put back on hook (hangðup) before the abort is completed. To abort an in-progress connect command, send any character to the

```
modem. This will typically result in a NO CARRIER response. The result code
scanner should be called after the abort character is sent to prevent
additional commands from being sent before the controller and the modem are
again in sync.

Smartcom products send AT<CR> to abort an in-progress connect command. This
elicits a result code regardless of whether the modem were off-hook or not. If
the modem was off-hook attempting to connect, this will abort the connect
operation and return NO CARRIER. If the modem was on-hook in command mode,
this simply returns <CR><LF>OK<CR><LF>.


*****************************************************************************
D.5 Carrier Loss Detection
You want your application to be able to detect when the carrier has been lost
so you can determine when the connection is complete. You might be unable to
put this part of the code in your controller software, since the controller is
typically running only during the connect or hang-up process. Once the
application has detected the carrier loss event, it can call the modem
controller to clean-up.

+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
D.5.1 Using the CD line
If you can be confident of the environment and cabling, and have access to the
EIA 232-D signal status, then monitoring the CD line is the easiest carrier
loss detection method to implement. This requires &C1 to be programmed at
setup time, or be stored in the modem as the value recalled on reset or
powerup.

However, this is the most restrictive and risky choice. It requires a properly
wired cable and support of &C1 by the modem's command set or proper DIP-switch
settings.

+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
D.5.2 Scanning the Incoming Data Stream
In cases where you  cannot depend on 100% Hayes compatibility or want to be
independent from the cable wiring, then scanning for the NO CARRIER result is
more reliable. It is also more complex to implement.

Typically, at the low-level of the program all received data is retrieved
through one subroutine. This subroutine can be augmented or layered to provide
the service needed. As data passes through, the last fourteen characters are
buffered, typically in a circular buffer. If more data passes in each call,
only the last fourteen need to be copied. At a time when the processor is free
such as after 100 ms of idle time or the receive routine has returned no data
for 30 to 100 calls, then the buffer is compared against the <CR><LF>NO
CARRIER<CR><LF> result code. If a match is found, the carrier lost event is
triggered.

By only checking when there is idle time, or after no data has been received
for a while, you reduce the CPU overhead and ensure that the modem is not
falsely triggered when the string is imbedded in an actual data stream.

You can also modify the linefeed character by using S4 to a different value
such as S4=31 to make the result code sequence more unique. This action,
however, affects other result codes generated by the modem.
```

```
****************************************************************************
D.6 Escape and Hang Up
When your controller has been instructed to terminate the connection, you must
put the modem back in command state and issue the hang-up (H) command. In
addition to hanging-up, you will also want to restore settings you changed to
their factory-set values, or issue an ATZ<CR> to undo the effects of your
changes. In any case, clean up is necessary even if the connection were
terminated due to loss of carrier.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
D.6.1 Escaping the Modem to Command State
To escape the modem, the controller must first delay the escape guard time
(specified by S12), then issue the escape character three times (specified by
S2). then wait for an OK result. Waiting for the result also enforces the
required guard time after the escape sequence. Once the OK result is received,
the modem has entered command state. The controller can then hang-up and
restore the modem.

The controller software must be sure to wait the required guard time before
sending the escape characters. Your controller may have been called just after
data was transmitted and, without the delay, your characters will just be sent
without triggering the escape recognition process. It is important that the
serial transmitter be permitted to be idle for the escape guard time, plus a
few extra milliseconds to allow for error, before sending characters.

For example, if  S12=10 a delay of at least 200 milliseconds is required
before sending the escape characters. After sending the escape characters, the
OK result will be received after another 200 millisecond wait. This completes
the escape process in slightly over 400 milliseconds. If S12=50 (factory
setting) is used, one full second must pass before the characters can be sent,
then another second delay must transpire prior to the OK result. This
completes the process in slightly over two seconds. For this reason, it is
recommended that S12=10 be issued to speed up this process.

A delay slightly longer than that stored in S12 should be used to allow for
errors in the system clock as well as in the modem clock. 100ms is an adequate
safety margin.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
D.6.2 Using DTR to Escape or Hang Up
The DTR EIA-232-D signal can be used to escape the modem to command state, or
to reset the modem depending on the &D command set or DIP-switch settings last
set. This also requires the cable to be properly wired. Unless the software
will operate in a highly-controlled environment, this technique is discouraged
over the escape process because of the requirements to make it function
properly. Leaving a call connected simply because the cable was not properly
wired can be potentially expensive. The escape sequence is reliably in all
environments if it is properly utilized.


****************************************************************************
D.7 Modem Re-configuration
When the call has been completed, a "clean-up" command should be issued to
return the modem a more known configuration. For example, if verbose result
codes were selected when the modem was reset, and the controller selected
numeric result codes, on completing the session, the controller should reset
```

the modem to re-select verbose result codes. In the same way, if the linefeed character were changed to suit the software or environment, the character should be set to its former value. Any other command options that were modified, should be restored to their factory-set values.

The minimum the controller should do when through with the modem is issuing a Z command option to ensure the modem is restored to its powerup state.

****
D.8 Timing Considerations
A modem controller inherently has a sense of time. Usually all that is needed to utilize the timing part of the controller is access to a time reference. For example, the number of milliseconds since powerup or program launch, or a "system tick" value can be used.

Under DOS, the INT 1C timer tick produces an interrupt every 55 milliseconds. An ISR can be installed on this interrupt to add 55 to a long integer every time it is called. This will provide a millisecond counter.

On the Macintosh, the "TickCount" function will return the number of vertical-retrace ticks since computer power up. Each tick represents one sixtieth of a second.

++
D.8.1 Programming for Time
The time value is used to determine relative time. For example, if a loop should be executed for only 2 seconds it could be coded as:

```
timeout = TickCount() + 120 ; /* 60 tics per second = 2 seconds */
do
{
        got_one = Check_Result( ) ;
}
while( ( ! got_one ) && ( SystemTick() < timeout ) ) ;
```

This code fragment continues to call the Check_Result function until it returns a true value, or until two seconds have elapsed.

This technique is independent of processor speed. A faster processor may make thousands of trips through the loop, where a slower one would only make a few hundred. Any anticipated result code would arrive within that two-second real-time window.

Care should be given to considering when to start the timing loop. If an AT command string is sent, then a loop executed, the time interval may also include the time required to send the AT command (if data is buffered and sent by an interrupt service routine).

At 300 bps, where each character takes 33ms just to transmit (10/300), a 40 character AT command would take over a second to transmit. This means a two second loop spends more than half of its time waiting for the AT command process to complete, leaving only a fraction of a second for the modem to respond with the result (again at 33ms per character).

One way to avoid this is to wait until all data has been transmitted by an ISR before entering the result code scan loop. Alternatively, more time can be provided for loops to process results. Another option is to measure idle time rather then elapsed time.

++

D.8.2 When to Consider Time

The use of timing varies from command to command and operation to operation. Some commands take longer to execute. The guidelines below can be used to determine the best amount of time to wait.

* For the Z command, wait two seconds for a response, then wait an additional 600 ms, whether a response were received or not.

* For general setup commands, wait two seconds for the response.

* For the hang-up command (H), wait up to 20 seconds for a response. V-Series modems may take longer to hang-up if data buffered within the modem is still waiting to be transmitted and acknowledged. This time is controlled by S38.

* For dial commands (D or O) wait at least one minute or more. Values set for carrier detect time, tone versus pulse dialing, commas in the phone number, all can take additional time.

If the software times out, the modem may, in fact, not be connected to the computer, disconnected, or turned off. If this is the case, enforce a reasonable timeout to the first setup or identification command. That will determine whether a modem is attached and functioning.

A timeout may also occur when the software receives a result code it does not recognize. The software may continue to wait until it receives a code it does recognize. If this is the case, the controller should proceed as if an ERROR response were received. The only instance in which it is not prudent to continue is when a connect (D, A, or S0) command was issued.

Before implementing a timeout, the advantages, if any, to this level of program interruption should be considered. For example, if the program times out from a dial command in one minute when it may take two minutes to complete the call, the timeout defeats the purpose of the command. The modem always responds with a result code, whether BUSY, NO CARRIER, or CONNECT, after some length of time.

Idle time is the time since data was received. Elapsed time is the time since the software started looking for the result. Idle time can be measured by resetting the timeout clock each time the software receives a character. Rather than exiting the loop after two seconds of elapsed time, the logic changes to exit after no further data has been received for two seconds.

++

D.8.3 Recovering when "Out Of Sync"

Another disadvantage of timing out is that an early time out can put the software out of sync with the modem command processor. The controller may be interpreting results sent in response to previous commands as the response to later commands. To avoid this condition, any pending receive data should be flushed before the next command is issued.

D.9 General Tips and Techniques

The following are tips and techniques that may help in the exchange of information between the software controller and the modem command processor.

Commands in the command line should be ordered starting with the safest and ending with the most risky. Risk is defined as the potential to generate an ERROR, causing the remainder of the command line to be ignored.

Any command that may return ERROR should be anticipated. This or other unexpected results can be ignored unless the command is critical (configuration or call placement).

Send I0 or I4 at 1200 bps, which is supported by the majority of modem products. A modem reset (&F or Z) should be performed at 1200 bps before sending the identification commands.

Setup processing can be speeded by sending all but the last D or S0 command at the highest DTE rate supported by the modem. The last command must be sent at the speed at which the connection should be made (except V-Series System Products which specify this with S37).

Any dependency on proper cabling can be eliminated by avoiding techniques that depend on EIA 232-D signals:

* Have the software scan for result codes, rather than depending on the condition of the CD line

* Transparent flow control should be used with V-Series System Products rather than with RTS/CTS signals

* The escape process and H command should be used to hang-up instead of terminating a connection by dropping DTR

* Any unexpected RING result codes may indicate the last command may not have been processed correctly. The command should be-issued

Sample Controller/Modem Exchange

```
Clock   Controller                 Speed        Modem
--------------------------------------------------------------------------
                                   (1200 bps)
00000   ATZ<CR>
00034                                            ATZ<CR>
00068                                            (one second to do reset)
01068                                            0<CR> (V0 stored as
                                                 default)
01084   (delay additional 600ms)
01684   ATEQV1S0=0S12=10S4=3HI<CR>
01884                                            ATEQV1S0=0S12=10S4=3HI<CR>
                                                 (echo)
02084                                           <CR><LF>960<CR><LF>
02142                                           <CR><LF>OK<CR><LF>
                                  (19200 bps)
02192   ATM0X4L1S12=10S2=1&Q5W1S36
        =7S37=9&K5<CR>
02206                                           <CR><LF>OK<CR><LF>
02209   ATDT9W14045551212<CR>
```

```
38000                                        <CR><LF>CARRIER 2400<CR><LF>
45000                                        <CR><LF>PROTOCOL: NONE<CR><LF>
45010                                        <CR><LF>CONNECT 2400<CR><LF>
                                   (2400 bps)
                    (Connection Established)
                                   (2400 bps)
00000   (delay 300ms, need 200,
        add 100 for safety)
00300   (escape char is ^A, S2=1)
00313                                        (waits 200ms)
00513                                        <CR><LF>OK<CR><LF>
00538   ATHE1S2=43S12=50W0&Q0<CR>
00630                                        <CR><LF>OK<CR><LF>
------------------------------------------------------------------------

END
```

1.13 Wise Link Modem Beállítasok

A Wise Link modemeknek a következö beállitást tudom ajánlani:

```
at&f        <-- Ezt irod te
OK          <-- Ez a gép válasza rá

atw2
OK

ats95=1
OK

at&w        <-- Elmented a beállitást.
OK

at&v        <-- A modem tartalmának listája.

ACTIVE PROFILE: NORMAL RINGING DETECTION
B1 E1 L2 M1 N1 P Q0 V1 W2 X4 Y0 &C1 &D2 &G0 &I0 &L0 &K3 &Q5 &R0 &S0 &T4 &X0 &Y0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006
S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007 S37:000 S38:060 S44:003
S46:138 S48:007

STORED PROFILE 0:
B1 E1 L2 M1 N1 P Q0 V1 W2 X4 Y0 &C1 &D2 &G0 &I0 &L0 &K3 &Q5 &R0 &S0 &T4 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000
S25:005 S26:001 S36:007 S37:000 S38:060 S44:003 S46:138 S48:007

STORED PROFILE 1:
B1 E1 L3 M1 N1 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &I0 &L0 &K3 &Q5 &R0 &S0 &T4 &X0
S00:001 S02:043 S06:002 S07:045 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000
S25:005 S26:001 S36:007 S37:000 S38:060 S44:003 S46:138 S48:007

TELEPHONE NUMBERS:
0=                                      1=
2=                                      3=
```

```
OK

Ha a tied is igy nézz ki akkor mindent jol csináltál és aránylag van egy
optimális beállitásod amit ugyan a modem könyv segitségével csiszolhatsz.
Nekem ezekkel a beállitásokkal müködnek a modemek és kb 1700-1800 CPS
a file átviteli sebesség. ( Legrosszabb esetbe is 1630 CPS )
Ha még ezen kivül van gondod és a könyvböl sem találsz rá megoldást akkor
hagyj nyugodtan egy üzenetett.


                                                              Zotya
```

1.14 ZModem Protocoll

```
     The ZMODEM Inter Application File Transfer Protocol

            Chuck Forsberg

         Omen Technology Inc


    A overview of this document is available as ZMODEM.OV

           Omen Technology Incorporated
          The High Reliability Software

       17505-V Northwest Sauvie Island Road
        Portland Oregon 97231
      VOICE: 503-621-3406 :VOICE
    Modem: 503-621-3746 Speed 1200,2400,19200(Telebit PEP)
         Compuserve:70007,2304  GEnie:CAF
        UUCP: ...!tektronix!reed!omen!caf

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1.  IIIINNNNTTTTEEEENNNNDDDDEEEEDDDD AAAAUUUUDDDDIIIIEEEENNNNCCCCEEEE

This document is intended for telecommunications managers, systems
programmers, and others who choose and implement asynchronous file
transfer protocols over dial-up networks and related environments.


2.  WWWWHHHHYYYY  DDDDEEEEVVVVEEEELLLLOOOOPPPP  ZZZZMMMMOOOODDDDEEEEMMMM????
```

```
Since its development half a decade ago, the Ward Christensen MMMMOOOODDDDEEEEMMMM
protocol has enabled a wide variety of computer systems to interchange
data.  There is hardly a communications program that doesn't at least
claim to support this protocol, now called XXXXMMMMOOOODDDDEEEEMMMM.

Advances in computing, modems and networking have spread the XMODEM
protocol far beyond the micro to micro environment for which it was
designed.  These application have exposed some weaknesses:

   o+ The awkward user interface  is suitable for computer hobbyists.
     Multiple commands must be keyboarded to transfer each file.

   o+ Since commands must be given to both programs, simple menu  selections
     are not possible.

   o+ The short block length causes throughput to suffer  when used with
     timesharing systems, packet switched networks, satellite circuits,
     and buffered (error correcting) modems.

   o+ The 8 bit checksum  and unprotected supervison allow undetected errors
     and disrupted file transfers.

   o+ Only one file can be sent per command.  The file name has to be given
     twice, first to the sending program and then again to the receiving
     program.

   o+ The transmitted file accumulates as many as 127 bytes of garbage.

   o+ The modification date and other file attributes are lost.

   o+ XMODEM requires _c_o_m_p_l_e_t_e 8  bit transparency, all 256 codes.  XMODEM
     will not operate over some networks that use ASCII flow control or
     escape codes.  Setting network transparency disables important
     control functions for the duration of the call.

A number of other protocols have been developed over the years, but none
have proven satisfactory.

   o+ Lack of public domain documentation and example programs have kept
     proprietary protocols such as RRRReeeellllaaaayyyy,,,, BBBBllllaaaasssstttt ↩
        ,,,, and others tightly bound
     to the fortunes of their suppliers.  These protocols have not
     benefited from public scrutiny of their design features.



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```

```
   o+ Link level  protocols such as XXXX....22225555,,,,  XXXX....PPPPCCCC,,,, and ↩
        MMMMNNNNPPPP do not manage
     application to application file transfers.

   o+ Link Level  protocols do not eliminate end-to-end errors.  Interfaces
     between error-free networks are not necessarily error-free.
     Sometimes, error-free networks aren't.

   o+ The KKKKeeeerrrrmmmmiiiitttt  protocol was developed to allow file transfers ↩
        in
     environments hostile to XMODEM.  The performance compromises
     necessary to accommodate traditional mainframe environments limit
     Kermit's efficiency.  Even with completely transparent channels,
     Kermit control character quoting limits the efficiency of binary file
     transfers to about 75 per cent.[1]

     A number of submodes are used in various Kermit programs, including
     different methods of transferring binary files.  Two Kermit programs
     will mysteriously fail to operate with each other if the user has not
     correctly specified these submodes.

     Kermit Sliding Windows ("SuperKermit") improves throughput over
     networks at the cost of increased complexity.  SuperKermit requires
     full duplex communications and the ability to check for the presence
     of characters in the input queue, precluding its implementation on
     some operating systems.

     SuperKermit state transitions are encoded in a special language
     "wart" which requires a C compiler.

     SuperKermit sends an ACK packet for each data packet of 96 bytes
     (fewer if control characters are present).  This reduces throughput
     on high speed modems, from 1350 to 177 characters per second in one
     test.

A number of extensions to the XMODEM protocol have been made to improve
performance and (in some cases) the user interface.  They provide useful
improvements in some applications but not in others.  XMODEM's unprotected
control messages compromise their reliability.  Complex proprietary
techniques such as CCCCyyyybbbbeeeerrrrnnnneeeetttttiiiicccc DDDDaaaattttaaaa  ↩
   RRRReeeeccccoooovvvveeeerrrryyyy((((TTTTMMMM))))[2] improve reliability,
but are not universally available.  Some of the XMODEM mutant protocols
have significant design flaws of their own.

 o+ XXXXMMMMOOOODDDDEEEEMMMM----kkkk uses 1024 byte blocks to reduce the  overhead ↩
      from transmission
   delays by 87 per cent compared to XMODEM, but network delays still
```

1. Some Kermit programs support run length encoding.

2. Unique to DSZ, ZCOMM, Professional-YAM and PowerCom

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degrade performance. Some networks cannot transmit 1024 byte packets without flow control, which is difficult to apply without impairing the perfect transparency required by XMODEM. XMODEM-k adds garbage to received files.

o+ YYYYMMMMOOOODDDDEEEEMMMM sends the file name, file length, and creation date ↩ at the beginning of each file, and allows optional 1024 byte blocks for improved throughput. The handling of files that are not a multiple of 1024 or 128 bytes is awkward, especially if the file length is not known in advance, or changes during transmission. The large number of non conforming and substandard programs claiming to support YMODEM further complicates its use.

o+ YYYYMMMMOOOODDDDEEEEMMMM----gggg provides efficient batch file transfers, ↩ preserving exact file length and file modification date. YMODEM-g is a modification to YMODEM wherein ACKs for data blocks are not used. YMODEM-g is essentially insensitive to network delays. Because it does not support error recovery, YMODEM-g must be used hard wired or with a reliable link level protocol. Successful application at high speed requires cafeful attention to transparent flow control. When YMODEM-g detects a CRC error, data transfers are aborted. YMODEM-g is easy to implement because it closely resembles standard YMODEM.

o+ WWWWXXXXMMMMOOOODDDDEEEEMMMM,,,, SSSSEEEEAAAAllllliiiinnnnkkkk,,,, and ↩ MMMMEEEEGGGGAAAAllllliiiinnnnkkkk have applied a subset of ZMODEM's techniques to "Classic XMODEM" to improve upon their suppliers' previous offerings. They provide good performance under ideal conditions.

Another XMODEM "extension" is protocol cheating, such as Omen Technology's OOOOvvvveeeerrrrTTTThhhhrrrruuuussssttttteeeerrrr((((TTTTMMMM)))) and ↩ OOOOvvvveeeerrrrTTTThhhhrrrruuuussssttttteeeerrrr IIIIIIII((((TTTTMMMM)))). ↩ These improve XMODEM throughput under some conditions by compromising error recovery.

The ZMODEM Protocol corrects the weaknesses described above while maintaining as much of XMODEM/CRC's simplicity and prior art as possible.

3. ZZZZMMMMOOOODDDDEEEEMMMM PPPPrrrroooottttooooccccoooollll DDDDeeeessssiiiiggggnnnn CCCCrrrriiiitttteeeerrrriiiiaaaa

The design of a file transfer protocol is an engineering compromise between conflicting requirements:

3.1 EEEEaaaasssseeee ooooffff UUUUsssseeee

- o+ ZMODEM allows either program to initiate file transfers, passing commands and/or modifiers to the other program.
- o+ File names need be entered only once.
- o+ Menu selections are supported.

- o+ Wild Card names may be used with batch transfers.
- o+ Minimum keystrokes required to initiate transfers.
- o+ ZRQINIT frame sent by sending program can trigger automatic downloads.
- o+ ZMODEM can step down to YMODEM if the other end does not support ZMODEM.[1]

3.2 TTTThhhhrrrroooouuuugggghhhhppppuuuutttt

All file transfer protocols make tradeoffs between throughput, reliability, universality, and complexity according to the technology and knowledge base available to their designers.

In the design of ZMODEM, three applications deserve special attention.

- o+ Network applications with significant delays (relative to character transmission time) and low error rate
- o+ Timesharing and buffered modem applications with significant delays and throughput that is quickly degraded by reverse channel traffic. ZMODEM's economy of reverse channel bandwidth allows modems that dynamically partition bandwidth between the two directions to operate at optimal speeds. Special ZMODEM features allow simple, efficient implementation on a wide variety of timesharing hosts.

```
  o+ Direct modem to modem communications with high error rate

Unlike Sliding Windows Kermit, ZMODEM is not optimized for optimum
throughput when error rate and delays are both high.  This tradeoff
markedly reduces code complexity and memory requirements.  ZMODEM
generally provides faster error recovery than network compatible XMODEM
implementations.

In the absence of network delays, rapid error recovery is possible, much
faster than MEGAlink and network compatible versions of YMODEM and XMODEM.

File transfers begin immediately regardless of which program is started
first, without the 10 second delay associated with XMODEM.
```

____

```
 1. Provided the transmission medium accommodates X/YMODEM.
```

```
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```

```
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```

```
3.3  IIIInnnnttttteeeeggggrrrriiiitttttyyyy aaaannnndddd  ↩
   RRRRoooobbbbuuuusssstttttnnnneeeesssssss

Once a ZMODEM session is begun, all transactions are protected with 16 or
32 bit CRC.[2] Complex proprietary techniques such as  ↩
   CCCCyyyybbbbeeeerrrrnnnneeeettttiiiicccc DDDDaaaattttaaaa
RRRReeeeccccoooovvvveeeerrrryyyy((((TTTTMMMM))))[3] are not needed for reliable  ↩
   transfers.

An optional 32-bit CRC used as the frame check sequence in ADCCP (ANSI
X3.66, also known as FIPS PUB 71 and FED-STD-1003, the U.S. versions of
CCITT's X.25) is used when available.  The 32 bit CRC reduces undetected
errors by at least five orders of magnitude when properly applied (-1
preset, inversion).

A security challenge mechanism guards against "Trojan Horse" messages
written to mimic legitimate command or file downloads.
```

3.4 EEEEaaaasssseeee oooffff ↩
IIIImmmmpppplllleeeemmmmeeeennnnttttaaaattttiiiioooonnnn

ZMODEM accommodates a wide variety of systems:

- o+ Microcomputers that cannot overlap disk and serial i/o
- o+ Microcomputers that cannot overlap serial send and receive
- o+ Computers and/or networks requiring XON/XOFF flow control
- o+ Computers that cannot check the serial input queue for the presence of data without having to wait for the data to arrive.

Although ZMODEM provides "hooks" for multiple "threads", ZMODEM is not intended to replace link level protocols such as X.25.

ZMODEM accommodates network and timesharing system delays by continuously transmitting data unless the receiver interrupts the sender to request retransmission of garbled data. ZMODEM in effect uses the entire file as a window.[4] Using the entire file as a window simplifies buffer management, avoiding the window overrun failure modes that affect MEGAlink, SuperKermit, and others.

ZMODEM provides a general purpose application to application file transfer protocol which may be used directly or with with reliable link level

---

2. Except for the CAN-CAN-CAN-CAN-CAN abort sequence which requires five successive CAN characters.

3. Unique to Professional-YAM and PowerCom

4. Streaming strategies are discussed in coming chapters.

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protocols such as X.25, MNP, Fastlink, etc. When used with X.25, MNP, Fastlink, etc., ZMODEM detects and corrects errors in the interfaces between error controlled media and the remainder of the communications link.

ZMODEM was developed _f_o_r _t_h_e _p_u_b_l_i_c _d_o_m_a_i_n under a Telenet ↩
contract. The
ZMODEM protocol descriptions and the Unix rz/sz program source code are
public domain. No licensing, trademark, or copyright restrictions apply
to the use of the protocol, the Unix rz/sz source code and the _Z_M_O_D_E_M
name.

4. EEEEVVVVOOOOLLLLUUUUTTTTIIIIOOOONNNN OOOOFFFF ZZZZMMMMOOOODDDDEEEEMMMM

In early 1986, Telenet funded a project to develop an improved public domain application to application file transfer protocol. This protocol would alleviate the throughput problems network customers were experiencing with XMODEM and Kermit file transfers.

In the beginning, we thought a few modifications to XMODEM would allow high performance over packet switched networks while preserving XMODEM's simplicity.

The initial concept would add a block number to the ACK and NAK characters used by XMODEM. The resultant protocol would allow the sender to send more than one block before waiting for a response.

But how to add the block number to XMODEM's ACK and NAK? WXMODEM, SEAlink, MEGAlink and some other protocols add binary byte(s) to indicate the block number.

Pure binary was unsuitable for ZMODEM because binary code combinations won't pass bidirectionally through some modems, networks and operating systems. Other operating systems may not be able to recognize something coming back[1] unless a break signal or a system dependent code or sequence is present. By the time all this and other problems with the simple ACK/NAK sequences mentioned above were corrected, XMODEM's simple ACK and NACK characters had evolved into a real packet. The Frog was riveting.

Managing the window[2] was another problem. Experience gained in debugging The Source's SuperKermit protocol indicated a window size of about 1000 characters was needed at 1200 bps. High speed modems require a

---

1. Without stopping for a response

2. The WINDOW is the data in transit between sender and receiver.

window of 20000 or more characters for full throughput. Much of the SuperKermit's inefficiency, complexity and debugging time centered around its ring buffering and window management. There had to be a better way to get the job done.

A sore point with XMODEM and its progeny is error recovery. More to the point, how can the receiver determine whether the sender has responded, or is ready to respond, to a retransmission request? XMODEM attacks the problem by throwing away characters until a certain period of silence. Too short a time allows a spurious pause in output (network or timesharing congestion) to masquerade as error recovery. Too long a timeout devastates throughput, and allows a noisy line to lock up the protocol. SuperKermit solves the problem with a distinct start of packet character (SOH). WXMODEM and ZMODEM use unique character sequences to delineate the start of frames. SEAlink and MEGAlink do not address this problem.

A further error recovery problem arises in streaming protocols. How does the receiver know when (or if) the sender has recognized its error signal? Is the next packet the correct response to the error signal? Is it something left over "in the queue"? Or is this new subpacket one of many that will have to be discarded because the sender did not receive the error signal? How long should this continue before sending another error signal? How can the protocol prevent this from degenerating into an argument about mixed signals?

SuperKermit uses selective retransmission, so it can accept any good packet it receives. Each time the SuperKermit receiver gets a data packet, it must decide which outstanding packet (if any) it "wants most" to receive, and asks for that one. In practice, complex software "hacks" are needed to attain acceptable robustness.[3]

For ZMODEM, we decided to forgo the complexity of SuperKermit's packet assembly scheme and its associated buffer management logic and memory requirements.

Another sore point with XMODEM and WXMODEM is the garbage added to files. This was acceptable with old CP/M files which had no exact length, but not with modern systems such as DOS and Unix. YMODEM uses file length information transmitted in the header block to trim the output file, but this causes data loss when transferring files that grow during a transfer. In some cases, the file length may be unknown, as when data is obtained from a process. Variable length data subpackets solve both of these

---

3. For example, when SuperKermit encounters certain errors, the _w_n_d_e_s_r function is called to determine the next block to request. A burst of errors generates several wasteful requests to retransmit the same block.

problems.

Since some characters had to be escaped anyway, there wasn't any point wasting bytes to fill out a fixed packet length or to specify a variable packet length. In ZMODEM, the length of data subpackets is denoted by ending each subpacket with an escape sequence similar to BISYNC and HDLC.

The end result is a ZMOEM header containing a "frame type", four bytes of supervisory information, and its own CRC. Data frames consist of a header followed by 1 or more data subpackets. In the absence of transmission errors, an entire file can be sent in one data frame.

Since the sending system may be sensitive to numerous control characters or strip parity in the reverse data path, all of the headers sent by the receiver are sent in hex. A common lower level routine receives all headers, allowing the main program logic to deal with headers and data subpackets as objects.

With equivalent binary (efficient) and hex (application friendly) frames, the sending program can send an "invitation to receive" sequence to activate the receiver without crashing the remote application with unexpected control characters.

Going "back to scratch" in the protocol design presents an opportunity to steal good ideas from many sources and to add a few new ones.

From Kermit and UUCP comes the concept of an initial dialog to exchange system parameters.

ZMODEM generalizes Compuserve B Protocol's host controlled transfers to single command AutoDownload and command downloading. A Security Challenge discourages password hackers and Trojan Horse authors from abusing ZMODEM's power.

We were also keen to the pain and $uffering of legions of telecommunicators whose file transfers have been ruined by communications and timesharing faults. ZMODEM's file transfer recovery and advanced file management are dedicated to these kindred comrades.

After ZMODEM had been operational a short time, Earl Hall pointed out the obvious: ZMODEM's user friendly AutoDownload was almost useless if the user must assign transfer options to each of the sending and receiving programs. Now, transfer options may be specified to/by the sending program, which passes them to the receiving program in the ZFILE header.

5. RRRROOOOSSSSEEEETTTTTTTTAAAA SSSSTTTTOOOONNNNEEEE

Here are some definitions which reflect current vernacular in the computer media. The attempt here is identify the file transfer protocol rather than specific programs.

FRAME A ZMODEM frame consists of a header and 0 or more data subpackets.

XMODEM refers to the original 1977 file transfer etiquette introduced by Ward Christensen's MODEM2 program. It's also called the MODEM or MODEM2 protocol. Some who are unaware of MODEM7's unusual batch file mode call it MODEM7. Other aliases include "CP/M Users's Group" and "TERM II FTP 3". This protocol is supported by most communications programs because it is easy to implement.

XMODEM/CRC replaces XMODEM's 1 byte checksum with a two byte Cyclical Redundancy Check (CRC-16), improving error detection.

XMODEM-1k Refers to XMODEM-CRC with optional 1024 byte blocks.

YMODEM refers to the XMODEM/CRC protocol with batch transmission and optional 1024 byte blocks as described in YMODEM.DOC.[1]

6. ZZZZMMMMOOOODDDDEEEEMMMM RRRREEEEQQQQUUUUIIIIRRRREEEEMMMMEEEENNNNTTTTSSSS

ZMODEM requires an 8 bit transfer medium.[1] ZMODEM escapes network control characters to allow operation with packet switched networks. In general, ZMODEM operates over any path that supports XMODEM, and over many that don't.

To support full streaming,[2] the transmission path should either assert flow control or pass full speed transmission without loss of data. Otherwise the ZMODEM sender must manage the window size.

6.1 FFFFiiiillllleeee CCCCoooonnnnttttteeeennnnttttssss

6.1.1 BBBBiiiinnnnaaaarrrryyyy FFFFiiiilllleeeessss
ZMODEM places no constraints on the information content of binary files, except that the number of bits in the file must be a multiple of 8.

---

1. Available on TeleGodzilla as part of YZMODEM.ZOO

1. The ZMODEM design allows encoded packets for less transparent media.

2. With XOFF and XON, or out of band flow control such as X.25 or CTS

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6.1.2 TTTTeeeexxxxtttt FFFFiiiillllleeeessss
Since ZMODEM is used to transfer files between different types of computer systems, text files must meet minimum requirements if they are to be readable on a wide variety of systems and environments.

Text lines consist of printing ASCII characters, spaces, tabs, and backspaces.

6.1.2.1 AAAASSSSCCCCIIIIIIII EEEEnnnndddd ooooffff LLLLiiiinnnneeee
The ASCII code definition allows text lines terminated by a CR/LF (015, 012) sequence, or by a NL (012) character. Lines logically terminated by a lone CR (013) are not ASCII text.

A CR (013) without a linefeed implies overprinting, and is not acceptable as a logical line separator. Overprinted lines should print all important characters in the last pass to allow CRT displays to display meaningful text. Overstruck characters may be generated by backspacing or by overprinting the line with CR (015) not followed by LF.

Overstruck characters generated with backspaces should be sent with the most important character last to accommodate CRT displays that cannot overstrike. The sending program may use the ZZZZCCCCNNNNLLLL bit to force the receiving program to convert the received end of line to its local end of line convention.[3]

3. Files that have been translated in such a way as to modify their length cannot be updated with the ZZZZCCCCRRRREEEECCCCOOOOVVVV Conversion Option.

7. ZZZZMMMMOOOODDDDEEEEMMMM BBBBAAAASSSSIIIICCCCSSSS

7.1 PPPPaaaacccckkkkeeeettttiiiizzzzaaaattttiiiioooonnnn

ZMODEM frames differ somewhat from XMODEM blocks. XMODEM blocks are not used for the following reasons:

o+ Block numbers are limited to 256

o+ No provision for variable length blocks

o+ Line hits corrupt protocol signals, causing failed file transfers. In particular, modem errors sometimes generate false block numbers, false EOTs and false ACKs. False ACKs are the most troublesome as they cause the sender to lose synchronization with the receiver.

State of the art programs such as Professional-YAM and ZCOMM overcome some of these weaknesses with clever proprietary code, but a stronger protocol is desired.

o+ It is difficult to determine the beginning and ends of XMODEM blocks when line hits cause a loss of synchronization. This precludes rapid error recovery.

7.2 LLLLiiiinnnnkkkk EEEEssssccccaaaappppeeee EEEEnnnnccccooooddddiiiinnnngggg

ZMODEM achieves data transparency by extending the 8 bit character set (256 codes) with escape sequences based on the ZMODEM data link escape character ZDLE.[1]

Link Escape coding permits variable length data subpackets without the overhead of a separate byte count. It allows the beginning of frames to be detected without special timing techniques, facilitating rapid error recovery.

Link Escape coding does add some overhead. The worst case, a file consisting entirely of escaped characters, would incur a 50% overhead.

The ZDLE character is special. ZDLE represents a control sequence of some sort. If a ZDLE character appears in binary data, it is prefixed with ZDLE, then sent as ZDLEE.

The value for ZDLE is octal 030 (ASCII CAN). This particular value was chosen to allow a string of 5 consecutive CAN characters to abort a ZMODEM

1. This and other constants are defined in the _z_m_o_d_e_m._h include file. Please note that constants with a leading 0 are octal constants in C.

session, compatible with YMODEM session abort.

Since CAN is not used in normal terminal operations, interactive applications and communications programs can monitor the data flow for ZDLE. The following characters can be scanned to detect the ZRQINIT header, the invitation to automatically download commands or files.

Receipt of five successive CAN characters will abort a ZMODEM session. Eight CAN characters are sent.

The receiving program decodes any sequence of ZDLE followed by a byte with bit 6 set and bit 5 reset (upper case letter, either parity) to the equivalent control character by inverting bit 6. This allows the transmitter to escape any control character that cannot be sent by the communications medium. In addition, the receiver recognizes escapes for 0177 and 0377 should these characters need to be escaped.

ZMODEM software escapes ZDLE, 020, 0220, 021, 0221, 023, and 0223. If preceded by 0100 or 0300 (@), 015 and 0215 are also escaped to protect the Telenet command escape CR-@-CR. The receiver ignores 021, 0221, 023, and 0223 characters in the data stream.

The ZMODEM routines in zm.c accept an option to escape all control characters, to allow operation with less transparent networks. This option can be given to either the sending or receiving program.

7.3 HHHHeeeeaaaaddddeeeerrrr

All ZMODEM frames begin with a header which may be sent in binary or HEX form. ZMODEM uses a single routine to recognize binary and hex headers. Either form of the header contains the same raw information:

o+ A type byte[2] [3]

o+ Four bytes of data indicating flags and/or numeric quantities depending on the frame type

---

2. The frame types are cardinal numbers beginning with 0 to minimize state transition table memory requirements.

3. Future extensions to ZMODEM may use the high order bits of the type byte to indicate thread selection.

```
       FFFFiiiiggggguuuurrrreeee 1111....  Order of Bytes in Header

       TYPE:  frame type
       F0: Flags least significant byte
       P0: file Position least significant
       P3: file Position most significant

         TYPE  F3 F2 F1 F0
         -------------------
         TYPE  P0 P1 P2 P3
```

7.3.1 11116666 BBBBiiiitttt CCCCRRRRCCCC BBBBiiiinnnnaaaarrrryyyy ↩
HHHHeeeeaaaaddddeeeerrrr

A binary header is sent by the sending program to the receiving program.
ZDLE encoding accommodates XON/XOFF flow control.

A binary header begins with the sequence ZPAD, ZDLE, ZBIN.

The frame type byte is ZDLE encoded.

The four position/flags bytes are ZDLE encoded.

A two byte CRC of the frame type and position/flag bytes is ZDLE encoded.

0 or more binary data subpackets with 16 bit CRC will follow depending on
the frame type.

The function _z_s_b_h_d_r transmits a binary header. The function _z_g_e_t_h_d_r
receives a binary or hex header.

```
       FFFFiiiiggggguuuurrrreeee 2222....  16 Bit CRC Binary Header
      * ZDLE A TYPE F3/P0 F2/P1 F1/P2 F0/P3 CRC-1 CRC-2
```

7.3.2 33332222 BBBBiiiitttt CCCCRRRRCCCC BBBBiiiinnnnaaaarrrryyyy ↩
HHHHeeeeaaaaddddeeeerrrr

A "32 bit CRC" Binary header is similar to a Binary Header, except the
ZZZZBBBBIIIINNNN (A) character is replaced by a ZZZZBBBBIIIINNNN33332222 (C) ↩
character, and four
characters of CRC are sent. 0 or more binary data subpackets with 32 bit
CRC will follow depending on the frame type.

The common variable _T_x_f_c_s_3_2 may be set TRUE for 32 bit CRC iff the
receiver indicates the capability with the CCCCAAAANNNNFFFFCCCC33332222 bit. The ↩
zgethdr,
zsdata and zrdata functions automatically adjust to the type of Frame
Check Sequence being used.

```
       FFFFiiiiggggguuuurrrreeee 3333....  32 Bit CRC Binary Header
      * ZDLE C TYPE F3/P0 F2/P1 F1/P2 F0/P3 CRC-1 CRC-2 CRC-3 CRC-4
```

7.3.3 HHHHEEEEXXXX HHHHeeeeaaaaddddeeeerrrr

The receiver sends responses in hex headers. The sender also uses hex
headers when they are not followed by binary data subpackets.

Hex encoding protects the reverse channel from random control characters. The hex header receiving routine ignores parity.

Use of Kermit style encoding for control and paritied characters was considered and rejected because of increased possibility of interacting with some timesharing systems' line edit functions. Use of HEX headers from the receiving program allows control characters to be used to interrupt the sender when errors are detected. A HEX header may be used in place of a binary header wherever convenient. If a data packet follows a HEX header, it is protected with CRC-16.

A hex header begins with the sequence ZPAD, ZPAD, ZDLE, ZHEX. The _z_g_e_t_h_d_r routine synchronizes with the ZPAD-ZDLE sequence. The extra ZPAD character allows the sending program to detect an asynchronous header (indicating an error condition) and then call _z_g_e_t_h_d_r to receive the header.

The type byte, the four position/flag bytes, and the 16 bit CRC thereof are sent in hex using the character set 01234567890abcdef. Upper case hex digits are not allowed; they false trigger XMODEM and YMODEM programs. Since this form of hex encoding detects many patterns of errors, especially missing characters, a hex header with 32 bit CRC has not been defined.

A carriage return and line feed are sent with HEX headers. The receive routine expects to see at least one of these characters, two if the first is CR. The CR/LF aids debugging from printouts, and helps overcome certain operating system related problems.

An XON character is appended to all HEX packets except ZACK and ZFIN. The XON releases the sender from spurious XOFF flow control characters generated by line noise, a common occurrence. XON is not sent after ZACK headers to protect flow control in streaming situations. XON is not sent after a ZFIN header to allow clean session cleanup.

0 or more data subpackets will follow depending on the frame type.

The function _z_s_h_h_d_r sends a hex header.

        FFFFiiiiggguuuurrrreeee 4444.... HEX Header

```
      * * ZDLE B TYPE F3/P0 F2/P1 F1/P2 F0/P3 CRC-1 CRC-2 CR LF XON
```

(TYPE, F3...F0, CRC-1, and CRC-2 are each sent as two hex digits.)

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7.4 BBBBiiiinnnnaaaarrrryyyy DDDDaaaattttaaaa ↩
SSSSuuuubbbbppppaaaacccckkkkeeeettttssss

Binary data subpackets immediately follow the associated binary header packet. A binary data packet contains 0 to 1024 bytes of data. Recommended length values are 256 bytes below 2400 bps, 512 at 2400 bps, and 1024 above 4800 bps or when the data link is known to be relatively error free.[4]

No padding is used with binary data subpackets. The data bytes are ZDLE encoded and transmitted. A ZDLE and frameend are then sent, followed by two or four ZDLE encoded CRC bytes. The CRC accumulates the data bytes and frameend.

The function _z_s_d_a_t_a sends a data subpacket. The function _z_r_d_a_t_a ↩
receives
a data subpacket.

7.5 AAAASSSSCCCCIIIIIIII EEEEnnnnccccooooddddeeeedddd DDDDaaaattttaaaa ↩
SSSSuuuubbbbppppaaaacccckkkkeeeetttt

The format of ASCII Encoded data subpackets is not currently specified. These could be used for server commands, or main transfers in 7 bit environments.

8. PPPPRRRROOOOTTTTOOOOCCCCOOOOLLLL TTTTRRRRAAAANNNNSSSSAAAACCCCTTTTIIIIOOOONNNN ↩
OOOOVVVVEEEERRRRVVVVIIIIEEEEWWWW

As with the XMODEM recommendation, ZMODEM timing is receiver driven. The transmitter should not time out at all, except to abort the program if no headers are received for an extended period of time, say one minute.[1]

8.1 SSSSeeeessssssssiiiioooonnnn SSSSttttaaaarrrrttttuuuupppp

To start a ZMODEM file transfer session, the sending program is called with the names of the desired file(s) and option(s).

The sending program may send the string "rz\r" to invoke the receiving program from a possible command mode. The "rz" followed by carriage return activates a ZMODEM receive program or command if it were not already active.

The sender may then display a message intended for human consumption, such

---

4. Strategies for adjusting the subpacket length for optimal results based on real time error rates are still evolving. Shorter subpackets speed error detection but increase protocol overhead slightly.

1. Special considerations apply when sending commands.

as a list of the files requested, etc.

Then the sender may send a ZZZZRRRRQQQQIIIINNNNIIIITTTT header. The ZZZZRRRRQQQQIIIINNNNIIIITTTT header causes a previously started receive program to send its ZZZZRRRRIIIINNNNIIIITTTT header without delay.

In an interactive or conversational mode, the receiving application may monitor the data stream for ZDLE. The following characters may be scanned for BBBB00000000 indicating a ZRQINIT header, a command to download a command or data.

The sending program awaits a command from the receiving program to start file transfers. If a "C", "G", or NAK is received, an XMODEM or YMODEM file transfer is indicated, and file transfer(s) use the YMODEM protocol. Note: With ZMODEM and YMODEM, the sending program provides the file name, but not with XMODEM.

In case of garbled data, the sending program can repeat the invitation to
receive a number of times until a session starts.

When the ZMODEM receive program starts, it immediately sends a ↩
ZZZZRRRRIIIINNNNIIIITTTT
header to initiate ZMODEM file transfers, or a ↩
ZZZZCCCCHHHHAAAALLLLLLLLEEEENNNNGGGGEEEE header to verify
the sending program. The receive program resends its header at _r_e_s_p_o_n_s_e
_t_i_m_e (default 10 second) intervals for a suitable period of time (40
seconds total) before falling back to YMODEM protocol.

If the receiving program receives a ZZZZRRRRQQQQIIIINNNNIIIITTTT header, it ↩
resends the ZZZZRRRRIIIINNNNIIIITTTT
header. If the sending program receives the ↩
ZZZZCCCCHHHHAAAALLLLLLLLEEEENNNNGGGGEEEE header, it places
the data in ZP0...ZP3 in an answering ZZZZAAAACCCCKKKK header.

If the receiving program receives a ZZZZRRRRIIIINNNNIIIITTTT header, it is an echo
indicating that the sending program is not operational.

Eventually the sending program correctly receives the ZZZZRRRRIIIINNNNIIIITTTT ↩
header.

The sender may then send an optional ZZZZSSSSIIIINNNNIIIITTTT frame to define the ↩
receiving
program's AAAAttttttttnnnn sequence, or to specify complete control character
escaping.[2]

If the ZSINIT header specifies ESCCTL or ESC8, a HEX header is used, and
the receiver activates the specified ESC modes before reading the
following data subpacket.

The receiver sends a ZZZZAAAACCCCKKKK header in response, optionally containing ↩
the

---

2. If the receiver specifies the same or higher level of escaping, the
ZSINIT frame need not be sent unless an Attn sequence is needed.

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serial number of the receiving program, or 0.

```
8.2  FFFFiiiillllleeee TTTTrrrraaaannnnssssmmmmiiiissssssssiiiioooonnnn

The sender then sends a ZZZZFFFFIIIILLLLEEEE header with ZMODEM Conversion,  ↩
   Management,
and Transport options[3] followed by a ZCRCW data subpacket containing the
file name, file length, modification date, and other information identical
to that used by YMODEM Batch.

The receiver examines the file name, length, and date information provided
by the sender in the context of the specified transfer options, the
current state of its file system(s), and local security requirements.  The
receiving program should insure the pathname and options are compatible
with its operating environment and local security requirements.

The receiver may respond with a ZZZZSSSSKKKKIIIIPPPP header, which makes the  ↩
   sender
proceed to the next file (if any) in the batch.

       If the receiver has a file with the same name and length,
       it may respond with a ZZZZCCCCRRRRCCCC header, which requires the
       sender to perform a 32 bit CRC on the file and transmit the
       complement of the CRC in a ZZZZCCCCRRRRCCCC header.[4] The receiver
       uses this information to determine whether to accept the
       file or skip it.  This sequence is triggered by the ZMCRC
       Management Option.

A ZZZZRRRRPPPPOOOOSSSS  header from the receiver initiates transmission of the  ↩
   file data
starting at the offset in the file specified in the ZZZZRRRRPPPPOOOOSSSS header.
Normally the receiver specifies the data transfer to begin begin at
offset 0 in the file.
       The receiver may start the transfer further down in the
       file.  This allows a file transfer interrupted by a loss
       or carrier or system crash to be completed on the next
       connection without requiring the entire file to be
       retransmitted.[5] If downloading a file from a timesharing
       system that becomes sluggish, the transfer can be
       interrupted and resumed later with no loss of data.

The sender sends a ZZZZDDDDAAAATTTTAAAA binary  header (with file position)  ↩
   followed by
one or more data subpackets.
```

```
 3. See below, under ZFILE header type.

 4. The crc is initialized to 0xFFFFFFFF.

 5. This does not apply to files that have been translated.
```

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The receiver compares the file position in the ZZZZDDDDAAAATTTTAAAA header with ↩
the
number of characters successfully received to the file. If they do not
agree, a ZZZZRRRRPPPPOOOOSSSS error response is generated to force the sender to ↩
the
right position within the file.[6]

A data subpacket terminated by ZZZZCCCCRRRRCCCCGGGG and CRC does not elicit a ↩
response
unless an error is detected; more data subpacket(s) follow immediately.

ZZZZCCCCRRRRCCCCQQQQ data subpackets expect a ZZZZAAAACCCCKKKK response ↩
with the
receiver's file offset if no error, otherwise a ZZZZRRRRPPPPOOOOSSSS
response with the last good file offset. Another data
subpacket continues immediately. ZZZZCCCCRRRRCCCCQQQQ subpackets are
not used if the receiver does not indicate FDX ability
with the CCCCAAAANNNNFFFFDDDDXXXX bit.

ZZZZCCCCRRRRCCCCWWWW data subpackets expect a response before the next frame is ↩
sent.
If the receiver does not indicate overlapped I/O capability with the
CCCCAAAANNNNOOOOVVVVIIIIOOOO bit, or sets a buffer size, the sender uses the ↩
ZZZZCCCCRRRRCCCCWWWW to allow
the receiver to write its buffer before sending more data.

A zero length data frame may be used as an idle
subpacket to prevent the receiver from timing out in
case data is not immediately available to the sender.

In the absence of fatal error, the sender eventually encounters end of
file. If the end of file is encountered within a frame, the frame is
closed with a ZZZZCCCCRRRRCCCCEEEE data subpacket which does not elicit a response
except in case of error.

The sender sends a ZZZZEEEEOOOOFFFF header with the file ending offset equal to
the number of characters in the file. The receiver compares this
number with the number of characters received. If the receiver has
received all of the file, it closes the file. If the file close was
satisfactory, the receiver responds with ZZZZRRRRIIIINNNNIIIITTTT. If the ↩
receiver has
not received all the bytes of the file, the receiver ignores the ZEOF
because a new ZDATA is coming. If the receiver cannot properly close
the file, a ZZZZFFFFEEEERRRRRRRR header is sent.

After all files are processed, any further protocol errors should not prevent the sending program from returning with a success status.

---

6. If the ZMSPARS option is used, the receiver instead seeks to the position given in the ZDATA header.

8.3 SSSSeeeesssssssssiiiioooonnnn CCCCllllleeeeaaaannnnuuuupppp

The sender closes the session with a ZZZZFFFFIIIINNNN header. The receiver acknowledges this with its own ZZZZFFFFIIIINNNN header.

When the sender receives the acknowledging header, it sends two characters, "OO" (Over and Out) and exits to the operating system or application that invoked it. The receiver waits briefly for the "O" characters, then exits whether they were received or not.

8.4 SSSSeeeesssssssssiiiioooonnnn AAAAbbbboooorrrrtttt SSSSeeeeqqqquuuueeeennnncccceeee

If the receiver is receiving data in streaming mode, the AAAAttttttttnnnn sequence is executed to interrupt data transmission before the Cancel sequence is sent. The Cancel sequence consists of eight CAN characters and ten backspace characters. ZMODEM only requires five Cancel characters, the other three are "insurance".

The trailing backspace characters attempt to erase the effects of the CAN characters if they are received by a command interpreter.

```
       static char canistr[] = {
  24,24,24,24,24,24,24,24,8,8,8,8,8,8,8,8,8,8,0
       };
```

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9. SSSSTTTTRRRREEEEAAAAMMMMIIIINNNNGGGG TTTTEEEECCCCHHHHNNNNIIIIQQQQUUUUEEEESSSS ↩
//// EEEERRRRRRRROOOORRRR RRRREEEECCCCOOOOVVVVEEEERRRRYYYY

It is a fact of life that no single method of streaming is applicable to a majority of today's computing and telecommunications environments. ZMODEM provides several data streaming methods selected according to the limitations of the sending environment, receiving environment, and transmission channel(s).

9.1 FFFFuuuullllllll SSSSttttrrrreeeeaaaammmmiiiinnnngggg wwwwiiiitttthhhh ↩
SSSSaaaammmmpppplllliiiinnnngggg

If the receiver can overlap serial I/O with disk I/O, and if the sender can sample the reverse channel for the presence of data without having to wait, full streaming can be used with no AAAAttttttttnnnn sequence required. The sender begins data transmission with a ↩
ZZZZDDDDAAAATTTTAAAA
header and continuous ZZZZCCCCRRRRCCCCGGGG data subpackets. When the receiver

detects an error, it executes the AAAAttttttttnnnn sequence and then sends a ZZZZRRRRPPPPOOOOSSSS header with the correct position within the file.

At the end of each transmitted data subpacket, the sender checks for the presence of an error header from the receiver. To do this, the sender samples the reverse data stream for the presence of either a ZPAD or CAN character.[1] Flow control characters (if present) are acted upon.

Other characters (indicating line noise) increment a counter which is reset whenever the sender waits for a header from the receiver. If the counter overflows, the sender sends the next data subpacket as ZCRCW, and waits for a response.

ZPAD indicates some sort of error header from the receiver. A CAN suggests the user is attempting to "stop the bubble machine" by keyboarding CAN characters. If one of these characters is seen, an empty ZCRCE data subpacket is sent. Normally, the receiver will have sent an ZRPOS or other error header, which will force the sender to resume transmission at a different address, or take other action. In the unlikely event the ZPAD or CAN character was spurious, the receiver will time out and send a ZRPOS header.[2]

Then the receiver's response header is read and acted upon.[3]

---

1. The call to rdchk() in sssszzzz....cccc performs this function.

2. The obvious choice of ZCRCW packet, which would trigger an ZACK from the receiver, is not used because multiple in transit frames could result if the channel has a long propagation delay.

3. The call to getinsync() in sssszzzz....cccc performs this function.

A ZZZZRRRRPPPPOOOOSSSS header resets the sender's file offset to the correct position. If possible, the sender should purge its output buffers and/or networks of all unprocessed output data, to minimize the amount of unwanted data the receiver must discard before receiving data starting at the correct file offset. The next transmitted data frame should be a ZCRCW frame followed by a wait to guarantee complete flushing of the network's memory.

If the receiver gets a ZZZZAAAACCCCKKKK header with an address that disagrees with the sender address, it is ignored, and the sender waits for another header. A ZZZZFFFFIIIINNNN, ZZZZAAAABBBBOOOORRRRTTTT, or ↩
TTTTIIIIMMMMEEEEOOOOUUUUTTTT terminates the session; a ZZZZSSSSKKKKIIIIPPPP terminates the processing of this file.

The reverse channel is then sampled for the presence of another header from the receiver.[4] if one is detected, the getinsync() function is again called to read another error header. Otherwise, transmission resumes at the (possibly reset) file offset with a ↩
ZZZZDDDDAAAATTTTAAAA
header followed by data subpackets.

9.1.1 WWWWiiiinnnnddddoooowwww MMMMaaaannnnaaaaggggeeeemmmmeeeennnntttt

When sending data through a network, some nodes of the network store data while it is transferred to the receiver. 7000 bytes and more of transient storage have been observed. Such a large amount of storage causes the transmitter to "get ahead" of the reciever. This can be fatal with MEGAlink and other protocols that depend on timely notification of errors from the receiver. This condition is not fatal with ZMODEM, but it does slow error recovery.

To manage the window size, the sending program uses ZCRCQ data subpackets to trigger ZACK headers from the receiver. The returning ZACK headers inform the sender of the receiver's progress. When the window size (current transmitter file offset - last reported receiver file offset) exceeds a specified value, the sender waits for a ZACK[5] packet with a receiver file offset that reduces the window size.

Unix _s_z versions beginning with May 9 1987 control the window size with the "-w N" option, where N is the maximum window size. Pro-YAM, ZCOMM and DSZ versions beginning with May 9 1987 control the window size with "zmodem pwN". This is compatible with previous versions of these programs.[6]

---

4. If sampling is possible.

5. ZRPOS and other error packets are handled normally.

6. When used with modems or networks that simultaneously assert flow

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9.2 FFFFuuuullllllll SSSStttttrrrreeeeaaaammmmiiiinnnngggg wwwwiiiittttthhhh ↩ RRRReeeevvvveeeerrrrsssseeee IIIInnnnttttteeeerrrrrrrruuuupppptttt

The above method cannot be used if the reverse data stream cannot be sampled without entering an I/O wait. An alternate method is to instruct the receiver to interrupt the sending program when an error is detected.

The receiver can interrupt the sender with a control character, break signal, or combination thereof, as specified in the AAAAttttttttnnnn sequence. After executing the AAAAttttttttnnnn sequence, the receiver sends a hex ↩ ZZZZRRRRPPPPOOOOSSSS header to force the sender to resend the lost data.

When the sending program responds to this interrupt, it reads a HEX header (normally ZRPOS) from the receiver and takes the action described in the previous section. The Unix sssszzzz....cccc program uses a setjmp/longjmp call to catch the interrupt generated by the AAAAttttttttnnnn sequence. Catching the interrupt activates the getinsync() function to read the receiver's error header and take appropriate action.

When compiled for standard SYSTEM III/V Unix, sssszzzz....cccc uses an ↩ AAAAttttttttnnnn sequence of Ctrl-C followed by a 1 second pause to interrupt the sender, then give the sender (Unix) time to prepare for the receiver's error header.

9.3 FFFFuuuullllllll SSSStttttrrrreeeeaaaammmmiiiinnnngggg wwwwiiiittttthhhh ↩ SSSSlllliiiiddddiiiinnnngggg WWWWiiiinnnnddddoooowwww

If none of the above methods is applicable, hope is not yet lost. If the sender can buffer responses from the receiver, the sender can use ZCRCQ data subpackets to get ACKs from the receiver without interrupting the transmission of data. After a sufficient number of ZCRCQ data subpackets have been sent, the sender can read one of the headers that should have arrived in its receive interrupt buffer.

A problem with this method is the possibility of wasting an excessive amount of time responding to the receiver's error header. It may be possible to program the receiver's AAAAttttttttnnnn sequence to flush the sender's interrupt buffer before sending the ZRPOS header.

---

control with XON and XOFF characters aaaannnndddd pass XON characters that violate flow control, the receiving program should have a revision

```
    date of May 9 or later.



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9.4  FFFFuuuulllllll SSSStttrrrreeeeaaaammmmiiiinnnngggg oooovvvveeeerrrr  ←
   EEEErrrrrrrroooorrrr FFFFrrrreeeeeeee CCCChhhhaaaannnnnnnneeeellllssss

File transfer protocols predicated on the existence of an error free
end to end communications channel have been proposed from time to
time.  Such channels have proven to be more readily available in
theory than in actuality.  The frequency of undetected errors
increases when modem scramblers have more bits than the error
detecting CRC.

A ZMODEM sender assuming an error free channel with end to end flow
control can send the entire file in one frame without any checking of
the reverse stream.  If this channel is completely transparent, only
ZDLE need be escaped.  The resulting protocol overhead for average
long files is less than one per cent.[7]

9.5  SSSSeeeeggggmmmmeeeennnntttteeeedddd SSSSttttrrrreeeeaaaammmmiiiinnnngggg

If the receiver cannot overlap serial and disk I/O, it uses the
ZZZZRRRRIIIINNNNIIIITTTT frame to specify a buffer length which the sender will  ←
   not
overflow.  The sending program sends a ZZZZCCCCRRRRCCCCWWWW data subpacket and   ←
   waits
for a ZZZZAAAACCCCKKKK header before sending the next segment of the file.

If the sending program supports reverse data stream sampling or
interrupt, error recovery will be faster (on average) than a protocol
(such as YMODEM) that sends large blocks.

A sufficiently large receiving buffer allows throughput to closely
approach that of full streaming.  For example, 16kb segmented
streaming adds about 3 per cent to full streaming ZMODEM file
transfer times when the round trip delay is five seconds.


10.  AAAATTTTTTTTEEEENNNNTTTTIIIIOOOONNNN SSSSEEEEQQQQUUUUEEEENNNNCCCCEEEE

The receiving program sends the AAAAttttttttnnnn sequence whenever it detects an
error and needs to interrupt the sending program.
```

The default AAAAttttttttnnnn string value is empty (no Attn sequence). The receiving program resets Attn to the empty default before each transfer session.

The sender specifies the Attn sequence in its optional ZSINIT frame. The AAAAttttttttnnnn string is terminated with a null.

---

7. One in 256 for escaping ZDLE, about two (four if 32 bit CRC is used) in 1024 for data subpacket CRC's

Two meta-characters perform special functions:

o+ \335 (octal) Send a break signal

o+ \336 (octal) Pause one second

11. FFFFRRRRAAAAMMMMEEEE TTTTYYYYPPPPEEEESSSS

The numeric values for the values shown in boldface are given in _z_m_o_d_e_m._h. Unused bits and unused bytes in the header (ZP0...ZP3) are set to 0.

11.1 ZZZZRRRRQQQQIIIINNNNIIIITTTT

Sent by the sending program, to trigger the receiving program to send its ZRINIT header. This avoids the aggravating startup delay associated with XMODEM and Kermit transfers. The sending program may repeat the receive invitation (including ZRQINIT) if a response is not obtained at first.

ZF0 contains ZCOMMAND if the program is attempting to send a command, 0 otherwise.

11.2 ZZZZRRRRIIIINNNNIIIITTTT

Sent by the receiving program. ZF0 and ZF1 contain the bitwise or of the receiver capability flags:

```
#define CANCRY      8 /* Receiver can decrypt */
#define CANFDX     01 /* Rx can send and receive true FDX */
#define CANOVIO    02 /* Rx can receive data during disk I/O */
#define CANBRK     04 /* Rx can send a break signal */
#define CANCRY    010 /* Receiver can decrypt */
#define CANLZW    020 /* Receiver can uncompress */
#define CANFC32   040 /* Receiver can use 32 bit Frame Check */
#define ESCCTL   0100 /* Receiver expects ctl chars to be escaped
*/
#define ESC8   0200 /* Receiver expects 8th bit to be escaped */

ZP0 and ZP1 contain the size of the receiver's buffer in bytes, or 0
if nonstop I/O is allowed.

11.3  ZZZZSSSSIIIINNNNIIIITTTT

The Sender sends flags followed by a binary data subpacket terminated
with ZZZZCCCCRRRRCCCCWWWW.

/* Bit Masks for ZSINIT flags byte ZF0 */
#define TESCCTL 0100   /* Transmitter expects ctl chars to be escaped
*/
#define TESC8 0200   /* Transmitter expects 8th bit to be escaped



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*/

The data subpacket contains the null terminated AAAAttttttttnnnn sequence,
maximum length 32 bytes including the terminating null.

11.4  ZZZZAAAACCCCKKKK

Acknowledgment to a ZZZZSSSSIIIINNNNIIIITTTT frame, ↩
   ZZZZCCCCHHHHAAAALLLLLLLLEEEENNNNGGGGEEEE header, ZZZZCCCCRRRRCCCCQQQQ or ↩
   ZZZZCCCCRRRRCCCCWWWW
data subpacket.  ZP0 to ZP3 contain file offset.  The response to
ZCHALLENGE contains the same 32 bit number received in the ZCHALLENGE
header.

11.5  ZZZZFFFFIIIILLLLEEEE

This frame denotes the beginning of a file transmission attempt.
ZF0, ZF1, and ZF2 may contain options.  A value of 0 in each of these
bytes implies no special treatment.  Options specified to the
```

receiver override options specified to the sender with the exception
of ZZZZCCCCBBBBIIIINNNN which overrides any other Conversion Option given to the
sender or receiver.

11.5.1 ZZZZFFFF0000:::: CCCCooooonnnnvvvveeeerrrrssssiiiioooonnnn OOOOppppttttiiiioooonnnn

If the receiver does not recognize the Conversion Option, an
application dependent default conversion may apply.

ZZZZCCCCBBBBIIIINNNN "Binary" transfer - inhibit conversion unconditionally

ZZZZCCCCNNNNLLLL Convert received end of line to local end of line
convention. The supported end of line conventions are
CR/LF (most ASCII based operating systems except Unix
and Macintosh), and NL (Unix). Either of these two end
of line conventions meet the permissible ASCII
definitions for Carriage Return and Line Feed/New Line.
Neither the ASCII code nor ZMODEM ZCNL encompass lines
separated only by carriage returns. Other processing
appropriate to ASCII text files and the local operating
system may also be applied by the receiver.[1]

ZZZZCCCCRRRREEEECCCCOOOOVVVV Recover/Resume interrupted file transfer. ZCREVOV is
also useful for updating a remote copy of a file that
grows without resending of old data. If the destination
file exists and is no longer than the source, append to
the destination file and start transfer at the offset
corresponding to the receiver's end of file. This

1. Filtering RUBOUT, NULL, Ctrl-Z, etc.

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option does not apply if the source file is shorter.
Files that have been converted (e.g., ZCNL) or subject
to a single ended Transport Option cannot have their
transfers recovered.

11.5.2 ZZZZFFFF1111:::: MMMMaaaannnnaaaaggggeeeemmmmeeeennnntttt ↩
OOOOppppttttiiiioooonnnn
If the receiver does not recognize the Management Option, the file should be transferred normally.

The ZZZZMMMMSSSSKKKKNNNNOOOOLLLLOOOOCCCC bit instructs the receiver to bypass the current file if the receiver does not have a file with the same name.

Five bits (defined by ZZZZMMMMMMMMAAAASSSSKKKK) define the following set of mutually exclusive management options.

ZZZZMMMMNNNNEEEEWWWWLLLL Transfer file if destination file absent. Otherwise, transfer file overwriting destination if the source file is newer or longer.

ZZZZMMMMCCCCRRRRCCCC Compare the source and destination files. Transfer if file lengths or file polynomials differ.

ZZZZMMMMAAAAPPPPNNNNDDDD Append source file contents to the end of the existing destination file (if any).

ZZZZMMMMCCCCLLLLOOOOBBBB Replace existing destination file (if any).

ZZZZMMMMDDDDIIIIFFFFFFFF Transfer file if destination file absent. Otherwise, transfer file overwriting destination if files have different lengths or dates.

ZZZZMMMMPPPPRRRROOOOTTTT Protect destination file by transferring file only if the destination file is absent.

ZZZZMMMMNNNNEEEEWWWW Transfer file if destination file absent. Otherwise, transfer file overwriting destination if the source file is newer.

11.5.3 ZZZZFFFF2222:::: TTTTrrrraaaannnnssssppppoooorrrrtttt ↩
OOOOppppttttiiiioooonnnn
If the receiver does not implement the particular transport option, the file is copied without conversion for later processing.

ZZZZTTTTLLLLZZZZWWWW Lempel-Ziv compression. Transmitted data will be identical to that produced by ccccoooommmmpppprrrreeeessssssss 4444....0000 ↩
operating on
a computer with VAX byte ordering, using 12 bit encoding.

ZZZZTTTTCCCCRRRRYYYYPPPPTTTT Encryption. An initial null terminated string identifies the key. Details to be determined.

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ZZZZTTTTRRRRLLLLEEEE Run Length encoding, Details to be determined.

A ZZZZCCCCRRRRCCCCWWWW data subpacket follows with file name, file length, modification date, and other information described in a later chapter.

11.5.4 ZZZZFFFF3333:::: EEEExxxxttttteeeennnnddddeeeedddd ↩
OOOOppppttttiiiioooonnnnssss

The Extended Options are bit encoded.

ZZZZTTTTSSSSPPPPAAAARRRRSSSS Special processing for sparse files, or sender ↩
managed
selective retransmission. Each file segment is transmitted as a separate frame, where the frames are not necessarily contiguous. The sender should end each segment with a ZCRCW data subpacket and process the expected ZACK to insure no data is lost. ZTSPARS cannot be used with ZCNL.

11.6 ZZZZSSSSKKKKIIIIPPPP

Sent by the receiver in response to ZZZZFFFFIIIILLLLEEEE, makes the sender skip to the next file.

11.7 ZZZZNNNNAAAAKKKK

Indicates last header was garbled. (See also ZZZZRRRRPPPPOOOOSSSS).

11.8 ZZZZAAAABBBBOOOORRRRTTTT

Sent by receiver to terminate batch file transfers when requested by the user. Sender responds with a ZZZZFFFFIIIINNNN sequence.[2]

11.9 ZZZZFFFFIIIINNNN

Sent by sending program to terminate a ZMODEM session. Receiver responds with its own ZZZZFFFFIIIINNNN.

11.10 ZZZZRRRRPPPPOOOOSSSS

Sent by receiver to force file transfer to resume at file offset given in ZP0...ZP3.

2. Or ZZZZCCCCOOOOMMMMPPPPLLLL in case of server mode.

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11.11 ZZZZDDDDAAAATTTTAAAA

ZP0...ZP3 contain file offset. One or more data subpackets follow.

11.12 ZZZZEEEEOOOOFFFF

Sender reports End of File. ZP0...ZP3 contain the ending file offset.

11.13 ZZZZFFFFEEEERRRRRRRR

Error in reading or writing file, protocol equivalent to ZZZZAAAABBBBOOOORRRRTTTT.

11.14 ZZZZCCCCRRRRCCCC

Request (receiver) and response (sender) for file polynomial. ZP0...ZP3 contain file polynomial.

11.15 ZZZZCCCCHHHHAAAALLLLLLLLEEEENNNNGGGGEEEE

Request sender to echo a random number in ZP0...ZP3 in a ZACK frame. Sent by the receiving program to the sending program to verify that it is connected to an operating program, and was not activated by spurious data or a Trojan Horse message.

11.16 ZZZZCCCCOOOOMMMMPPPPLLLL

Request now completed.

11.17 ZZZZCCCCAAAANNNN

This is a pseudo frame type returned by gethdr() in response to a Session Abort sequence.

11.18 ZZZZFFFFRRRREEEEEEEECCCCNNNNTTTT

Sending program requests a ZACK frame with ZP0...ZP3 containing the number of free bytes on the current file system. A value of 0 represents an indefinite amount of free space.

```
11.19  ZZZZCCCCOOOOMMMMMMMMAAAANNNNDDDD

ZCOMMAND is sent in a binary frame.  ZZZZFFFF0000 contains 0000 or  ↩
   ZZZZCCCCAAAACCCCKKKK1111 (see
below).

A ZCRCW data subpacket follows, with the ASCII text command string
terminated with a NULL character.  If the command is intended to be
executed by the operating system hosting the receiving program
(e.g., "shell escape"), it must have "!" as the first character.
Otherwise the command is meant to be executed by the application
program which receives the command.



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If the receiver detects an illegal or badly formed command, the
receiver immediately responds with a ZCOMPL header with an error
code in ZP0...ZP3.

If ZF0 contained ZZZZCCCCAAAACCCCKKKK1111,,,, the receiver immediately responds  ↩
   with  a
ZCOMPL header with 0 status.

Otherwise, the receiver responds with a ZCOMPL header when the
operation is completed.  The exit status of the completed command is
stored in ZP0...ZP3.  A 0 exit status implies nominal completion of
the command.

If the command causes a file to be transmitted, the command sender
will see a ZRQINIT frame from the other computer attempting to send
data.

The sender examines ZF0 of the received ZRQINIT header to verify it
is not an echo of its own ZRQINIT header.  It is illegal for the
sending program to command the receiving program to send a command.

If the receiver program does not implement command downloading, it
may display the command to the standard error output, then return a
ZCOMPL header.



12.  SSSSEEEESSSSSSSSIIIIOOOONNNN TTTTRRRRAAAANNNNSSSSAAAACCCCTTTTIIIIOOOONNNN  ↩
   EEEEXXXXAAAAMMMMPPPPLLLLEEEESSSS
```

12.1 AAAA ssssiiiimmmmpppplllleeee ffffiiiilllleeee ttttrrrraaaannnnssssffffeeeerrrr

A simple transaction, one file, no errors, no CHALLENGE, overlapped I/O:

```
Sender         Receiver

"rz\r"
ZRQINIT(0)
         ZRINIT
ZFILE
         ZRPOS
ZDATA data ...
ZEOF
         ZRINIT
ZFIN
         ZFIN
OO
```


12.2 CCCChhhhaaaallllllllleeeennnnggggeeee aaaannnndddd CCCCoooommmmmmmmaaaannnndddd DDDDoooowwwwnnnnllllooooaaaadddd

```
Sender        Receiver

"rz\r"
ZRQINIT(ZCOMMAND)
        ZCHALLENGE(random-number)
ZACK(same-number)
        ZRINIT
ZCOMMAND, ZDATA
        (Performs Command)
        ZCOMPL
ZFIN
        ZFIN
OO
```

```
13.  ZZZZFFFFIIIILLLLEEEE FFFFRRRRAAAAMMMMEEEE FFFFIIIILLLLEEEE  ↩
   IIIINNNNFFFFOOOORRRRMMMMAAAATTTTIIIIOOOONNNN

ZMODEM sends the same file information with the ZZZZFFFFIIIILLLLEEEE frame data
that YMODEM Batch sends in its block 0.  NNNN....BBBB....:::: TTTThhhheeee  ↩
   ppppaaaatttthhhhnnnnaaaammmmeeee ((((ffffiiiilllleeee
nnnnaaaammmmeeee)))) ffffiiiieeeelllldddd iiiissss  ↩
   mmmmaaaannnnddddaaaattttoooorrrryyyy....

PPPPaaaatttthhhhnnnnaaaammmmeeee The pathname (conventionally, the file name) is  ↩
   sent as a
     null terminated ASCII string.  This is the filename format used
     by the handle oriented MSDOS(TM) functions and C library fopen
     functions.  An assembly language example follows:
         DB   'foo.bar',0
     No spaces are included in the pathname.  Normally only the file
     name stem (no directory prefix) is transmitted unless the
     sender has selected YAM's ffff option  to send the ffffuuuullllllll absolute  ↩
        or
     relative pathname.  The source drive designator (A:, B:, etc.)
     usually is not sent.

       FFFFiiiilllleeeennnnaaaammmmeeee  ↩
          CCCCoooonnnnssssiiiiddddeeeerrrraaaattttiiiioooonnnnssss

  o+ File names should be translated to lower case  unless the
    sending system supports upper/lower case file names.  This
    is a convenience for users of systems (such as Unix) which
    store filenames in upper and lower case.

  o+ The receiver should accommodate file names in  lower and
    upper case.

  o+ When transmitting files between different operating
    systems, file names must be acceptable to both the sender
    and receiving operating systems.  If not, transformations
    should be applied to make the file names acceptable.  If
    the transformations are unsuccessful, a new file name may
    be invented be the receiving program.
```



```
     If directories are included, they are delimited by /; i.e.,
```

"subdir/foo" is acceptable, "subdir\foo" is not.

LLLLeeeennnnggggtttthhhh The file length and each of the succeeding fields are optional.[1] The length field is stored as a decimal string counting the number of data bytes in the file.

The ZMODEM receiver uses the file length as an estimate only. It may be used to display an estimate of the transmission time, and may be compared with the amount of free disk space. The actual length of the received file is determined by the data transfer. A file may grow after transmission commences, and all the data will be sent.

MMMMooooddddiiiiffffiiiiccccaaaattttiiiioooonnnn DDDDaaaatttteeee A single space separates the modification date from the file length.

The mod date is optional, and the filename and length may be sent without requiring the mod date to be sent.

The mod date is sent as an octal number giving the time the ccccoooonnnntttteeeennnnttttssss of the file were last changed measured in seconds from Jan 1 1970 Universal Coordinated Time (GMT). A date of 0 implies the modification date is unknown and should be left as the date the file is received.

This standard format was chosen to eliminate ambiguities arising from transfers between different time zones.

FFFFiiiilllleeee MMMMooooddddeeee A single space separates the file mode from the modification date. The file mode is stored as an octal string. Unless the file originated from a Unix system, the file mode is set to 0. rz(1) checks the file mode for the 0x8000 bit which indicates a Unix type regular file. Files with the 0x8000 bit set are assumed to have been sent from another Unix (or similar) system which uses the same file conventions. Such files are not translated in any way.

SSSSeeeerrrriiiiaaaallll NNNNuuuummmmbbbbeeeerrrr A single space separates the serial number from the file mode. The serial number of the transmitting program is stored as an octal string. Programs which do not have a serial number should omit this field, or set it to 0. The receiver's use of this field is optional.

1. Fields may not be skipped.

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NNNNuuuummmmbbbbeeeerrrr ooooffff FFFFiiiilllleeeessss ↩
RRRReeeemmmmaaaaiiiinnnniiiinnnngggg Iff the number of files remaining is sent, a single space separates this field from the previous field. This field is coded as a decimal number, and includes the current file. This field is an estimate, and incorrect values must not be allowed to cause loss of data. The receiver's use of this field is optional.

NNNNuuuummmmbbbbeeeerrrr ooooffff BBBByyyytttteeeessss ↩
RRRReeeemmmmaaaaiiiinnnniiiinnnngggg Iff the number of bytes remaining is sent, a single space separates this field from the previous field. This field is coded as a decimal number, and includes the current file. This field is an estimate, and incorrect values must not be allowed to cause loss of data. The receiver's use of this field is optional.

The file information is terminated by a null. If only the pathname is sent, the pathname is terminated with ttttwwwwoooo nulls. The length of the file information subpacket, including the trailing null, must not exceed 1024 bytes; a typical length is less than 64 bytes.

14. PPPPEEEERRRRFFFFOOOORRRRMMMMAAAANNNNCCCCEEEE RRRREEEESSSSUUUULLLLTTTTSSSS

14.1 CCCCoooommmmppppaaaattttiiiibbbbiiiilllliiiittttyyyy

Extensive testing has demonstrated ZMODEM to be compatible with satellite links, packet switched networks, microcomputers, minicomputers, regular and error correcting buffered modems at 75 to 19200 bps. ZMODEM's economy of reverse channel bandwidth allows modems that dynamically partition bandwidth between the two directions to operate at optimal speeds.

14.2 TTTThhhhrrrroooouuuugggghhhhppppuuuutttt

Between two single task PC-XT computers sending a program image on an in house Telenet link, SuperKermit provided 72 ch/sec throughput at 1200 baud. YMODEM-k yielded 85 chars/sec, and ZMODEM provided 113 chars/sec. XMODEM was not measured, but would have been much slower based on observed network propagation delays.

Recent tests downloading large binary files to an IBM PC (4.7 mHz V20) running YAMK 16.30 with table driven 32 bit CRC calculation yielded a throughput of 1870 cps on a 19200 bps direct connection.

Tests with TELEBIT TrailBlazer modems have shown transfer rates approaching 1400 characters per second for long files. When files are compressed, effective transfer rates of 2000 characters per second are possible.

14.3 EEEErrrrrrrroooorrrr RRRReeeeccccoooovvvveeeerrrryyyy

Some tests of ZMODEM protocol error recovery performance have been made. A PC-AT with SCO SYS V Xenix or DOS 3.1 was connected to a PC with DOS 2.1 either directly at 9600 bps or with unbuffered dial-up 1200 bps modems. The ZMODEM software was configured to use 1024 byte data subpacket lengths above 2400 bps, 256 otherwise.

Because no time delays are necessary in normal file transfers, per file negotiations are much faster than with YMODEM, the only observed delay being the time required by the program(s) to update logging files.

During a file transfer, a short line hit seen by the receiver usually induces a CRC error. The interrupt sequence is usually seen by the sender before the next data subpacket is completely sent, and the resultant loss of data throughput averages about half a data subpacket per line hit. At 1200 bps this is would be about .75 second lost per hit. At 10-5 error rate, this would degrade throughput by about 9 per cent.

The throughput degradation increases with increasing channel delay, as more data subpackets in transit through the channel are discarded when an error is detected.

A longer noise burst that affects both the receiver and the sender's reception of the interrupt sequence usually causes the sender to remain silent until the receiver times out in 10 seconds. If the round trip channel delay exceeds the receiver's 10 second timeout, recovery from this type of error may become difficult.

Noise affecting only the sender is usually ignored, with one common exception. Spurious XOFF characters generated by noise stop the sender until the receiver times out and sends an interrupt sequence which concludes with an XON.

In summation, ZMODEM performance in the presence of errors resembles that of X.PC and SuperKermit. Short bursts cause minimal data retransmission. Long bursts (such as pulse dialing noises) often require a timeout error to restore the flow of data.

15. PPPPAAAACCCCKKKKEEEETTTT SSSSWWWWIIIITTTTCCCCHHHHEEEEDDDD ↩
NNNNEEEETTTTWWWWOOOORRRRKKKK ↩
CCCCOOOONNNNSSSSIIIIDDDDEEEERRRRAAAATTTTIIIIOOOONNNNSSSS

Flow control is necessary for printing messages and directories, and for streaming file transfer protocols. A non transparent flow control is incompatible with XMODEM and YMODEM transfers. XMODEM and YMODEM protocols require complete transparency of all 256 8 bit codes to operate properly.

The "best" flow control (when X.25 or hardware CTS is unavailable)

would not "eat" any characters at all. When the PAD's buffer almost fills up, an XOFF should be emitted. When the buffer is no longer nearly full, send an XON. Otherwise, the network should neither generate nor eat XON or XOFF control characters.

On Telenet, this can be met by setting CCIT X3 5:1 and 12:0 at bbbbooootttthhhh ends of the network. For best throughput, parameter 64 (advance ACK) should be set to something like 4. Packets should be forwarded when the packet is a full 128 bytes, or after a moderate delay (3:0,4:10,6:0).

With PC-Pursuit, it is sufficient to set parameter 5 to 1 at both ends after one is connected to the remote modem.

```
<ENTER>@<ENTER>
set 5:1<ENTER>
rst? 5:1<ENTER>
cont<ENTER>
```

Unfortunately, many PADs do not accept the "rst?" command.

For YMODEM, PAD buffering should guarantee that a minimum of 1040 characters can be sent in a burst without loss of data or generation of flow control characters. Failure to provide this buffering will generate excessive retries with YMODEM.

TTTTAAAABBBBLLLLEEEE 1111.... Network and Flow Control Compatibility

Connectivity	Interactive	XMODEM	WXMODEM	SUPERKERMIT	ZMODEM
Direct Connect	YES	YES	YES	YES	YES
Network, no FC	nnnnoooo	YES	(4)	(6)	YES (1)
Net, transparent FC	YES	YES	YES	YES	YES
Net, non-trans. FC	YES	nnnnoooo	no (5)	YES	YES
Network, 7 bit	YES	nnnnoooo	no	YES (2)	YES (3)

(1) ZMODEM can optimize window size or burst length for fastest transfers.
(2) Parity bits must be encoded, slowing binary transfers.
(3) Natural protocol extension possible for encoding data to 7 bits.
(4) Small WXMODEM window size may may allow operation.
(5) Some flow control codes are not escaped in WXMODEM.
(6) Kermit window size must be reduced to avoid buffer overrun.

16. PPPPEEEERRRRFFFFOOOORRRRMMMMAAAANNNNCCCCEEEE CCCCOOOOMMMMPPPPAAAARRRRIIIISSSSOOOONNNN TTTTAAAABBBBLLLLEEEESSSS

"Round Trip Delay Time" includes the time for the last byte in a packet to propagate through the operating systems and network to the receiver, plus the time for the receiver’s response to that packet to propagate back to the sender.

The figures shown below are calculated for round trip delay times of 40 milliseconds and 5 seconds. Shift registers in the two computers and a pair of 212 modems generate a round trip delay time on the order of 40 milliseconds. Operation with busy timesharing computers and networks can easily generate round trip delays of five seconds. Because the round trip delays cause visible interruptions of data transfer when using XMODEM protocol, the subjective effect of these delays is greatly exaggerated, especially when the user is paying for connect time.

A 102400 byte binary file with randomly distributed codes is sent at 1200 bps 8 data bits, 1 stop bit. The calculations assume no transmission errors. For each of the protocols, only the per file functions are considered. Processor and I/O overhead are not included. YM-k refers to YMODEM with 1024 byte data packets. YM-g refers to the YMODEM "g" option. ZMODEM uses 256 byte data subpackets for this example. SuperKermit uses maximum standard packet size, 8 bit transparent transmission, no run length compression. The 4 block WXMODEM window is too small to span the 5 second delay in this example; the resulting thoughput degradation is ignored.

For comparison, a straight "dump" of the file contents with no file management or error checking takes 853 seconds.

TTTTAAAABBBBLLLLEEEE 2222.... Protocol Overhead Information
(102400 byte binary file, 5 Second Round Trip)

Protocol	XMODEM	YM-k	YM-g	ZMODEM	SKermit	WXMODEM
Protocol Round Trips	804	104	5	5	5	4
Trip Time at 40ms	32s	4s	0	0	0	0
Trip Time at 5s	4020s	520s	25s	25s	25	20
Overhead Characters	4803	603	503	3600	38280	8000
Line Turnarounds	1602	204	5	5	2560	1602

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Transfer Time at 0s	893s	858s	857s	883s	1172s	916s
Transfer Time at 40ms	925s	862s	857s	883s	1172s	916s
Transfer Time at 5s	5766s	1378s	882s	918s	1197s	936s

FFFFiiiiggggguuuurrrreeee 5555.... Transmission Time Comparison
(102400 byte binary file, 5 Second Round Trip)

```
************************************************** XMODEM
************ YMODEM-K
********** SuperKermit (Sliding Windows)
******* ZMODEM 16kb Segmented Streaming
******* ZMODEM Full Streaming
******* YMODEM-G
```

TTTTAAAABBBBLLLLEEEE 3333.... Local Timesharing Computer Download Performance

Command	Protocol	Time/HD	Time/FD	Throughput	Efficiency
kermit -x	Kermit	1:49	2:03	327	34%
sz -Xa phones.t	XMODEM	1:20	1:44	343	36%
sz -a phones.t	ZMODEM	:39	:48	915	95%

Times were measured downloading a 35721 character text file at 9600 bps, from Santa Cruz SysV 2.1.2 Xenix on a 9 mHz IBM PC-AT to DOS 2.1 on an IBM PC. Xenix was in multiuser mode but otherwise idle. Transfer times to PC hard disk and floppy disk destinations are shown.

C-Kermit 4.2(030) used server mode and file compression, sending to Pro-YAM 15.52 using 0 delay and a "get phones.t" command.

Crosstalk XVI 3.6 used XMODEM 8 bit checksum (CRC not available) and an "ESC rx phones.t" command. The Crosstalk time does nnnnoooottttt include

```
the time needed to enter the extra commands not needed by Kermit and
ZMODEM.

Professional-YAM used ZMODEM AutoDownload.  ZMODEM times included a
security challenge to the sending program.




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          TTTTAAAABBBBLLLLEEEE 4444.... File Transfer Speeds

_________________________________________________________________
| Prot          file    bytes    bps     ch/sec     Notes     |
_|
   _________________________________________________________________
   |_
|X    jancol.c     18237    2400   53        Tymnet PTL 5/3/87   |
|X    source.xxx     6143     2400   56        Source/Telenet PTL 5/29/87|
|X    jancol.c     18237    2400   64        Tymnet PTL    |
|B    jancol.c     18237    1200   87        DataPac (604-687-7144)  |
|XN   tsrmaker.arc     25088    1200   94        GEnie PTL     |
|B/ovth   emaibm.arc     51200    1200   101         CIS PTL MNP     |
|UUCP   74 files, each   >7000    1200   102         Average, Various callers  |
|ZM   jancol.c     18237    1200   112         DataPac (604-687-7144)  |
|X/ovth   emaibm.arc     51200    1200   114         CIS PTL MNP     |
|ZM   emaibm.arc     51200    1200   114         CIS PTL MNP     |
|B    jancol.c     18237    2400   124         Tymnet PTL    |
|B    YI0515.87    9081     2400   157         CIS PTL node 5/29/87  |
|SK   source.xxx     6143     2400   170         Source/Telenet PTL 5/29/87|
|ZM   jancol.c     18237    2400   221         Tymnet PTL upl/dl   |
|B/ovth   destro.gif     33613    2400   223         CIS/PTL LEVEL 5 9-12-87   |
|ZM   jancol.c     18237    2400   224         Tymnet PTL    |
|ZM   jancol.c     18237    2400   226/218     TeleGodzilla upl    |
|ZM   jancol.c     18237    2400   226         Tymnet PTL 5/3/87   |
|ZM   zmodem.ov    35855    2400   227         CIS PTL node    |
|C    jancol.c     18237    2400   229         Tymnet PTL 5/3/87   |
|ZM   jancol.c     18237    2400   229/221     TeleGodzilla    |
|ZM   zmodem.ov    35855    2400   229         CIS PTL node upl    |
|ZM   jancol.c     18237    2400   232         CIS PTL node    |
|ZM   mbox       473104   9600   948/942     TeleGodzilla upl    |
|ZM   zmodem.arc     318826   14k    1357/1345   TeleGodzilla    |
|ZM   mbox       473104   14k    1367/1356   TeleGodzilla upl    |
|ZM   c2.doc     218823   38k    3473        Xenix 386 Toolkit upl   |
|ZM   mbox       511893   38k    3860        386 Xenix 2.2 Beta #  |
|ZM   c.doc      218823   57k    5611        **      |
```

```
_| ↩
   ___________________________________________________________________________ ↩
   |

Times are for downloads unless noted.  Where two speeds are noted,
the faster speed is reported by the receiver because its transfer
time calculation excludes the security check and transaction log
file processing.  The TeleGodzilla computer is a 4.77 mHz IBM PC
with a 10 MB hard disk.  The 386 computer uses an Intel motherboard
at 18 mHz 1ws.  The AT Clone (QIC) runs at 8 mHz 0ws.
Abbreviations:
 B      Compuserve B Protocol
 B/ovth     CIS B with Omen Technology OverThruster(TM)
 C      Capture DC2/DC4 (no protocol)
 K      Kermit
 MNP    Microcom MNP error correcting SX/1200 modem
 PTL    Portland Oregon network node
 SK     Sliding Window Kermit (SuperKermit) w=15
 X      XMODEM



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 XN     XMODEM protocol implemented in network modes
 X/ovth     XMODEM, Omen Technology OverThruster(TM)
 ZM     ZMODEM
 Tk     Xenix 386 Toolkit, rz compiled -M3, dumb serial port
 **     AT Clone ramdisk to 386 ramdisk, or either ramdisk to nul
 #      On the fly format translation NL to CR/LF
           TTTTAAAABBBBLLLLEEEE 5555....   Protocol Checklist

______________________________________________________________________
|Item          XMODEM  WXMODEM  YMDM-k   YMDM-g  ZMODEM  SKermit|
_|______________________________________|_________________|_________________| ↩
   __________________|________________|________________|_________________|_
|IIIINNNN SSSSEEEERRRRVVVVIIIICCCCEEEE      |  1977  | 1986   | 1982   | 1985  |  ↩
   1986  | 1985 |
_|___________________|_________|_________|_________|________|________|_________|
|UUUUSSSSEEEERRRR FFFFEEEEAAAATTTTUUUURRRREEEESSSS      |       |         |         | ↩
          |       |  |
|User Friendly I/F  |  -      | -       | -       | -      | YES    | -  |
|Commands/batch     |  2*N    | 2*N     | 2       | 2      | 1      | 1(1) |
|Commands/file      |  2      | 2       | 0       | 0      | 0      | 0  |
|Command Download   |  -      | -       | -       | -      | YES    | YES(6) |
|Menu Compatible    |  -      | -       | -       | -      | YES    | -  |
|Transfer Recovery  |  -      | -       | -       | -      | YES    | -  |
```

```
|File Management    |  -     | -      | -      | -     | YES   | -  |
|Security Check     |  -     | -      | -      | -     | YES   | -  |
|YMODEM Fallback    |  YES   | YES    | YES    | YES   | YES   | -  |
_|______________________|__________|__________|__________|_________|_________|__________|
|CCCCOOOOMMMMPPPPAAAATTTTIIIIBBBBIIIILLLLIIIITTTTYYYY     |       |         |  ↩
           |        |        |  |
|Dynamic Files      |  YES   | YES    | FFFFAAAAIIIILLLL   | FFFFAAAAIIIILLLL  |  ↩
   YES   | YES  |
|Packet SW NETS     |  -     | YES    | -      | -     | YES   | YES  |
|7 bit PS NETS      |  -     | -      | -      | -     | (8)   | YES  |
|Old Mainframes     |  -     | -      | -      | -     | (8)   | YES  |
|CP/M-80      |  YES   | YES    | YES    | -     | YES(9)| -  |
_|______________________|__________|__________|__________|_________|_________|__________|
|AAAATTTTTTTTRRRRIIIIBBBBUUUUTTTTEEEESSSS     |       |         |         |        |  ↩
          |  |
|Reliability(5)     |  fair  | poor   | fair(5)| none  | BEST  | HIGH |
|Streaming      |  -     | YES    | -      | YES   | YES   | YES  |
|Overhead(2)      |  7%    | 7%     | 1%     | 1%    | 1%    | 30%  |
|Faithful Xfers     |  -     | -      | YES    | YES   | YES   | YES  |
|Preserve Date      |  -     | -      | YES    | YES   | YES   | -  |
_|______________________|__________|__________|__________|_________|_________|__________|
|CCCCOOOOMMMMPPPPLLLLEEEEXXXXIIIITTTTYYYY     |       |         |         |        |  ↩
          |  |
|No-Wait Sample     |  -     | REQD   | -      | -     | opt   | REQD |
|Ring Buffers     |  -     | REQD   | -      | -     | opt   | REQD |
|XMODEM Similar     |  YES   | LOW    | HIGH   | HIGH  | LOW   | NONE |
|Complexity     |  LOW(5)| MED    | LOW(5) | LOW   | MED   | HIGH |
_|______________________|__________|__________|__________|_________|_________|__________|
|EEEEXXXXTTTTEEEENNNNSSSSIIIIOOOONNNNSSSS     |       |         |         |        |  ↩
          |  |
|Server Operation   |  -     | -      | -      | -     | YES(4)| YES  |
|Multiple Threads   |  -     | -      | -      | -     | future| -  |
_|__________________________________________|___________________|____________________|  ↩
   ___________________|_________________|_________________|___________________|_
```

NOTES:
(1) Server mode or Omen Technology Kermit AutoDownload

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(2) Character count, binary file, transparent channel
(3) 32 bit math needed for accurate transfer (no garbage added)
(4) AutoDownload operation
(5) CCCCyyyybbbbeeeerrrrnnnneeeettttiiiicccc DDDDaaaattttaaaa ↩
   RRRReeeeccccoooovvvveeeerrrryyyy((((TTTTMMMM)))) improves XMODEM and YMODEM

```
reliability with complex proprietary logic.
(6) Server commands only
(7) No provision for transfers across time zones
(8) Future enhancement provided for
(9) With Segmented Streaming
WXMODEM: XMODEM derivative protocol with data encoding and windowing
```

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17. FFFFUUUUTTTTUUUURRRREEEE EEEEXXXXTTTTEEEENNNNSSSSIIIIOOOONNNNSSSS

Future extensions include:

o+ Compatibility with 7 bit networks

o+ Server/Link Level operation: An END-TO-END error corrected program to program session is required for financial and other sensitive applications.

o+ Multiple independent threads

o+ Encryption

o+ Compression

o+ File Comparison

o+ Selective transfer within a file (e.g., modified segments of a database file)

o+ Selective Retransmission for error correction

18. RRRREEEEVVVVIIIISSSSIIIIOOOONNNNSSSS

10-27-87 Optional fields added for number of files remaining to be sent and total number of bytes remaining to be sent.
07-31-1987 The receiver should ignore a ZEOF with an offset that does not match the current file length. The previous action of responding with ZRPOS caused transfers to fail if a CRC error occurred immediately before end of file, because two retransmission requests were being sent for each error. This has been observed under exceptional conditions, such as data transmission at speeds greater than the receiving computer’s interrupt response capabilitiy or gross misapplication of flow control.

Discussion of the Tx backchannel garbage count and ZCRCW after error ZRPOS was added. Many revisions for clarity.
07-09-87 Corrected XMODEM’s development date, incorrectly stated as 1979 instead of the actual August 1977. More performance data was added.
05-30-87 Added ZMNEW and ZMSKNOLOC
05-14-87 Window management, ZACK zshhdr XON removed, control character escaping, ZMSPARS changed to ZXPARS, editorial changes.
04-13-87 The ZMODEM file transfer protocol’s public domain status is emphasized.
04-04-87: minor editorial changes, added conditionals for overview version.
03-15-87: 32 bit CRC added.
12-19-86: 0 Length ZCRCW data subpacket sent in response to ZPAD or

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ZDELE detected on reverse channel has been changed to ZCRCE. The reverse channel is now checked for activity before sending each ZDATA header.
11-08-86: Minor changes for clarity.
10-2-86: ZCNL definition expanded.
9-11-86: ZMPROT file management option added.
8-20-86: More performance data included.
8-4-86: ASCII DLE (Ctrl-P, 020) now escaped; compatible with previous versions. More document revisions for clarity.
7-15-86: This document was extensively edited to improve clarity and correct small errors. The definition of the ZMNEW management option was modified, and the ZMDIFF management option was added. The cancel sequence was changed from two to five CAN characters after spurious two character cancel sequences were detected.

19. MMMMOOOORRRREEEE IIIINNNNFFFFOOOORRRRMMMMAAAATTTTIIIIOOOONNNN

Please contact Omen Technology for troff source files and typeset copies of this document.

19.1 TTTTeeeellllleeeeGGGGooooddddzzzziiiillllllllaaaa ↩
   BBBBuuuulllllllleeeettttiiiinnnn BBBBooooaaaarrrrdddd

More information may be obtained by calling the TeleGodzilla bulletin board at 503-621-3746. TeleGodzilla supports 19200 (Telebit PEP), 2400 and 1200 bps callers with automatic speed recognition.

Relevant files include YZMODEM.ZOO, YAMDEMO.ZOO, YAMHELP.ZOO, ZCOMMEXE.ARC, ZCOMMDOC.ARC, ZCOMMHLP.ARC, and YMODEM.DQC.

Useful commands for TeleGodzilla include "menu", "dir", "sx file (XMODEM)", "kermit sb file ...", and "sz file ...".

19.2 UUUUnnnniiiixxxx UUUUUUUUCCCCPPPP AAAAcccccccceeeessssssss

UCP sites can obtain the current version of this file with

```
        uucp omen!/u/caf/public/zmodem.doc /tmp
```

A continually updated list of available files is stored in /usr/spool/uucppublic/FILES.

```
     uucp  omen!~uucp/FILES   /usr/spool/uucppublic
```

The following L.sys line allows UUCP to call site "omen" via Omen's bulletin board system "TeleGodzilla". TeleGodzilla is an instance of Omen Technology's Professional-YAM in host operation, acting as a bulletin board and front ending a Xenix system.

In response to TeleGodzilla's "Name Please:" (e:--e:), uucico gives the Pro-YAM "link" command as a user name. Telegodzilla then asks for a link password (d:). The password (Giznoid) controls access to

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the Xenix system connected to the IBM PC's other serial port. Communications between Pro-YAM and Xenix use 9600 bps; YAM converts this to the caller's speed.

Finally, the calling uucico sees the Xenix "Login:" message (n:--n:), and logs in as "uucp". No password is used for the uucp account.

```
omen Any ACU 2400 1-503-621-3746 e:--e: link d: Giznoid n:--n: uucp
```

20. ZZZZMMMMOOOODDDDEEEEMMMM PPPPRRRROOOOGGGGRRRRAAAAMMMMSSSS

A copy of this document, a demonstration version of Professional-YAM, a flash-up tree structured help file and processor, are available in _Y_Z_M_O_D_E_M._Z_O_O on TeleGodzilla and other bulletin boards. This file must be unpacked with _L_O_O_Z._E_X_E, also available on TeleGodzilla. _Y_Z_M_O_D_E_M._Z_O_O may be distributed provided none of the files are deleted or modified without the written consent of Omen Technology.

TeleGodzilla and other bulletin boards also feature ZZZZCCCCOOOOMMMMMMMM, a shareware communications program. ZCOMM includes Omen Technology's TurboLearn(TM) Script Writer, ZMODEM, Omen's highly acclaimed XMODEM and YMODEM protocol support, Sliding Windows Kermit, several traditional protocols, a powerful script language, and the most accurate VT100/102 emulation available in a usr supported program. The ZCOMM files include:

- o+ ZZZZCCCCOOOOMMMMMMMMEEEEXXXXEEEE....AAAARRRRCCCC Executable files and beginner's telephone directory

```
  o+ ZZZZCCCCOOOOMMMMMMMMDDDDOOOOCCCC....AAAARRRRCCCC "Universal Line Printer ↩
     Edition" Manual

  o+ ZZZZCCCCOOOOMMMMMMMMHHHHLLLLPPPP....AAAARRRRCCCC Tree structured Flash-UP ↩
     help processor and
    database
```

Source code and manual pages for the Unix/Xenix _r_z and _s_z programs
are available on TeleGodzilla in _R_Z_S_Z._Z_O_O. This ZOO archive may be
unpacked with _L_O_O_Z._E_X_E, also available on TeleGodzilla. Most Unix
like systems are supported, including V7, Sys III, 4.x BSD, SYS V,
Idris, Coherent, and Regulus.

_R_Z_S_Z._Z_O_O includes a ZCOMM/Pro-YAM/PowerCom script _Z_U_P_L._T to upload
the small (178 lines) YMODEM bootstrap program _M_I_N_I_R_B._C without a
file transfer protocol. _M_I_N_I_R_B uses the Unix stty(1) program to set
the required raw tty modes, and compiles without special flags on
virtually all Unix and Xenix systems. _Z_U_P_L._T directs the Unix
system to compile _M_I_N_I_R_B, then uses it as a bootstrap to upload the
rz/sz source and manual files.

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The PC-DOS OOOOppppuuuussss and NNNNooooccccchhhhaaaannnnggggeeee bulletin boards ↩
support ZMODEM.
Integrated ZMODEM support for the CCCCooooollllllllliiiieeee bulletin board program ↩
is
planned.

A number of other bulletin board programs support ZMODEM with
external modules (DSZ, etc.).

The PC-DOS Teleconferencing system IIIINNNN----SSSSYYYYNNNNCCCCHHHH uses ZMODEM.

The LAN modem sharing program LLLLiiiinnnneeee PPPPllllluuuussss has announced ↩
ZMODEM
support.

Other PC-DOS communications programs with ZMODEM support modules
include QMODEM and BOYAN. Many programs are adding direct ZMODEM
support, including Crosstalk Mark IV, Telix 3.0, and (expected)
Procomm and Qmodem.

The ZModem communications program by Jwahar Bammi runs on Atari ST machines.

The OOOOnnnnlllliiiinnnneeee!!!! program for the Amiga supports ZMODEM.

The Compuserve Information Service has ported the Unix rz/sz ZMODEM
programs to DECSYSTEM 20 assembler.

20.1 AAAAddddddddiiiinnnngggg ZZZZMMMMOOOODDDDEEEEMMMM ttttoooo DDDDOOOOSSSS PPPPrrrroooogggrrrraaaammmmssss

_D_S_Z is a small program that supports XMODEM, YMODEM, and ZMODEM file
transfers. _D_S_Z is designed to be called from a bulletin board
program or another communications program. It may be called as
         dsz port 2 sz file1 file2
to send files, or as
         dsz port 2 rz
to receive zero or more file(s), or as
         dsz port 2 rz filea fileb
to receive two files, the first to _f_i_l_e_a and the second (if sent) to
_f_i_l_e_b. This form of _d_s_z may be used to control the pathname of
incoming file(s). In this example, if the sending program attempted
to send a third file, the transfer would be terminated.

_D_s_z uses DOS stdout for messages (no direct CRT access), acquires
the COMM port vectors with standard DOS calls, and restores the COMM
port's interrupt vector and registers upon exit.

Further information on _d_s_z may be found in _d_s_z._d_o_c and the ZCOMM or
Pro-YAM user manuals.

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21. YYYYMMMMOOOODDDDEEEEMMMM PPPPRRRROOOOGGGGRRRRAAAAMMMMSSSS

The Unix _r_z/_s_z programs support YMODEM as well as ZMODEM. Most Unix
like systems are supported, including V7, Sys III, 4.2 BSD, SYS V,
Idris, Coherent, and Regulus.

A version for VAX-VMS is available in VRBSB.SHQ, in the same
directory.

```
Irv Hoff has added 1k packets and YMODEM transfers to the KMD and
IMP series programs, which replace the XMODEM and MODEM7/MDM7xx
series respectively.  Overlays are available for a wide variety of
CP/M systems.

Many other programs, including MEX-PLUS and Crosstalk Mark IV also
support some of YMODEM's features.

Questions about YMODEM, the Professional-YAM communications program,
and requests for evaluation copies may be directed to:

     Chuck Forsberg
     Omen Technology Inc
     17505-V Sauvie Island Road
     Portland Oregon 97231
     VOICE: 503-621-3406 :VOICE
     Modem (TeleGodzilla): 503-621-3746
     Usenet: ...!tektronix!reed!omen!caf
     Compuserve: 70007,2304
     Source: TCE022


22.  AAAACCCCKKKKNNNNOOOOWWWWLLLLEEEEDDDDGGGGMMMMEEEENNNNTTTTSSSS

ZMODEM was developed _f_o_r _t_h_e _p_u_b_l_i_c _d_o_m_a_i_n under a Telenet ↩
   contract.
The ZMODEM protocol descriptions and the Unix rz/sz program source
code are public domain.  No licensing, trademark, or copyright
restrictions apply to the use of the protocol, the Unix rz/sz source
code and the _Z_M_O_D_E_M name.

Encouragement and suggestions by Thomas Buck, Ward Christensen, Earl
Hall, Irv Hoff, Stuart Mathison, and John Wales, are gratefully
acknowledged.  32 bit CRC code courtesy Gary S. Brown.


23.  RRRREEEELLLLAAAATTTTEEEEDDDD FFFFIIIILLLLEEEESSSS

The following files may be useful while studying this document:

YYYYMMMMOOOODDDDEEEEMMMM....DDDDOOOOCCCC Describes the XMODEM, XMODEM-1k, and ↩
   YMODEM batch file
  transfer protocols.  This file is available on TeleGodzilla
  as YMODEM.DQC.



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```

```
zzzzmmmmooooddddeeeemmmm....hhhh Definitions for ZMODEM manifest constants

rrrrzzzz....cccc,,,, sssszzzz....cccc,,,, rrrrbbbbssssbbbb....cccc Unix source ↩
   code for operating ZMODEM programs.

rrrrzzzz....1111,,,, sssszzzz....1111 Manual pages  for rz and sz (Troff sources).

zzzzmmmm....cccc  Operating system independent low level ZMODEM subroutines.

mmmmiiiinnnniiiirrrrbbbb....cccc A YMODEM bootstrap program, 178 lines.

RRRRZZZZSSSSZZZZ....ZZZZOOOOOOOO,,,,rrrrzzzzsssszzzz....aaaarrrrcccc Contain the C ↩
     source code and manual pages listed
  above, plus a ZCOMM script to upload minirb.c to a Unix or
  Xenix system, compile it, and use the program to upload the
  ZMODEM source files with error checking.

DDDDSSSSZZZZ....ZZZZOOOOOOOO,,,,ddddsssszzzz....aaaarrrrcccc  Contains DSZ.COM, a  ↩
   shareware X/Y/ZMODEM subprogram,
  DESQview "pif" files for background operation in minimum
  memory, and DSZ.DOC.

ZZZZCCCCOOOOMMMMMMMM****....AAAARRRRCCCC Archive files for ZCOMM, a powerful  ↩
   shareware
  communications program.
```

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     The ZMODEM Inter Application File Transfer Protocol

            Chuck Forsberg

        Omen Technology Inc


        _A_B_S_T_R_A_C_T


The ZMODEM file transfer protocol provides reliable file and command
transfers with complete EEEENNNNDDDD----TTTTOOOO----EEEENNNNDDDD data integrity  ↩
   between application
programs.  ZMODEM's 32 bit CRC catches errors that continue to sneak into
even the most advanced networks.
```

```
ZMODEM rapidly transfers files, particularly with buffered (error
correcting) modems, timesharing systems, satellite relays, and wide area
packet switched networks.

ZMODEM greatly simplifies file transfers compared to XMODEM.  In addition
to a friendly user interface, ZMODEM provides Personal Computer and other
users an efficient, accurate, and robust file transfer method.

ZMODEM provides advanced file management features including AutoDownload
(Automatic file Download initiated without user intervention), Crash
Recovery, selective file transfers, and security verified command
downloading.

ZMODEM protocol features allow implementation on a wide variety of systems
operating in a wide variety of environments.  A choice of buffering and
windowing modes allows ZMODEM to operate on systems that cannot support
other streaming protocols.  Finely tuned control character escaping allows
operation with real world networks without Kermit's high overhead.

Although ZMODEM software is more complex than unreliable XMODEM routines,
actual C source code to pppprrrrooooddddduuuuccccttttiiiioooonnnn programs allows  ↩
   developers to upgrade
their applications with efficient, reliable ZMODEM file transfers with a
minimum of effort.

ZMODEM is carefully designed to provide these benefits using a minimum of
new software technology.  ZMODEM can be implemented on all but the most
brain damaged computers.

ZMODEM was developed _f_o_r _t_h_e _p_u_b_l_i_c _d_o_m_a_i_n under a Telenet  ↩
   contract.  The
ZMODEM protocol descriptions and the Unix rz/sz program source code are
public domain.  No licensing, trademark, or copyright restrictions apply
to the use of the protocol, the Unix rz/sz source code and the _Z_M_O_D_E_M
name.
```

1.15 YModem Protocoll

```
                               - 1 -



                    XMODEM/YMODEM PROTOCOL REFERENCE
                 A compendium of documents describing the

                           XMODEM and YMODEM

                        File Transfer Protocols



                  This document was formatted 10-27-87.
```

Edited by Chuck Forsberg

Please distribute as widely as possible.

Questions to Chuck Forsberg

Omen Technology Inc
The High Reliability Software
17505-V Sauvie Island Road
Portland Oregon 97231
VOICE: 503-621-3406 :VOICE
Modem (TeleGodzilla): 503-621-3746 Speed 19200(Telebit PEP),2400,1200,300
CompuServe: 70007,2304
GEnie: CAF
UUCP: ...!tektronix!reed!omen!caf

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1. TOWER OF BABEL

A "YMODEM Tower of Babel" has descended on the microcomputing community bringing with it confusion, frustration, bloated phone bills, and wasted man hours. Sadly, I (Chuck Forsberg) am partly to blame for this mess.

As author of the early 1980s batch and 1k XMODEM extensions, I assumed readers of earlier versions of this document would implement as much of the YMODEM protocol as their programming skills and computing environments would permit. This proved a rather naive assumption as programmers motivated by competitive pressure implemented as little of YMODEM as possible. Some have taken whatever parts of YMODEM that appealed to them, applied them to MODEM7 Batch, Telink, XMODEM or whatever, and called the result YMODEM.

Jeff Garbers (Crosstalk package development director) said it all: "With protocols in the public domain, anyone who wants to dink around with them can go ahead." [1]

Documents containing altered examples derived from YMODEM.DOC have added to the confusion. In one instance, the heading in YMODEM.DOC's Figure 1 has mutated from "1024 byte Packets" to "YMODEM/CRC File Transfer Protocol". None of the XMODEM and YMODEM examples shown in that document were correct.

To put an end to this confusion, we must make "perfectly clear" what YMODEM stands for, as Ward Christensen defined it in his 1985 coining of the term.

To the majority of you who read, understood, and respected Ward's definition of YMODEM, I apologize for the inconvenience.

1.1 Definitions

ARC ARC is a program that compresses one or more files into an archive and extracts files from such archives.

XMODEM refers to the file transfer etiquette introduced by Ward Christensen's 1977 MODEM.ASM program. The name XMODEM comes from Keith Petersen's XMODEM.ASM program, an adaptation of MODEM.ASM for Remote CP/M (RCPM) systems. It's also called the MODEM or MODEM2 protocol. Some who are unaware of MODEM7's unusual batch file mode call it MODEM7. Other aliases include "CP/M Users' Group" and "TERM II FTP 3". The name XMODEM caught on partly because it is distinctive and partly because of media interest in

1. Page C/12, PC-WEEK July 12, 1987

Chapter 1

bulletin board and RCPM systems where it was accessed with an "XMODEM" command. This protocol is supported by every serious communications program because of its universality, simplicity, and reasonable performance.

XMODEM/CRC replaces XMODEM's 1 byte checksum with a two byte Cyclical Redundancy Check (CRC-16), giving modern error detection protection.

XMODEM-1k Refers to the XMODEM/CRC protocol with 1024 byte data blocks.

YMODEM Refers to the XMODEM/CRC (optional 1k blocks) protocol with batch transmission as described below. In a nutshell, YMODEM means BATCH.

YMODEM-g Refers to the streaming YMODEM variation described below.

True YMODEM(TM) In an attempt to sort out the YMODEM Tower of Babel, Omen Technology has trademarked the term True YMODEM(TM) to represent the complete YMODEM protocol described in this document, including pathname, length, and modification date transmitted in block 0. Please contact Omen Technology about certifying programs for True YMODEM(TM) compliance.

ZMODEM uses familiar XMODEM/CRC and YMODEM technology in a new protocol that provides reliability, throughput, file management, and user amenities appropriate to contemporary data communications.

ZOO Like ARC, ZOO is a program that compresses one or more files into a "zoo archive". ZOO supports many different operating systems including Unix and VMS.

Chapter 1

2. YMODEM MINIMUM REQUIREMENTS

All programs claiming to support YMODEM must meet the following minimum requirements:

+ The sending program shall send the pathname (file name) in block 0.

+ The pathname shall be a null terminated ASCII string as described below.

+ The receiving program shall use this pathname for the received file name, unless explicitly overridden.

+ The sending program shall use CRC-16 in response to a "C" pathname nak, otherwise use 8 bit checksum.

+ The receiving program must accept any mixture of 128 and 1024 byte blocks within each file it receives. Sending programs may switch between 1024 and 128 byte blocks at the end of file(s), and when the frequency of retransmissions so suggests.

+ The sending program must not change the length of an unacknowledged block.

+ At the end of each file, the sending program shall send EOT up to ten times until it receives an ACK character. (This is part of the XMODEM spec.)

+ The end of a transfer session shall be signified by a null (empty) pathname.

Programs not meeting all of these requirements are not YMODEM compatible, and shall not be described as supporting YMODEM.

Meeting these MINIMUM requirements does not guarantee reliable file transfers under stress. Particular attention is called to XMODEM's single character supervisory messages that are easily corrupted by transmission errors.

Chapter 2

3. WHY YMODEM?

Since its development half a decade ago, the Ward Christensen modem protocol has enabled a wide variety of computer systems to interchange data. There is hardly a communications program that doesn't at least claim to support this protocol.

Advances in computing, modems and networking have revealed a number of weaknesses in the original protocol:

+ The short block length caused throughput to suffer when used with timesharing systems, packet switched networks, satellite circuits, and buffered (error correcting) modems.

+ The 8 bit arithmetic checksum and other aspects allowed line impairments to interfere with dependable, accurate transfers.

+ Only one file could be sent per command. The file name had to be given twice, first to the sending program and then again to the receiving program.

+ The transmitted file could accumulate as many as 127 extraneous bytes.

+ The modification date of the file was lost.

A number of other protocols have been developed over the years, but none have displaced XMODEM to date:

+ Lack of public domain documentation and example programs have kept proprietary protocols such as Blast, Relay, and others tightly bound to the fortunes of their suppliers.

+ Complexity discourages the widespread application of BISYNC, SDLC, HDLC, X.25, and X.PC protocols.

+ Performance compromises and complexity have limited the popularity of the Kermit protocol, which was developed to allow file transfers in environments hostile to XMODEM.

The XMODEM protocol extensions and YMODEM Batch address some of these weaknesses while maintaining most of XMODEM's simplicity.

YMODEM is supported by the public domain programs YAM (CP/M), YAM(CP/M-86), YAM(CCPM-86), IMP (CP/M), KMD (CP/M), rz/sz (Unix, Xenix, VMS, Berkeley Unix, Venix, Xenix, Coherent, IDRIS, Regulus). Commercial implementations include MIRROR, and Professional-YAM.[1] Communications

Chapter 3

programs supporting these extensions have been in use since 1981.

The 1k block length (XMODEM-1k) described below may be used in conjunction with YMODEM Batch Protocol, or with single file transfers identical to the XMODEM/CRC protocol except for minimal changes to support 1k blocks.

Another extension is the YMODEM-g protocol. YMODEM-g provides batch transfers with maximum throughput when used with end to end error correcting media, such as X.PC and error correcting modems, including 9600 bps units by TeleBit, U.S.Robotics, Hayes, Electronic Vaults, Data Race, and others.

To complete this tome, edited versions of Ward Christensen's original protocol document and John Byrns's CRC-16 document are included for reference.

References to the MODEM or MODEM7 protocol have been changed to XMODEM to accommodate the vernacular. In Australia, it is properly called the Christensen Protocol.

3.1 Some Messages from the Pioneer

```
#: 130940 S0/Communications 25-Apr-85  18:38:47
Sb: my protocol
Fm: Ward Christensen 76703,302 [2]
To: all
```

Be aware the article[3] DID quote me correctly in terms of the phrases like "not robust", etc.

It was a quick hack I threw together, very unplanned (like everything I do), to satisfy a personal need to communicate with "some other" people.

ONLY the fact that it was done in 8/77, and that I put it in the public domain immediately, made it become the standard that it is.

---

1. Available for IBM PC,XT,AT, Unix and Xenix

2. Edited for typesetting appearance

3. Infoworld April 29 p. 16

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I think its time for me to

(1) document it; (people call me and say "my product is going to include it - what can I 'reference'", or "I'm writing a paper on it, what do I put in the bibliography") and

(2) propose an "incremental extension" to it, which might take "exactly" the form of Chuck Forsberg's YAM protocol. He wrote YAM in C for CP/M and put it in the public domain, and wrote a batch protocol for Unix[4] called rb and sb (receive batch, send batch), which was basically XMODEM with

   (a) a record 0 containing filename date time and size
   (b) a 1K block size option
   (c) CRC-16.

He did some clever programming to detect false ACK or EOT, but basically left them the same.

People who suggest I make SIGNIFICANT changes to the protocol, such as "full duplex", "multiple outstanding blocks", "multiple destinations", etc etc don't understand that the incredible simplicity of the protocol is one of the reasons it survived to this day in as many machines and programs as it may be found in!

Consider the PC-NET group back in '77 or so - documenting to beat the band - THEY had a protocol, but it was "extremely complex", because it tried to be "all things to all people" - i.e. send binary files on a 7-bit system, etc. I was not that "benevolent". I (emphasize > I <) had an 8-bit UART, so "my protocol was an 8-bit protocol", and I would just say "sorry" to people who were held back by 7-bit limitations. ...

Block size: Chuck Forsberg created an extension of my protocol, called YAM, which is also supported via his public domain programs for UNIX called rb and sb - receive batch and send batch. They cleverly send a "block 0" which contains the filename, date, time, and size. Unfortunately, its UNIX style, and is a bit weird[5] - octal numbers, etc. BUT, it is a nice way to overcome the kludgy "echo the chars of the name" introduced with MODEM7. Further, chuck uses CRC-16 and optional 1K blocks. Thus the record 0, 1K, and CRC, make it a "pretty slick new protocol" which is not significantly different from my own.

Also, there is a catchy name - YMODEM. That means to some that it is the "next thing after XMODEM", and to others that it is the Y(am)MODEM

---

4. VAX/VMS versions of these programs are also available.

5. The file length, time, and file mode are optional. The pathname and file length may be sent alone if desired.

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protocol. I don't want to emphasize that too much - out of fear that other mfgrs might think it is a "competitive" protocol, rather than an "unaffiliated" protocol. Chuck is currently selling a much-enhanced version of his CP/M-80 C program YAM, calling it Professional Yam, and its for the PC - I'm using it right now. VERY slick! 32K capture buffer,

```
script, scrolling, previously captured text search, plus built-in commands
for just about everything - directory (sorted every which way), XMODEM,
YMODEM, KERMIT, and ASCII file upload/download, etc.  You can program it
to "behave" with most any system - for example when trying a number for
CIS it detects the "busy" string back from the modem and substitutes a
diff phone # into the dialing string and branches back to try it.
```

```
Chapter 3
```

4. XMODEM PROTOCOL ENHANCEMENTS

This chapter discusses the protocol extensions to Ward Christensen's 1982 XMODEM protocol description document.

The original document recommends the user be asked whether to continue trying or abort after 10 retries. Most programs no longer ask the operator whether he wishes to keep retrying. Virtually all correctable errors are corrected within the first few retransmissions. If the line is so bad that ten attempts are insufficient, there is a significant danger of undetected errors. If the connection is that bad, it's better to redial for a better connection, or mail a floppy disk.

4.1 Graceful Abort

The YAM and Professional-YAM X/YMODEM routines recognize a sequence of two consecutive CAN (Hex 18) characters without modem errors (overrun, framing, etc.) as a transfer abort command. This sequence is recognized when is waiting for the beginning of a block or for an acknowledgement to a block that has been sent. The check for two consecutive CAN characters reduces the number of transfers aborted by line hits. YAM sends eight CAN characters when it aborts an XMODEM, YMODEM, or ZMODEM protocol file transfer. Pro-YAM then sends eight backspaces to delete the CAN characters from the remote's keyboard input buffer, in case the remote had already aborted the transfer and was awaiting a keyboarded command.

4.2 CRC-16 Option

The XMODEM protocol uses an optional two character CRC-16 instead of the one character arithmetic checksum used by the original protocol and by most commercial implementations. CRC-16 guarantees detection of all single and double bit errors, all errors with an odd number of error bits, all burst errors of length 16 or less, 99.9969% of all 17-bit error bursts, and 99.9984 per cent of all possible longer error bursts. By contrast, a double bit error, or a burst error of 9 bits or more can sneak past the XMODEM protocol arithmetic checksum.

The XMODEM/CRC protocol is similar to the XMODEM protocol, except that the receiver specifies CRC-16 by sending C (Hex 43) instead of NAK when requesting the FIRST block. A two byte CRC is sent in place of the one byte arithmetic checksum.

YAM's c option to the r command enables CRC-16 in single file reception, corresponding to the original implementation in the MODEM7 series programs. This remains the default because many commercial communications programs and bulletin board systems still do not support CRC-16, especially those written in Basic or Pascal.

XMODEM protocol with CRC is accurate provided both sender and receiver both report a successful transmission. The protocol is robust in the presence of characters lost by buffer overloading on timesharing systems.

The single character ACK/NAK responses generated by the receiving program adapt well to split speed modems, where the reverse channel is limited to ten per cent or less of the main channel's speed.

XMODEM and YMODEM are half duplex protocols which do not attempt to transmit information and control signals in both directions at the same time. This avoids buffer overrun problems that have been reported by users attempting to exploit full duplex asynchronous file transfer protocols such as Blast.

Professional-YAM adds several proprietary logic enhancements to XMODEM's error detection and recovery. These compatible enhancements eliminate most of the bad file transfers other programs make when using the XMODEM protocol under less than ideal conditions.

4.3 XMODEM-1k 1024 Byte Block

Disappointing throughput downloading from Unix with YMODEM[1] lead to the development of 1024 byte blocks in 1982. 1024 byte blocks reduce the effect of delays from timesharing systems, modems, and packet switched networks on throughput by 87.5 per cent in addition to decreasing XMODEM's per byte overhead 3 per cent on long files.

The choice to use 1024 byte blocks is expressed to the sending program on its command line or selection menu.[2] 1024 byte blocks improve throughput in many applications, but some environments cannot accept 1024 byte bursts, especially minicomputers running 19.2kb ports.

An STX (02) replaces the SOH (01) at the beginning of the transmitted block to notify the receiver of the longer block length. The transmitted block contains 1024 bytes of data. The receiver should be able to accept any mixture of 128 and 1024 byte blocks. The block number (in the second and third bytes of the block) is incremented by one for each block regardless of the block length.

The sender must not change between 128 and 1024 byte block lengths if it has not received a valid ACK for the current block. Failure to observe this restriction allows transmission errors to pass undetected.

1. The name hadn't been coined yet, but the protocol was the same.

2. See "KMD/IMP Exceptions to YMODEM" below.

If 1024 byte blocks are being used, it is possible for a file to "grow" up to the next multiple of 1024 bytes. This does not waste disk space if the allocation granularity is 1k or greater. With YMODEM batch transmission, the optional file length transmitted in the file name block allows the receiver to discard the padding, preserving the exact file length and contents.

1024 byte blocks may be used with batch file transmission or with single file transmission. CRC-16 should be used with the k option to preserve data integrity over phone lines. If a program wishes to enforce this recommendation, it should cancel the transfer, then issue an informative diagnostic message if the receiver requests checksum instead of CRC-16.

Under no circumstances may a sending program use CRC-16 unless the receiver commands CRC-16.

```
          Figure 1.  XMODEM-1k Blocks

          SENDER                                  RECEIVER
                                                  "s -k foo.bar"
          "foo.bar open x.x minutes"
                                                  C
          STX 01 FE Data[1024] CRC CRC
                                                  ACK
          STX 02 FD Data[1024] CRC CRC
                                                  ACK
          STX 03 FC Data[1000] CPMEOF[24] CRC CRC
                                                  ACK
          EOT
                                                  ACK

          Figure 2.  Mixed 1024 and 128 byte Blocks

          SENDER                                  RECEIVER
                                                  "s -k foo.bar"
```

```
"foo.bar open x.x minutes"
                                       C
STX 01 FE Data[1024] CRC CRC
                                       ACK
STX 02 FD Data[1024] CRC CRC
                                       ACK
SOH 03 FC Data[128] CRC CRC
                                       ACK
SOH 04 FB Data[100] CPMEOF[28] CRC CRC
                                       ACK
EOT
                                       ACK
```

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5. YMODEM Batch File Transmission

The YMODEM Batch protocol is an extension to the XMODEM/CRC protocol that allows 0 or more files to be transmitted with a single command. (Zero files may be sent if none of the requested files is accessible.) The design approach of the YMODEM Batch protocol is to use the normal routines for sending and receiving XMODEM blocks in a layered fashion similar to packet switching methods.

Why was it necessary to design a new batch protocol when one already existed in MODEM7?[1] The batch file mode used by MODEM7 is unsuitable because it does not permit full pathnames, file length, file date, or other attribute information to be transmitted. Such a restrictive design, hastily implemented with only CP/M in mind, would not have permitted extensions to current areas of personal computing such as Unix, DOS, and object oriented systems. In addition, the MODEM7 batch file mode is somewhat susceptible to transmission impairments.

As in the case of single a file transfer, the receiver initiates batch file transmission by sending a "C" character (for CRC-16).

The sender opens the first file and sends block number 0 with the following information.[2]

Only the pathname (file name) part is required for batch transfers.

```
To maintain upwards compatibility, all unused bytes in block 0 must be set
to null.

Pathname The pathname (conventionally, the file name) is sent as a null
     terminated ASCII string.  This is the filename format used by the
     handle oriented MSDOS(TM) functions and C library fopen functions.
     An assembly language example follows:
                              DB      'foo.bar',0
     No spaces are included in the pathname.  Normally only the file name
     stem (no directory prefix) is transmitted unless the sender has
     selected YAM's f option to send the full pathname.  The source drive
     (A:, B:, etc.) is not sent.

     Filename Considerations:
```

____

1. The MODEM7 batch protocol transmitted CP/M FCB bytes f1...f8 and t1...t3 one character at a time. The receiver echoed these bytes as received, one at a time.

2. Only the data part of the block is described here.


```
        + File names are forced to lower case unless the sending system
          supports upper/lower case file names.  This is a convenience for
          users of systems (such as Unix) which store filenames in upper
          and lower case.

        + The receiver should accommodate file names in lower and upper
          case.

        + When transmitting files between different operating systems,
          file names must be acceptable to both the sender and receiving
          operating systems.

     If directories are included, they are delimited by /; i.e.,
     "subdir/foo" is acceptable, "subdir\foo" is not.

Length The file length and each of the succeeding fields are optional.[3]
     The length field is stored in the block as a decimal string counting
```

the number of data bytes in the file. The file length does not include any CPMEOF (^Z) or other garbage characters used to pad the last block.

If the file being transmitted is growing during transmission, the length field should be set to at least the final expected file length, or not sent.

The receiver stores the specified number of characters, discarding any padding added by the sender to fill up the last block.

Modification Date The mod date is optional, and the filename and length may be sent without requiring the mod date to be sent.

Iff the modification date is sent, a single space separates the modification date from the file length.

The mod date is sent as an octal number giving the time the contents of the file were last changed, measured in seconds from Jan 1 1970 Universal Coordinated Time (GMT). A date of 0 implies the modification date is unknown and should be left as the date the file is received.

This standard format was chosen to eliminate ambiguities arising from transfers between different time zones.

---

3. Fields may not be skipped.

Mode Iff the file mode is sent, a single space separates the file mode from the modification date. The file mode is stored as an octal string. Unless the file originated from a Unix system, the file mode is set to 0. rb(1) checks the file mode for the 0x8000 bit which indicates a Unix type regular file. Files with the 0x8000 bit set are assumed to have been sent from another Unix (or similar) system which uses the same file conventions. Such files are not translated in any way.

Serial Number Iff the serial number is sent, a single space separates the serial number from the file mode. The serial number of the transmitting program is stored as an octal string. Programs which do not have a serial number should omit this field, or set it to 0. The receiver's use of this field is optional.

Other Fields YMODEM was designed to allow additional header fields to be added as above without creating compatibility problems with older YMODEM programs. Please contact Omen Technology if other fields are needed for special application requirements.

The rest of the block is set to nulls. This is essential to preserve upward compatibility.[4]

If the filename block is received with a CRC or other error, a retransmission is requested. After the filename block has been received, it is ACK'ed if the write open is successful. If the file cannot be opened for writing, the receiver cancels the transfer with CAN characters as described above.

The receiver then initiates transfer of the file contents according to the standard XMODEM/CRC protocol.

After the file contents have been transmitted, the receiver again asks for the next pathname.

Transmission of a null pathname terminates batch file transmission.

Note that transmission of no files is not necessarily an error. This is possible if none of the files requested of the sender could be opened for reading.

---

4. If, perchance, this information extends beyond 128 bytes (possible with Unix 4.2 BSD extended file names), the block should be sent as a 1k block as described above.

```
The YMODEM receiver requests CRC-16 by default.

The Unix programs sz(1) and rz(1) included in the source code file
RZSZ.ZOO should answer other questions about YMODEM batch protocol.

          Figure 3.  YMODEM Batch Transmission Session

          SENDER                                  RECEIVER
                                                  "sb foo.*<CR>"
          "sending in batch mode etc."
                                                  C (command:rb)
          SOH 00 FF foo.c NUL[123] CRC CRC
                                                  ACK
                                                  C
          SOH 01 FE Data[128] CRC CRC
                                                  ACK
          SOH 03 FC Data[128] CRC CRC
                                                  ACK
          SOH 04 FB Data[100] CPMEOF[28] CRC CRC
                                                  ACK
          EOT
                                                  NAK
          EOT
                                                  ACK
                                                  C
          SOH 00 FF NUL[128] CRC CRC
                                                  ACK

        Figure 4.  YMODEM Batch Transmission Session-1k Blocks

        SENDER                                  RECEIVER
                                                "sb -k foo.*<CR>"
        "sending in batch mode etc."
                                                C (command:rb)
        SOH 00 FF foo.c NUL[123] CRC CRC
                                                ACK
                                                C
        STX 02 FD Data[1024] CRC CRC
                                                ACK
        SOH 03 FC Data[128] CRC CRC
                                                ACK
        SOH 04 FB Data[100] CPMEOF[28] CRC CRC
                                                ACK
        EOT
                                                NAK
        EOT
                                                ACK
                                                C
        SOH 00 FF NUL[128] CRC CRC
                                                ACK
```

Figure 5. YMODEM Filename block transmitted by sz

```
-rw-r--r--  6347 Jun 17 1984 20:34 bbcsched.txt

00 0100FF62 62637363 6865642E 74787400   |...bbcsched.txt.|
10 36333437 20333331 34373432 35313320   |6347 3314742513 |
20 31303036 34340000 00000000 00000000   |100644..........|
30 00000000 00000000 00000000 00000000
40 00000000 00000000 00000000 00000000
50 00000000 00000000 00000000 00000000
60 00000000 00000000 00000000 00000000
70 00000000 00000000 00000000 00000000
80 000000CA 56
```

Figure 6. YMODEM Header Information and Features

Program	Length	Date	Mode	S/N	1k-Blk	YMODEM-g
Unix rz/sz	yes	yes	yes	no	yes	sb only
VMS rb/sb	yes	no	no	no	yes	no
Pro-YAM	yes	yes	no	yes	yes	yes
CP/M YAM	no	no	no	no	yes	no
KMD/IMP	?	no	no	no	yes	no

5.1 KMD/IMP Exceptions to YMODEM

KMD and IMP use a "CK" character sequence emitted by the receiver to trigger the use of 1024 byte blocks as an alternative to specifying this option to the sending program. Although this two character sequence works well on single process micros in direct communication, timesharing systems and packet switched networks can separate the successive characters by several seconds, rendering this method unreliable.

Sending programs may detect the CK sequence if the operating enviornment does not preclude reliable implementation.

Instead of the standard YMODEM file length, KMD and IMP transmit the CP/M record count in the last two bytes of the header block.

6. YMODEM-g File Transmission

Developing technology is providing phone line data transmission at ever higher speeds using very specialized techniques. These high speed modems, as well as session protocols such as X.PC, provide high speed, nearly error free communications at the expense of considerably increased delay time.

This delay time is moderate compared to human interactions, but it cripples the throughput of most error correcting protocols.

The g option to YMODEM has proven effective under these circumstances. The g option is driven by the receiver, which initiates the batch transfer by transmitting a G instead of C. When the sender recognizes the G, it bypasses the usual wait for an ACK to each transmitted block, sending succeeding blocks at full speed, subject to XOFF/XON or other flow control exerted by the medium.

The sender expects an inital G to initiate the transmission of a particular file, and also expects an ACK on the EOT sent at the end of each file. This synchronization allows the receiver time to open and close files as necessary.

If an error is detected in a YMODEM-g transfer, the receiver aborts the transfer with the multiple CAN abort sequence. The ZMODEM protocol should be used in applications that require both streaming throughput and error recovery.

Figure 7. YMODEM-g Transmission Session

```
SENDER                                  RECEIVER
                                        "sb foo.*<CR>"
"sending in batch mode etc..."
                                        G (command:rb -g)
SOH 00 FF foo.c NUL[123] CRC CRC
                                        G
SOH 01 FE Data[128] CRC CRC
STX 02 FD Data[1024] CRC CRC
```

```
        SOH 03 FC Data[128] CRC CRC
        SOH 04 FB Data[100] CPMEOF[28] CRC CRC
        EOT
                                        ACK
                                        G
        SOH 00 FF NUL[128] CRC CRC
```


7. XMODEM PROTOCOL OVERVIEW

8/9/82 by Ward Christensen.

I will maintain a master copy of this. Please pass on changes or suggestions via CBBS/Chicago at (312) 545-8086, CBBS/CPMUG (312) 849-1132 or by voice at (312) 849-6279.

7.1 Definitions

```
  <soh> 01H
  <eot> 04H
  <ack> 06H
  <nak> 15H
  <can> 18H
  <C>   43H
```

7.2 Transmission Medium Level Protocol

Asynchronous, 8 data bits, no parity, one stop bit.

The protocol imposes no restrictions on the contents of the data being transmitted. No control characters are looked for in the 128-byte data messages. Absolutely any kind of data may be sent - binary, ASCII, etc. The protocol has not formally been adopted to a 7-bit environment for the transmission of ASCII-only (or unpacked-hex) data , although it could be simply by having both ends agree to AND the protocol-dependent data with 7F hex before validating it. I specifically am referring to the checksum, and the block numbers and their ones- complement.

Those wishing to maintain compatibility of the CP/M file structure, i.e. to allow modemming ASCII files to or from CP/M systems should follow this data format:

+ ASCII tabs used (09H); tabs set every 8.

+ Lines terminated by CR/LF (0DH 0AH)

+ End-of-file indicated by ^Z, 1AH. (one or more)

+ Data is variable length, i.e. should be considered a continuous stream of data bytes, broken into 128-byte chunks purely for the purpose of transmission.

+ A CP/M "peculiarity": If the data ends exactly on a 128-byte boundary, i.e. CR in 127, and LF in 128, a subsequent sector containing the ^Z EOF character(s) is optional, but is preferred. Some utilities or user programs still do not handle EOF without ^Zs.

+ The last block sent is no different from others, i.e. there is no "short block".

Figure 8. XMODEM Message Block Level Protocol

```
Each block of the transfer looks like:
      <SOH><blk #><255-blk #><--128 data bytes--><cksum>
in which:
<SOH>         = 01 hex
<blk #>       = binary number, starts at 01 increments by 1, and
                wraps 0FFH to 00H (not to 01)
<255-blk #>   = blk # after going thru 8080 "CMA" instr, i.e.
                each bit complemented in the 8-bit block number.
                Formally, this is the "ones complement".
<cksum>       = the sum of the data bytes only.  Toss any carry.
```

7.3 File Level Protocol

7.3.1 Common_to_Both_Sender_and_Receiver

All errors are retried 10 times. For versions running with an operator (i.e. NOT with XMODEM), a message is typed after 10 errors asking the operator whether to "retry or quit".

Some versions of the protocol use <can>, ASCII ^X, to cancel transmission. This was never adopted as a standard, as having a single "abort" character makes the transmission susceptible to false termination due to an <ack> <nak> or <soh> being corrupted into a <can> and aborting transmission.

The protocol may be considered "receiver driven", that is, the sender need not automatically re-transmit, although it does in the current implementations.

7.3.2 Receive_Program_Considerations

The receiver has a 10-second timeout. It sends a <nak> every time it times out. The receiver's first timeout, which sends a <nak>, signals the transmitter to start. Optionally, the receiver could send a <nak> immediately, in case the sender was ready. This would save the initial 10 second timeout. However, the receiver MUST continue to timeout every 10 seconds in case the sender wasn't ready.

Once into a receiving a block, the receiver goes into a one-second timeout for each character and the checksum. If the receiver wishes to <nak> a block for any reason (invalid header, timeout receiving data), it must wait for the line to clear. See "programming tips" for ideas

Synchronizing: If a valid block number is received, it will be: 1) the expected one, in which case everything is fine; or 2) a repeat of the previously received block. This should be considered OK, and only indicates that the receivers <ack> got glitched, and the sender re-transmitted; 3) any other block number indicates a fatal loss of synchronization, such as the rare case of the sender getting a line-glitch

that looked like an <ack>. Abort the transmission, sending a <can>

7.3.3 Sending_program_considerations

While waiting for transmission to begin, the sender has only a single very long timeout, say one minute. In the current protocol, the sender has a 10 second timeout before retrying. I suggest NOT doing this, and letting the protocol be completely receiver-driven. This will be compatible with existing programs.

When the sender has no more data, it sends an <eot>, and awaits an <ack>, resending the <eot> if it doesn't get one. Again, the protocol could be receiver-driven, with the sender only having the high-level 1-minute timeout to abort.

Here is a sample of the data flow, sending a 3-block message. It includes the two most common line hits - a garbaged block, and an <ack> reply getting garbaged. <xx> represents the checksum byte.

Figure 9. Data flow including Error Recovery

```
SENDER                                    RECEIVER
                              times out after 10 seconds,
                              <---              <nak>
<soh> 01 FE -data- <xx>       --->
                              <---              <ack>
<soh> 02 FD -data- xx         --->       (data gets line hit)
                              <---              <nak>
<soh> 02 FD -data- xx         --->
                              <---              <ack>
<soh> 03 FC -data- xx         --->
(ack gets garbaged)           <---              <ack>
<soh> 03 FC -data- xx         --->              <ack>
<eot>                         --->
                              <---       <anything except ack>
<eot>                         --->
                              <---              <ack>
(finished)
```

7.4 Programming Tips

+ The character-receive subroutine should be called with a parameter specifying the number of seconds to wait. The receiver should first call it with a time of 10, then <nak> and try again, 10 times.

  After receiving the <soh>, the receiver should call the character receive subroutine with a 1-second timeout, for the remainder of the message and the <cksum>. Since they are sent as a continuous stream, timing out of this implies a serious like glitch that caused, say, 127 characters to be seen instead of 128.

+ When the receiver wishes to <nak>, it should call a "PURGE" subroutine, to wait for the line to clear. Recall the sender tosses any characters in its UART buffer immediately upon completing sending a block, to ensure no glitches were mis- interpreted.

The most common technique is for "PURGE" to call the character receive subroutine, specifying a 1-second timeout,[1] and looping back to PURGE until a timeout occurs. The <nak> is then sent, ensuring the other end will see it.

+ You may wish to add code recommended by John Mahr to your character receive routine - to set an error flag if the UART shows framing error, or overrun. This will help catch a few more glitches - the most common of which is a hit in the high bits of the byte in two consecutive bytes. The <cksum> comes out OK since counting in 1-byte produces the same result of adding 80H + 80H as with adding 00H + 00H.

1. These times should be adjusted for use with timesharing systems.

8. XMODEM/CRC Overview

Original 1/13/85 by John Byrns -- CRC option.

Please pass on any reports of errors in this document or suggestions for improvement to me via Ward's/CBBS at (312) 849-1132, or by voice at (312) 885-1105.

The CRC used in the Modem Protocol is an alternate form of block check which provides more robust error detection than the original checksum. Andrew S. Tanenbaum says in his book, Computer Networks, that the CRC-CCITT used by the Modem Protocol will detect all single and double bit errors, all errors with an odd number of bits, all burst errors of length 16 or less, 99.997% of 17-bit error bursts, and 99.998% of 18-bit and longer bursts.[1]

The changes to the Modem Protocol to replace the checksum with the CRC are straight forward. If that were all that we did we would not be able to communicate between a program using the old checksum protocol and one using the new CRC protocol. An initial handshake was added to solve this problem. The handshake allows a receiving program with CRC capability to determine whether the sending program supports the CRC option, and to switch it to CRC mode if it does. This handshake is designed so that it will work properly with programs which implement only the original protocol. A description of this handshake is presented in section 10.

Figure 10. Message Block Level Protocol, CRC mode

```
Each block of the transfer in CRC mode looks like:
     <SOH><blk #><255-blk #><--128 data bytes--><CRC hi><CRC lo>
in which:
<SOH>         = 01 hex
<blk #>       = binary number, starts at 01 increments by 1, and
                wraps 0FFH to 00H (not to 01)
<255-blk #>   = ones complement of blk #.
<CRC hi>      = byte containing the 8 hi order coefficients of the CRC.
<CRC lo>      = byte containing the 8 lo order coefficients of the CRC.
```

8.1 CRC Calculation

8.1.1 Formal_Definition

To calculate the 16 bit CRC the message bits are considered to be the coefficients of a polynomial. This message polynomial is first multiplied by X^16 and then divided by the generator polynomial (X^16 + X^12 + X^5 +

1. This reliability figure is misleading because XMODEM's critical supervisory functions are not protected by this CRC.

1) using modulo two arithmetic. The remainder left after the division is the desired CRC. Since a message block in the Modem Protocol is 128 bytes or 1024 bits, the message polynomial will be of order X^1023. The hi order bit of the first byte of the message block is the coefficient of X^1023 in the message polynomial. The lo order bit of the last byte of the message block is the coefficient of X^0 in the message polynomial.

Figure 11. Example of CRC Calculation written in C

The following XMODEM crc routine is taken from "rbsb.c". Please refer to the source code for these programs (contained in RZSZ.ZOO) for usage. A fast table driven version is also included in this file.

```
/* update CRC */
unsigned short
updcrc(c, crc)
register c;
register unsigned crc;
{
        register count;

        for (count=8; --count>=0;) {
                if (crc & 0x8000) {
                        crc <<= 1;
                        crc += (((c<<=1) & 0400)  !=  0);
                        crc ^= 0x1021;
                }
                else {
                        crc <<= 1;
                        crc += (((c<<=1) & 0400)  !=  0);
                }
        }
        return crc;
}
```

8.2 CRC File Level Protocol Changes

8.2.1 Common_to_Both_Sender_and_Receiver

The only change to the File Level Protocol for the CRC option is the initial handshake which is used to determine if both the sending and the receiving programs support the CRC mode. All Modem Programs should support the checksum mode for compatibility with older versions. A receiving program that wishes to receive in CRC mode implements the mode setting handshake by sending a <C> in place of the initial <nak>. If the sending program supports CRC mode it will recognize the <C> and will set itself into CRC mode, and respond by sending the first block as if a <nak> had been received. If the sending program does not support CRC mode it will not respond to the <C> at all. After the receiver has sent the <C> it will wait up to 3 seconds for the <soh> that starts the first block. If it receives a <soh> within 3 seconds it will assume the sender supports CRC mode and will proceed with the file exchange in CRC mode. If no <soh> is

received within 3 seconds the receiver will switch to checksum mode, send a <nak>, and proceed in checksum mode. If the receiver wishes to use checksum mode it should send an initial <nak> and the sending program should respond to the <nak> as defined in the original Modem Protocol. After the mode has been set by the initial <C> or <nak> the protocol follows the original Modem Protocol and is identical whether the checksum or CRC is being used.

8.2.2 Receive_Program_Considerations
There are at least 4 things that can go wrong with the mode setting handshake.

1. the initial <C> can be garbled or lost.

2. the initial <soh> can be garbled.

3. the initial <C> can be changed to a <nak>.

4. the initial <nak> from a receiver which wants to receive in checksum can be changed to a <C>.

The first problem can be solved if the receiver sends a second <C> after it times out the first time. This process can be repeated several times. It must not be repeated too many times before sending a <nak> and switching to checksum mode or a sending program without CRC support may time out and abort. Repeating the <C> will also fix the second problem if the sending program cooperates by responding as if a <nak> were received instead of ignoring the extra <C>.

It is possible to fix problems 3 and 4 but probably not worth the trouble since they will occur very infrequently. They could be fixed by switching modes in either the sending or the receiving program after a large number of successive <nak>s. This solution would risk other problems however.

8.2.3 Sending_Program_Considerations

The sending program should start in the checksum mode. This will insure compatibility with checksum only receiving programs. Anytime a <C> is received before the first <nak> or <ack> the sending program should set itself into CRC mode and respond as if a <nak> were received. The sender should respond to additional <C>s as if they were <nak>s until the first <ack> is received. This will assist the receiving program in determining the correct mode when the <soh> is lost or garbled. After the first <ack> is received the sending program should ignore <C>s.

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8.3 Data Flow Examples with CRC Option

Here is a data flow example for the case where the receiver requests transmission in the CRC mode but the sender does not support the CRC option. This example also includes various transmission errors. <xx> represents the checksum byte.

Figure 12. Data Flow: Receiver has CRC Option, Sender Doesn't

```
SENDER                                         RECEIVER
                        <---                < C>
                                times out after 3 seconds,
                        <---                <C>
                                times out after 3 seconds,
                        <---                <C>
                                times out after 3 seconds,
                        <---                <C>
                                times out after 3 seconds,
                        <---                <nak>
<soh> 01 FE -data- <xx> --->
                        <---                <ack>
<soh> 02 FD -data- <xx> --->        (data gets line hit)
                        <---                <nak>
```

```
<soh> 02 FD -data- <xx> --->
                        <---               <ack>
<soh> 03 FC -data- <xx> --->
   (ack gets garbaged)  <---               <ack>
                                times out after 10 seconds,
                        <---               <nak>
<soh> 03 FC -data- <xx> --->
                        <---               <ack>
<eot>                   --->
                        <---               <ack>
```

Here is a data flow example for the case where the receiver requests transmission in the CRC mode and the sender supports the CRC option. This example also includes various transmission errors. <xxxx> represents the 2 CRC bytes.

Figure 13. Receiver and Sender Both have CRC Option

```
SENDER                                      RECEIVER
                          <---                <C>
<soh> 01 FE -data- <xxxx> --->
                          <---                <ack>
<soh> 02 FD -data- <xxxx> --->         (data gets line hit)
                          <---                <nak>
<soh> 02 FD -data- <xxxx> --->
                          <---                <ack>
<soh> 03 FC -data- <xxxx> --->
(ack gets garbaged)       <---                <ack>
                                     times out after 10 seconds,
                          <---                <nak>
```

```
<soh> 03 FC -data- <xxxx> --->
                          <---                 <ack>
<eot>                     --->
                          <---                 <ack>
```


9. MORE INFORMATION

Please contact Omen Technology for troff source files and typeset copies of this document.

```
9.1  TeleGodzilla Bulletin Board

More information may be obtained by calling TeleGodzilla at 503-621-3746.
Speed detection is automatic for 1200, 2400 and 19200(Telebit PEP) bps.
TrailBlazer modem users may issue the TeleGodzilla trailblazer command to
swith to 19200 bps once they have logged in.

Interesting files include RZSZ.ZOO (C source code), YZMODEM.ZOO (Official
XMODEM, YMODEM, and ZMODEM protocol descriptions), ZCOMMEXE.ARC,
ZCOMMDOC.ARC, and ZCOMMHLP.ARC (PC-DOS shareware comm program with XMODEM,
True YMODEM(TM), ZMODEM, Kermit Sliding Windows, Telink, MODEM7 Batch,
script language, etc.).


9.2  Unix UUCP Access

UUCP sites can obtain the current version of this file with
                 uucp omen!/u/caf/public/ymodem.doc /tmp
A continually updated list of available files is stored in
/usr/spool/uucppublic/FILES.  When retrieving these files with uucp,
remember that the destination directory on your system must be writeable
by anyone, or the UUCP transfer will fail.

The following L.sys line calls TeleGodzilla (Pro-YAM in host operation).
TeleGodzilla determines the incoming speed automatically.

In response to "Name Please:" uucico gives the Pro-YAM "link" command as a
user name.  The password (Giznoid) controls access to the Xenix system
connected to the IBM PC's other serial port.  Communications between
Pro-YAM and Xenix use 9600 bps; YAM converts this to the caller's speed.

Finally, the calling uucico logs in as uucp.

omen Any ACU 2400 1-503-621-3746 se:--se: link ord: Giznoid in:--in: uucp



10.  REVISIONS

10-27-87 Optional fields added for number of files remaining to be sent
and total number of bytes remaining to be sent.
10-18-87 Flow control discussion added to 1024 byte block descritpion,
minor revisions for clarity per user comments.
8-03-87 Revised for clarity.
5-31-1987 emphasizes minimum requirements for YMODEM, and updates


Chapter 10                                        Xmodem Protocol Overview
```

information on accessing files.
9-11-1986 clarifies nomenclature and some minor points.
The April 15 1986 edition clarifies some points concerning CRC calculations and spaces in the header.

11. YMODEM Programs

ZCOMM, A shareware little brother to Professional-YAM, is available as ZCOMMEXE.ARC on TeleGodzilla and other bulletin board systems. ZCOMM may be used to test YMODEM amd ZMODEM implementations.

Unix programs supporting YMODEM are available on TeleGodzilla in RZSZ.ZOO. This ZOO archive includes a ZCOMM/Pro-YAM/PowerCom script ZUPL.T to upload a bootstrap program MINIRB.C, compile it, and then upload the rest of the files using the compiled MINIRB. Most Unix like systems are supported, including V7, Xenix, Sys III, 4.2 BSD, SYS V, Idris, Coherent, and Regulus.

A version for VAX-VMS is available in VRBSB.SHQ.

Irv Hoff has added 1k blocks and basic YMODEM batch transfers to the KMD and IMP series programs, which replace the XMODEM and MODEM7/MDM7xx series respectively. Overlays are available for a wide variety of CP/M systems.

Questions about Professional-YAM communications software may be directed to:

Chuck Forsberg
Omen Technology Inc
17505-V Sauvie Island Road
Portland Oregon 97231
VOICE: 503-621-3406 :VOICE
Modem: 503-621-3746 Speed: 19200(Telebit PEP),2400,1200,300
Usenet: ...!tektronix!reed!omen!caf
CompuServe: 70007,2304
GEnie: CAF

Unlike ZMODEM and Kermit, XMODEM and YMODEM place obstacles in the path of a reliable high performance implementation, evidenced by poor reliability under stress of the industry leaders' XMODEM and YMODEM programs. Omen Technology provides consulting and other services to those wishing to implement XMODEM, YMODEM, and ZMODEM with state of the art features and reliability.

Chapter 11 Xmodem Protocol Overview

CONTENTS

- i -

LIST OF FIGURES

1.16 S Registers Summary

```
  Commands to Change or Read Registers
  ____________________________________


   ATSn = ???   Changes the value of a register
                     'n'   = number of register
                     ???   = new value of register in decimal

   ATSn         Points to a new register
                     'n'   = number of register to point

   ATSn?        Displays the conternts of the register selected with 'n'

   AT = ???     Changes the value of the last referenced register
                     ???   = new value

   AT?          Displays the value of the referenced register


  S-Registers (Register summary)
  ______________________________

   The modem uses registers to store configuration status. Some of the
   registers control only one function, but some of them are called
   bit mapped registers which control several functions in single
   register.

      S-Register list (Hayes compatible Modems)
      S-Register list (Supra Modems)
      S-Register list (USR Modems)
```

1.17 LineLink and ProModem (Prometheus) FAQ

```
LineLink-Promodem144e Frequently Asked Questions Version 1.4.9
==============================================================
Version 1.5: December 13, 1994.

  This document gives information on the following Data/Fax/Voice
  modems:

* Prometheus Promodem 144e (roughly spring 1994 or later only)

* LineLink144e 14.4K  (Sold by MacWarehouse only)

* PowerUser 14,400 Data/Fax/Voice Modem.(Sold by MacWarehouse)

* VividLink 144e (Sold by MacMall).

* Performantz series modems (Sold by Mac Zone: Recent only)
```

Prices range from $89 to $169 (November 1994). When comparing the same firmware/ROM revision, these modems are identical in terms of hardware (according to multiple sources at Prometheus). Warranty, versions of software included and technical support will vary widely! Looks like they are **NOT** selling the modem under the "Linelink" label as of mid November 1994.

This FAQ also does not cover the other Prometheus modems, only the 144e model. It MAY or may NOT apply to some degree on the internal versions of the modem sold as the Prometheus Promodem 144i (theres a Mac powerbook model and a PC model). The Magnum modems are **NOT** made by Prometheus and are **NOT** covered by this FAQ even though they are $99 modems sold by MacWarehouse! Though this FAQ does cover a lot of generic things about 14.4K modems so it may be of some limited use to other modem users.

What's a LineLink144e Modem?

The LineLink144e/Promodem/PowerUser/VividLink/Performantz etc is a modem with v42bis (compression), v42(error correction), v32bis (operates at a true 14,400 bps), has Class 2 Fax and Voice mail support in hardware. In other words pretty much everything you could want in a 14.4K modem, **EXCEPT** Caller ID, silent answer, Class 1 or Class 2.0 fax support.

To avoid using Linelink/Promodem/PowerUser/VividLink/Performantz to refer to the modem. I will always refer to the modem later as a Linelink or LineLink144e since these were the first Prometheus made modem to use the chipset (I think!). As the Linelink becomes less popular I may change this to the Promodem144e in later FAQ's.

Most CURRENT Linelinks combined with the CURRENT MaxFax software allows you to send and receive fax documents and do voice mail. One telephone line can be used for both features. Specifically it recognizes incoming Faxes via the Fax CNG tones. This is a major improvement over previous versions of the modem (Firmware revisions 1.0, 1.3). **Note** As I am writing this **NO ONE** who is NOT associated with Prometheus has reported that this feature actually works reliably. I would greatly appreciate email telling me if it actually does.

More details can be found in "Specifications" and "Ordering" section

Legal Crap
==========

SHARE THIS INFORMATION FREELY AND IN GOOD FAITH
DO NOT DISTRIBUTE MODIFIED VERSIONS OF THIS FAQ
DO NOT REMOVE THIS NOTICE OR THE TEXT ABOVE

This FAQ is purely a volunteer effort. Although every effort has been made to insure that answers are as complete and accurate as

```
  possible, **NO GUARANTEE IS IMPLIED OR INTENDED**. The editor and
  indirectly the contributors have developed this FAQ as a service
  to the online community.

  You may upload or download this file anywhere including BBS's,
  ftp, gopher, WWW sites etc. to your heart's content. It may be
  placed on CD-ROM's including the info-mac CD-ROM. However do
  **NOT** upload to major internet sites ( macgifts, info-mac
  ,umich). I do that myself. If you wish to upload to AOL  or
  CompuServe please contact me first so they don't get three dozen
  copies!

  Exceptions to the above: Sections of this FAQ not exceeding 7000
  characters in TOTAL length may be reprinted, modified or used for
  any purpose. Anything larger requires prior approval (which is
  likely to be given). Also do not upload DRAFT versions of the FAQ,
  they are likely to contain more errors than normal versions!

  Please send your corrections and comments to the editor, Loudon
  Campbell, at loudon@uts.cc.utexas.edu. The FAQ does not improve
  otherwise!



About the FAQ itself
====================
  After reading this FAQ read the Linelink mailing list for help and
  check the ftp/gopher archive site mentioned later. For newest
  versions of the FAQ always check the ftp/gopher archive site
  first. If you have a world wide web client you can also check via
  my personal page at

http://uts.cc.utexas.edu/~loudon/main.html

Still to do
-----------
  Cleanup MaxFax voice mail section and add more comments. Same with
  Communicate Lite, Mark/Space Zmodem Tool and comm toolbox. Some
  ftp site listings still need to be checked and changed to more
  consistent URL's.

Versions and History
--------------------
Version 1.5: December 13, 1994.

  The LineLink was first sold in beginning of Aug/Sept 93.

  First FAQ for the LineLink was done in early September 93 by Jorn
  Barger (jorn@genesis.MCS.COM). John E. Bossom
  (jebossom@cognos.COM) then added to it. I had started my own FAQ
  for personal use and incorporated a lot from their FAQ (and a lot
  of other posts) in mid October 1993. These guys said they were
  dropping it, so I took it up.  Yes, they had a few things correct
  that I didn't include and found out the hard way!

  Previous Versions:
      ( 1.5     Dec. 13 1994) Fixed a few minor things.
```

```
( 1.4.9   Dec. 12 1994) Major reformatting- line length 68.
( 1.4.8   Nov. 15 1994) Release Version on ftp gopher site
( 1.4.5    Sept 9 1994) Public Draft on ftp gopher site
( 1.4.1    May 10 1994) Version sent to AOL.
( 1.4    March 30 1994) Version on info-mac and ftp sites.
( 1.3.3  March 21 1994) Private Distribution Only
( 1.3.2  March 10 1994) Corrupt version posted to info-mac!
( 1.3.1  March  9 1994) First version posted to macgifts.
( 1.3    March  2 1994) Very limited circulation.
( 1.2.1  Dec    3 1993) First good version.
( 1.1    Oct.  30 1993) First version by Loudon Campbell
 Sept 1993 First version by John Bossom and Jorn Barger
```

* Changes Since 1.4.5
  Much better and more correct section on Communicate Lite. Apologies to Brian Hall and the Mark/Space people. Interslip and many other program sections updated. Updated ftp site info.

* Changes Since 1.4.1:
  Too many for detailed list, highlights are: Info on new version of ROM/firmware. New version of MaxFax. Communicate Lite is now bundled with modem. Upgrade to Prometheus Promodem available (New Roms and MaxFax). Gopher and ftp server for Linelink. Comments on ValueFax Fax shareware software.

Internet and this FAQ

This FAQ is biased to internet users. This is mainly in terms of giving locations of programs on the internet for download and email addresses. As of October 1994 AOL has started beta testing their ftp software and other major services are moving in that direction. Mail servers on the internet can automagically send some of these files via email even without that capability. See near end of this FAQ for details. Note that AOL and compuserve can search for files by name in **THEIR** databases and are likely to have the files I am mentioning here under similiar names.

To get most of the free/demo/shareware programs listed in this FAQ you can ftp from various computer sites. You can also send email to a listserver to obtain these files. By the time you read this , these files may well be updated or moved but they probably will be in a similiar location. Lists of mirror sites of the info-mac and umich archives are in the ftp section. A mini primer on ftp and related topics is at the end of this FAQ.

Format of the FAQ

For best results in viewing this file use a small monospaced font (9 or 10 point Courier or Monaco are good choices). View it with any word processor or editor capable of reading a plain ASCII text file this large.

Better yet use an setext format reader. "setext" format, stands for Structure Enhanced Text format. Which is just an ordinary text file that follows simple formating rules so that programs will be able to view this file in outline format. As well as the use of **bold** , _underlined_ and ~italic~ text. Using a setext reader will let you find what you are looking for in a few seconds (I hope!) instead of scrolling through 50+ pages. For more information about setext format send email with the single word "setext" (no quotes) in the Subject: line to <fileserver@tidbits.com> A file should be returned shortly via email.

The macintosh "setext" viewer is EasyView. Its available at info-mac mirrors or on umich mirrors as

info-mac/text/easy-view-250.hqx
umich/util/text/easyview2.50.sit.hqx

an extension that allows you to directly access URL's via anarchie or MacWeb from within Easyview (or BBedit) is

info-mac/text/bbedit-get-url-11.hqx
umich/util/text/bbeditgeturl.cpt.hqx

The setext reader for Microsoft MS Windows 3.x is at

ftp://ftp.halcyon.com//disk2/tidbits/misc/EASYVIEW.uue

The unix setext reader is at

info-mac/help/cutil/setext-viewer-05-unix.uu

or

<ftp://ftp.halcyon.com//disk2/tidbits/tisk/util/
setext-viewer-03-unix.uu>

You can also find these programs on the "LineLink" ftp/gopher site

ftp://spinfree.cm.utexas.edu/
gopher://spinfree.cm.utexas.edu/

Or the world wide web page at

http://hospex.icm.edu.pl/hospex/setext-clients.html

List of major contributors

Special thanks to:

Stan Hall

```
 In charge of the  LineLink Mailing List/Digest

* Very large contributions from:

**Milt Sagen**
  One of authors of MaxFax (Prometheus). Poor soul who answered far
  too many questions from me. Has left company since!

**Darryl Harvey**
  Lots of Fax info, one of the first people to try voice version of
  MaxFax, its bugs, and more importantly its limitations and quick
  hacks, as well as proofing the FAQ.

**Brian Hall**
  (Mark/Space Communications) Communicate Lite info.


* List of other contributors:

**Scott Traurig**
  Great early suggestions (Oct. 6 1993) on init string AT&FW1\V1 for
  data calls

**Miles Abernathy**
  S7 register fix  , other Fax info, proofing FAQ

**Brian Bechtel**
  Suggesting the trm20.zip (i.e. Hayes documentation) file for use
  as a subsitute "Manual"

**Chris Baker**
  Another MaxFax author, who sent the voice mail documentation and
  caller ID,  LONG before it would have been available otherwise.

**Peter Lewis**
  Author of FTPd, Anarchie, MacTCP patch, MacTCPwatcher and other
  Mondo COOL stuff and for explaining MacTCP bugs and patches.

**Timothy Sherburne** (Prometheus)
  Info on MaxFax 2.5.x and 1.4g ROMS.


Many many others too numerous to list (or I plain lost track) !





About the LineLink FAQ editor
-----------------------------
  Please inform me of any information you find that is incorrect.
  Also contributions of information are greatly appreciated
  especially settings for programs not listed (including IBM
  software and Amigas) are especially appreciated.

  I am not a modem guru, just a reasonably happy LineLink owner. I
  have no special relation with MacWarehouse or Prometheus, beyond
```

bugging their tech support and getting answers from some of their
employees. I am largely just compiling information from usenet
news groups, email and personal experience.

I purchased my Linelink in September or October of 1993. Hence I
have orginal version 1.0 of the ROMS/Firmware. Information on
other ROMS/Firmware is all second hand.

Most of the information for using the LineLink as a data modem on
the Macintosh below was **VERIFIED** by myself (i.e. there may
have been someone else who deserves the real credit). This
includes the more popular terminal emulation programs such as
zterm, ClarisWorks, Communicate Lite, Macknowledge, etc as well as
the internet tools Macslip, InterSlip and MacPPP. I will try to
help on problems with applications such as these.

I have used and own a copy of MaxFax 3.3.1L, beta tested ValueFax,
and own (temporarily!) a copy of FaxSTF 2.2.3. However, I am only
a light user of Fax. I almost NEVER send a Fax and only receive
Faxes on occasion. Hence for both Fax and voice I am largely
relying on second or third hand information for real life
experiences.

Loudon Campbell email: loudon@uts.cc.utexas.edu

Why this FAQ is geared to Macintosh users.

I will happily include init strings and the like for IBM programs
or Amigas. **BUT I NEED PEOPLE TO SEND THEM TO ME** I now have
one volunteer for the Amiga section so things MAY improve for
Amiga owners in the next major version of this FAQ.

Reasons:

* Current LineLinks sold for the Mac market have an internal jumper
  between DTR and RTS. You should buy the LineLink from
  MicroWarehouse not MacWarehouse for either an IBM, Amiga, or UNIX
  box.

* I don't want to get into UART chips, interrupts, port addresses,
  BIOS versions, config.sys, win.ini etc. Yes, I own a 386 I pieced
  together from junk parts as well as a quadra 605. I don't use
  PC's for modem or Fax though OS/2 Warp looks interesting!

* Expensive UNIX boxes justify expensive V34 28.8K modems.

* The FAQ is getting too big and too much work as it is!

Specifications
==============

The various CURRENT modems have the same feature set which is as
follows

* FULL Error correction and data compression (v.42/v.42bis/MNP-5) In theory speeds can get up to an effective rate of 57,600 bps. But please don't expect any real data go this fast.

* Has all the old standards (V.21/V.22/V.23, Bell 103). As well as modern V.32 (9600) and V.32 bis (14400). It works from 75 bps all the way up to full 14,400 bps.

* Truly useless manual and documentation. Manual is 28 pages. This is the worst feature of buying this modem. S-Registers, Fax and Voice commands for this particular modem are detailed in documents found on the Prometheus BBS. This info is also on the Linelink gopher ftp site.

* HARDWARE capable to 14.4K faxes Uses Class 2 Fax which is better than Class 1 and as of late 1994 the most common Fax standard for modems. (Class 2.0 is current). If you own Fax Software it will probably work with correct init strings. Works with FaxStf 2.2.3, ValueFax, QuickLink II, FaxPro 1.5 and MaxFax 3.3.1 and above. FaxStf 2.6.x and 3.0.x however, have problems with receiving Faxes. No cure in sight as of Nov 4 1994!

* FIRMWARE as of this moment the current firmware version is 1.4g. Versions previous to this do NOT have Fax CNG tone recognition! Be sure to ask when you purchase if its the most current Firmware!

* Macintosh Communication Software CURRENTLY supplied is Communicate Lite by Mark/Space Softworks. This is a very competent Comm Toolbox based program. There is detailed info in the seperate section on Communicate Lite found later in the FAQ.

* Owners of OLDER modems were stuck with MacKnowledge software, which is **NOT** associated with Communicate Lite's authors. THAT software was old, didn't support modern standards like the comm toolbox or zmodem, had poor online manual and didn't work in 32bit mode. Mark/Space is now doing a competitive upgrade to Communicate Lite for MacKnowledge owners at $29.95 (includes a full featured Zmodem tool). Competitive upgrades to other commercial software are Sitcomm ($45) and Microphone Pro 2.0 ($79). Also consider the shareware alternatives Zterm ($30 or $40) and Telefinder Pro ($15) which are quite good also but are not Comm Toolbox based.

* Fax/Voice software Most CURRENT modems being sold INCLUDE MaxFax software. In the past the software was an extra price purchase most of the time! In the past and currently there were two versions of MaxFax. One is Fax only and one is Fax and Voice. When purchasing a NEW modem be careful that you get the Fax and Voice version if thats what you want! And make sure its version 3.5.1 or later! MaxFax is good Fax/Voice software. It has multiple mailboxes, fax mailing lists, good user interface (for most part).

* With the current MaxFax and current modems, you can receive both

Fax and voice calls on one phone line correctly! (I.e. the modem detects the difference!). Voice quality is also improved over the older modems. Reports as of Nov 5, 1994 indicate these features do not work as reliably as Prometheus claims however.

* Uses Seirra chip set

* Uses a digital signal processor and permanent ROMS/firmware (no flash ROM, you have trade in your old modem for upgrades which cost significant amounts of money).

* Includes power supply . Its a 120 volt transformer. Output Rated at 9 Volts AC at 1 amp, 15 watts. International users please note you will need to purchase a 240 volt AC to 9 volt AC adapter.

* Dimensions: Cheap, clean white plastic, rectangular 1.75"x7"x8" Size of hard cover novel. Has cheap "feel" a little bigger than it should be but looks OK.

* The modem has a cheap built-in speaker that sounds horrible.

* Has fewer LEDs (lights) than most modems do. The lights it has are AA (Auto Answer), CD (Carrier Detect), OH (off hook), MR (modem ready) and IO (Instead of separate Receive Data and Send Data lights). Some people find this a big deal, most could care less.

* The relay also chatters _extremely_ noisily on pulse dialing.

* LineLinks use slide on/off switch (in theory prone to wear).

* Includes a Mac to modem hardware handshaking cable.**HOWEVER**, if you bought a modem before Jan 1994 or are planning on using your modem on a PC or your cable on another modem read the subsection later on the cable!

* Comes with AppleTalk Remote Access scripts that seem to work with ARA 1.0. Unknown success rate with ARA 2.0. Current MaxFax supports (but does not include) Lineshare software. So with MaxFax, Lineshare and ARA you can use one phone line to do just about everything.

* Technical Support is provided by MacWarehouse for the Linelink and PowerUser modems via a 800 number. Prometheus handles tech support for their modem directly. Since Prometheus tech support does NOT have an 800 number use email if at all possible! Saves time on hold!

* Warranty varies with model. The Linelink from MacWarehouse has a 120 day warranty from Macwarehouse. The PowerUser has 1 year warranty. The Prometheus Promodem has a 5 year warranty. Don't know about other modems.

The following are **non-features** of the Linelink. The firmware and chipset supports these features but a relay is not included in the modem itself to implement these.

* You can’t use the telephone hooked up to your modem to record your outgoing announcement. If you don’t have a Mac with a sound input (or can’t borrow someones), you must call your mac from another phone to record outgoing messages.

* Almost Supports Caller ID (You can use it for some purposes though)

Modem Ordering Information
==========================

WARNING It is conceivable some of these companies have old stock they are trying to sell. They all appear to include MaxFax. What versions of MaxFax or ROMS are being sold by which companies is unknown and is currently changing. **BE SURE TO CHECK IT OUT YOURSELF!** Especially whether the voice mail version of MaxFax is included or the Fax version. For addresses, phone numbers etc see company address section.

Editors two cents: At current prices buy the Prometheus Promodem 14.4. Its now cheaper, has 5 year warranty and the better "name"!

* From catalog 25cd MacZone (November 1994) sells

  Performantz Upgradeable 14.4 Data Modem $99.98 Part #96571 with "Free Fax Upgrade"

  14.4 Performantz S/R Data Modem, $129.98 Part #99322 Includes Compuserve and eWorld starter kits.

* MacZone also sells the Prometheus 144e with MaxFax three different ways.

  Prometheus 14.4 S/R External Fax Modem. Includes MaxFax for $79.98 part #93360 but catch is you have to buy the Prodigy Memembership Kit part #93359 for $19.98. Five year warranty.

  Prometheus 14.4 S/R Fax Modem w/America Online Membership for the Mac. $99.98 Part #93371. Five year warranty.

  Prometheus Promodem 144e (Definitely includes MaxFax 3.5.x voice version, almost surely current ROM) Part # 00062, $129.98. Five year warranty.

* MacWarehouse (Catalog 36 November 1994) sells:

  PowerUser 14,400 Data/Fax/Voice Modem. $169 Part # MOD 0181 1 year warranty.

Prometheus Promodem 144e Voice Modem with MaxFax $119.95 Part # MOD 0064

Prometheus Promodem 144e (No voice) $89.95 Part # DMD 1352

* MacMall sells:

  VividLink 14.4K Fax Modem $99 Part #65304 Includes MaxFax but unknown version, firmware and warranty.

  Prometheus 14.4 ProModem with Voice $129.99   Part # 65173 Five year warranty. Current MaxFax and ROMS apparently

* Also, Prometheus Promodem 144e for the Mac is $89.47 part #31-10362 from Computer City (Its a national chain owned by Tandy/Radio Shack) . They sold out locally by the time I got around to checking on details.

```
Company Addresses, Phone Numbers and email
==========================================

  In general use email for technical support questions and
  international orders. Use 1-800 numbers to order and to get prices
  and sales info (in the US and Canada).

Prometheus
----------
  Prometheus Sales 1-800-477-3473 , 1-503-692-9600
  Prometheus Tech Support: 1-503-692-9601
  Prometheus BBS: 1-503-691-5199
  Prometheus FAX: 1-503-691-1101

  Email addresses for technical support are
  AppleLink: d2407
  AOL : promethean
  Internet:  d2407@applelink.apple.com  or  promethean@aol.com

  They also have a conference area on America Online.

Mark/Space Softworks
--------------------
  For questions on Communicate Lite which is now included with the
  Prometheus modems contact:

  Mark/Space Softworks
  111 West Saint John 2nd Floor
  San Jose, CA 95113

  sales 1-800-799-1718 and works from the US and Canada.

  techsupport 1-408-293-7299
```

```
  fax         1-408-293-7298
  bbs         1-408-293-7290

  Internet: mspace@netcom.com
  AppleLink, AOL: MARKSPACE
  eWorld: MarkSpace1
  CIS: 73244,3333

  Mark/Space also sells a CommToolbox Zmodem Tool, and PageNow which
  forwards messages from your modem to a text pager.

  They also will have a Telnet Tool and PC-ANSI tool coming out
  shortly.

  The demos of these programs, updates and other goodies can be had
  at the bbs or at their anonymous ftp site whose URL is

ftp://ftp.netcom.com/pub/mspace/


MacWarehouse
------------
  Macintosh Hardware and Software: Mail Order.
  Sold the "original" Linelink Modem
  Order phone number: 1-800-255-6227
  International order phone number: 1-908-370-4779
  Fax: 1-908-905-9279
  Express Customer Service  1-800-925-6227 (Returns, technical
  support)
  Compuserve: 70007,1616
  Or GO MW on compuserve itself.
  Internet: 70007.1616@compuserve.com



MacMall
-------
  Macintosh Hardware and Software: Mail Order
  MacMall order phone number: 1-800-222-2808
  MacMall customer service phone number: 1-800-560-6800


MacZone
-------
  Macintosh Hardware and Software: Mail Order.
  Order phone number: 1-800-248-0800
  International order phone number: 1-206-883-3088
  Fax order phone number: 1-206-881-3421
  They also have many international offices.

Mac'sPlace
----------
  Macintosh Hardware and Software: Mail Order.
  Orders 1-800-913-0009
  International 1-406-758-8000
  Fax 1-800-881-3090
  Compuserve:      76635,660
```

America Online: MacsPlace

STF Technologies

FaxSTF Fax software

STF Technologies, Inc.
P.O. Box 81
Concordia, MO 64020

Phone (800) 783-2002 or (816) 463-2021;
Fax (816) 463-7958.

CompuServe: 74740,1244
Internet: 74740.1244@CompuServe.COM

Delrina

Delrina FaxPro software

6830 Via Del Oro
Suite 240
San Jose, CA 95119-1353.

Phone (800) 268-6082 or (416) 441-2457;
Fax (416) 441-0774.

Technical Support
=================

See previous section titled "Company Addresses, Phone Numbers and email" for addresses phone numbers etc.

Technical support questions on Communicate Lite are handled by Mark/Space Softworks. Macknowledge questions are handled by Prometheus. Questions on the modem itself go to Prometheus if you bought a Prometheus Promodem. If you bought another "House brand" modem contact the company you bought it from.

The technical support number of MacWarehouse is 1-800-925-6227. MacWarehouse can be reached at: 70007.1616@compuserve.com. I am sorry to say this but Macwarehouse has disseminated more misinformation than valuable information. They are courteous and they do try so they may be able to help.

Online groups

In general ask questions on AOL, Compuserve, the LineLink mailing list. I believe there is a forum/area for Prometheus on AOL.

The following internet Usenet newsgroups would be helpful also

comp.dcom.modems
comp.dcom.fax

```
For Mac users also look at
  comp.sys.mac.comm
  comp.sys.mac.hardware


For Amiga owners also look at
  comp.sys.amiga.comm




Documents and Manuals
---------------------
  If you got Macknowledge Software instead of Communicate Lite the
  "Manual" was on disk and outdated. If they had bothered to update
  the manual to be specific for the Linelink modem they could have
  saved a lot of grief for early buyers.

  The MaxFax software manual is quite good. It answers most
  questions about MaxFax. However, it may take you a while to find
  the answer to your question, for that reason I suggest actually
  reading the manual cover to cover a couple days after you get
  MaxFax.

  The Communicate Lite Manual is very good. It explains things very
  well and is highly organized. (Would be nice if it covered the
  Apple supplied Comm Toolbox tools, but those are Apple tools after
  all) If you are using System 7.01, you will be quite pleased with
  the Balloon Help. I would say the Balloon Help is almost more
  complete than the manual!

  If you decide to buy the Mark/Space Zmodem Tool the manual and the
  Balloon Help is at least as good as Communicate Lite's.


  However the MODEM manual is next to useless. It does not cover any
  command in detail. Does not cover S registers, Fax or Voice
  commands AT ALL!

  The Prometheus BBS is at 1-503-691-5199. Documents on the
  Sregisters, Fax and Voice commands are something like
  144E_SREG.TXT, CLASS2.TXT,and VOICE231.TXT.(or VO231.TXT) . Its
  been a while since I called you may need to look around.


  The voice and fax documents really are not of general use. The are
  useful only if you are writing Fax or Voice mail software from
  scratch, or perhaps trying to do Resedit hacks to existing
  software.

  The S register document is (almost) essential. I only found two
  outright errors. Part of description of S12 seems wrong and
  default value on S1 appears to be typo i.e. its 0 not 43.


  Shishin "Squish" Yamada wrote his own " Linelink Manual". Its
```

available on info-mac archive. Version 1.0 of his manual states
the Linelink has Silent Answer which to the best of my knowledge
is NOT true. Its available at info-mac, umich as

linelink-144e-commands-10.txt

Its also the document V001N081.TX on the mailing list archive
server. Version 1.1 should be available soon.

If you want DETAILED info on AT commands in a more readable
format. Get the "The Hayes command set" including S-registers. Its
written by Hayes for THEIR modems. It can be found at following
sites.

ftp://rigel.acs.oakland.edu:/pub/msdos/modem/trm20.zip
ftp://ftp.uu.net:/systems/ibmpc/msdos/simtel20/modem/trm20.zip
ftp://wuarchive.wustl.edu:/systems/ibmpc/msdos/modem/trm20.zip
ftp://ccsun.unicamp.br:/pub3/simtel20/modem/trm20.zip
ftp://plaza.aarnet.edu.au:/micros/pc/oak/modem/trm20.zip

You will need to unzip the file either on a PC or Mac. Again this
document (unziped, sit and reformated versions) can be found on
the Linelink ftp/gopher site.

Another good place to look at files outlining commands for both
data and FAX is the site

ftp://ftp.halcyon.com/pub/supra/

Keep in mind this is a Prometheus manufactured modem. Their
implementation is not Hayes' or Supra's. Use the Prometheus
documents to determine what is implemented and the other documents
for further detailed explanation. Note the LineLink does not
strictly adhere to the Hayes command set (Minor differences). &R0
and &R1 are particular examples as well at TIES behavior.

With the above documents you should be nearly fully informed on
the data Fax and voice features of your modem. In fact for most
people you will have too much information.

Gopher Server FTP archive
=========================

I have set up a gopher and ftp site. **IF** you have access to the
internet you can get files stored on this site via either gopher
or anonymous ftp (or indirectly throught the world wide web). The
URLs are

ftp://spinfree.cm.utexas.edu/
gopher://spinfree.cm.utexas.edu/

```
  The site IP address is

              128.83.163.58

  This site is NOT sponsored or supported by Prometheus in any
  fashion. It contains no commercial software. It contains only
  INFORMATION on the Linelink, including

* The most current "official" Linelink FAQ  and older versions.

* Linelink modem documentation (S registers , Fax, Voice)

* The Linelink mailing list digest articles. Stan Hall kindly
  provided me with all the back issues!

* A few important or critical files for Macintosh users.

* Setup files, modem and ARA scripts etc.

* Misc documents. Possibly patches in the future.

* Gopher menus have links to important ftp and gopher sites on the
  internet of particular interest to communication on the Macintosh
  and major archive sites for Mac, PC and Next. Use gopher to this
  site if you have any choice, its easier, faster and more
  automatic!
  To use gopher on a unix box you would just type

gopher spinfree.cm.utexas.edu

  and follow the menus / lists from there.


  If you don’t have gopher, to use ftp on a unix box just type

ftp spinfree.cm.utexas.edu

  Then when it prompts you for a user name type anonymous and when
  asked for your password type in your mail address. The site is
  tricky to use ftp on if you are trying to get IBM PC binaries but
  is easy for Mac users or Unix users getting files for their Macs.

  A short primer on ftp can be found near the END of this document.

  At present you can log in at anytime. However please avoid its use
  between 11AM and 5PM Central Standard Time. Its a lowly Macintosh
  SE/30 being used for other tasks. So it may be overwhelmed or
  crash at any time etc. So please be courteous and expect the
  unexpected.

  Email me at loudon@uts.cc.utexas.edu for problems with the server
  or the content of the files on the server. Such as if you have
  more current files than I do!


LineLink Mailing List
=====================
```

"This list is for discussion of the LineLink 144e modem sold by MacWarehouse and manufactured by Prometheus. All discussions concerning this modem are welcome especially those about using it on platforms other than a Macintosh."

This is the best place to ask questions and get/give current info on the LineLink modem. It doesn't get much traffic now though. If you need info on using the Linelink with a PC, Amiga, NeXT computer or whatever try here first!

The mailing list and list server for the LineLink was established by Stan Hall, whose email address is <kilgore@pylon.pillar.com>.

If you wish to send a message to all of the list members, mail your message to:

    LineLink@pylon.pillar.com

However, before you do that your really should join the list!

If you would like to join the mailing list (highly suggested) send an email message to listserv@pylon.pillar.com with the following in the body , **NOT** in the subject line

```
JOIN LINELINK
QUIT
```

Within a day or so you will be added to the mailing list.

To unjoin the list just substitute UNJOIN above for JOIN in the example.

The old digests and the Linelink FAQ are archived on the listserver also. In the past I have not kept good track of what is on the mail server. I often assumed certain files were archived there that were not. That was my fault not Stan Hall's.

The address for the archive server is:
    archive-server@pylon.pillar.com

The commands used for the archive server(s) are:

HELP
  Returns command summary.

REPLYTO
  Responses from the server will be sent to this address instead of the address in the "From: " line.

INDEX

```
  Will send a listing of files available from this server.

GET <filespec> [uue[ncode] | xxe[ncode]]
  Sends the specified file <filespec>.  UU or XXencoding can be
  specified.

QUIT
  Causes anything after this command to be ignored.




  To get a list of all files on the server send an email message to
         archive-server@pylon.pillar.com

  the email should have in its body, NOT the subject line, the
  following two commands:

      INDEX
      QUIT

  Within a day or so you will get an email message back with the
  file listing.

**Example:**
  Lets assume the Linelink FAQ is listed as
  /public/LineLink/LineLink.faq

  To get that file send an email message to
  archive-server@pylon.pillar.com the email should have in its body,
  the following two commands:
       GET /public/LineLink/LineLink.faq
       QUIT

  **DON'T** put the commands in the subject line. Within a day or so
  you will get an email message back with the file.



Firmware/ROM revisions (And their BUGS)
=======================================

  At this writing current chipset is ABC, and current ROMS are 1.4g.
  I don't know how to determine the chipset.

  To determine which ROMS/firmware you have first get into command
  mode.

  Then type command ATI3I4I6

  Version 1.0 of the ROMs give result

Copyright (c) 1993 SSC, V1.0  - 08/27/93
SERIAL * V32BIS * V42BIS * VOICE 2.2 * TIES * CID * V23 * SRFAX *
DSP Version: V1.20
MCP Version: V1.3  - 07/07/93, Copyright (c) 1993 SSC
```

```
  The "Copyright (c) 1993 SSC, V1.0  - 08/27/93" above gives the
  ROM/Firmware revision as  1.0.


  Version 1.3 of the ROMs give results

Copyright (c) 1994 SSC, V1.3B.2     - 01/19/94
SERIAL * V32BIS * V42BIS * VOICE 2.2 * TIES * CID * SRFAX *
DSP Version: V1.30
MCP Version: V1.3  - 07/07/93, Copyright (c) 1993 SSC


  Version 1.4g of the ROMS give results (to ATI3I4 ?)

Copyright (c) 1994 Prometheus, V1.4G LL4.1 - 06/24/94
SERIAL * INT-HYB * V32BIS * V42BIS * VOICE 2.3 * TIES * V23 *
CLASS2 FAX *
DSP Version: V1.20

  I need the I6 command results yet on the 1.4g ROMS! Any one care
  to supply it?


  Version 1.3 of the ROMS have real problems connecting at high
  speed to various other brands of modems. (Telebits for instance).
  See seperate section on this problem. Similiar problems MAY exist
  on other versions of the ROM but no where near as severe as 1.3
  ROM modems!



  Voice features on version 1.0 and 1.3 ROMS are essentially
  identical. They are limited as follows when used with ANY version
  of voice/fax MaxFax used in voice mode.

* The CALLER must punch 77# to enable Fax during the outgoing
  message. The modem DOES NOT recognize Fax CNG tones.

* No volume control. (Actually I think you can get around this
  limitation)

* Fair to Poor voice quality. (Understandable but not good)

  Version 1.4g of the ROM/Firmware combined with MaxFax 3.5.1 ,
  **ACCORDING** to Prometheus eliminates the data, fax and voice
  bugs and nonfeatures listed above.  Check the user comments
  section on MaxFax 3.5.1 however. The reports I have from users so
  far indicates there are still problems with voice and Fax CNG tone
  recognition.

  In any case the new software and the OLD ROMS do NOT give you
  these features! Whether new bugs are present only time will tell.


  All versions of the modems do NOT include a second relay that
  would
```

* Allow full use of Caller ID.

* Allow recording off the phone connected to the Linelink.

* Perhaps allow silent answer. (Voice mail makes this Redundant!)

```
Upgrades: Hardware and Software
===============================

Upgrades from Prometheus
------------------------
  Facts are either from Prometheus sales 800 number or other
  Prometheus employees.

  If you purchased a Prometheus modem AFTER May 15, 1994 the upgrade
  to MaxFax 3.5.x is FREE.  If you purchased a modem BEFORE May 15,
  1994 there are two upgrade paths:

        MaxFax 3.5.x with Fax & Voice is $24.95 + $5 shipping.

        MaxFax 3.5.x with Fax only is $19.95 + $5 shipping.

  Users of older modems (Linelinks or Promodems or any of the other
  Prometheus manufactered modems) can upgrade to the ProModem 144e
  for $99 + shipping. This modem has the newer firmware (1.4g or
  later) You DO have to trade in your old modem. You DO get the new
  3.5.1 MaxFax software and Communicate Lite. The offer ends
  December 1994. I don't know for sure about a manuals and warranty
  (they sent the wrong info via US mail).

  For more info on these upgrades, call 1-800-477-3473.


  In combination with the latest 1.4g firmware in the MODEM this
  gives better quality and faster voice recordings, volume control,
  Fax/Voice discrimination (Thats THE BIG NEW FEATURE) and a lot of
  bells and whistles (like multiple mailboxes per caller,etc).  Its
  also has better support for AV's, PowerMac's , System 7.5 etc.

  (See however the user comments later on some problems)

  They now use DPCM sound compression rather than CVSD, which
  improves the voice recording quality and makes the codec times
  much faster. Translation: Its quicker and better at voice
  recording.

  It adds support for Lineshare (which for instance allows ARA and
  FAX to be received on one phone line) but does NOT include
  Lineshare software itself which would require a seperate purchase.
  (A demo version of Lineshare is available that allows a limited
  number of connections)

  Bad news is the MaxFax 3.5.1 software upgrade does NOT add the Fax
  / Voice discrimination or better voice quality to the 1.0 or 1.3
  firmware versions of the modem. You need a firmware (aka ROM)
  revision to the lastest 1.4g firmware for these. Since they are
```

```
  part of the board you have to do the $99 modem swap!  You can use
  the new software on the old firmware Linelinks, though and get the
  other improved features.

Communicate-Lite Upgrade
------------------------
  For owners of Linelinks/Promodems etc. Mark/Space Softworks has an
  upgrade to the full featured ZMODEM tool for $19.95 plus shipping.
  (There was a coupon in the box).  For owners of Macknowledge you
  can upgrade to Communicate Lite and the ZMODEM Tool for $29.95
  plus shipping.  Call 1-800-799-1718 to purchase.  For company info
  and location of the demos of this software see corresponding
  sections.


The editors two cents on upgrades
---------------------------------
  For recent and FUTURE purchasers of modems this is very good news.
  Prometheus have (in theory!) addressed most users major beefs with
  the modem! Though it looks like there are some teething pains on
  the new versions of MaxFax.

  For owners of Linelinks that NEVER purchased MaxFax or similiar
  software, I think you would be foolish not to get the software
  upgrade. Its as cheap as the shareware program ValueFax and better
  Fax software, PLUS you get Communicate Lite which is a BIG
  improvement over Macknowledge.

  For owners of Linelinks that did have MaxFax previously its a
  tough call. Weigh in the fact that the PowerMacs, AVs, ARA and
  System 7.5 are better supported with the new software. If you
  don't fit that profile it doesn't sound like its worth upgrading
  (i.e. if its not broke don't fix it). I don't know anyone who
  bought the software only upgrade yet, so I may be completely
  wrong!

  For owners of Linelinks that never purchased a better
  communication program than Macknowledge you should definitely
  consider getting Communicate Lite with the Zmodem tool.


  Given that Prometheus is charging $99 + shipping for a hardware
  upgrade on the modem and I now see the Prometheus Promodem is
  being sold locally for $89.47 (Nov 12, 1994) it would be stupid
  for anyone to do the hardware upgrade. Note: The price on new
  14.4K modems has fallen about $45 the past three months so
  Prometheus does NOT deserve flames on this policy since it was
  initiated then not NOW.

  If you have the old ROMS (1.0 or 1.3) you may be somewhat upset
  about the hardware upgrade. We KNEW the ROMS were probably NOT
  upgradeable since the Linelink came out!

  On the other hand, I think people who bought a Linelink and MaxFax
  with Voice when it was advertised by MacWarehouse as discrimating
  the Fax CNG tone from voice mail probably have a very legitimate
  gripe with either MacWarehouse or Prometheus! However, they only
```

```
  did that in one or two catalogs,for about a month or so and
  usually included a paper in the box noting the problem.  So only a
  very small percentage of owners fit that bill.


Undocumented Modem Features
===========================
  Some S registers seem to have larger ranges than indicated in the
  documentation.

ATW2
----
  Command ATW2 works. The corresponding register (S95) that Hayes
  uses is not present however. ATW2 just reports the carrier speed
  instead of the serial port (DTE) speed in the CONNECT message
  reported by the modem. Personally, I find ATW1 much nicer.


Caller ID (the feature that is sort of there)
---------------------------------------------
  Please note this is not a bug its a non-feature. Many people
  report the modem doesn't crash as Chris Baker says in some
  situations so its occasionally usable. A relay is not included as
  a cost cutting measure (reasonable since so few people have Caller
  ID at present and modems are at cutthroat prices now). I think the
  missing relay MIGHT also have been used for other features such as
  recording outgoing messages from the local phone.

  From Chris Baker (a co-author of MaxFax):

  The LineLink firmware DOES support caller id detection.  The modem
  will display the caller id it receives from the phone co.  The
  only problem is the modem will then crash and require a powercycle
  to get it back because the LineLink doesn't have the necessary
  relay switch onboard.

  To try the caller ID yourself do the following:'AT#VS4' after the
  OK set your DTE to DCE (port) speed to 19.2k and enter 'AT#CC1' to
  indicate formatted caller id output.



Modem Bugs and Misfeatures
==========================

  People have reported that the LineLink is about 15% slower than
  other modems in side by side comparisons.  At present I discount
  this claim, it appears to be about dead even with the majority of
  other 14.4K modems.

  Some of the S registers are NOT saved to non-volative memory that
  you might ASSUME should be saved. Most notably register S7 is not
  saved to non-volatile memory. (Thanks to Neil Schulman for
  pointing this out). This is NOT a bug, what is saved or not saved
  is largely up to the manufacturer.

  CNG FAX tones are only recognized for modems with version 1.4g
```

ROMS or later.

One person bought 4 LineLinks, after about 8 Hours of being on unattended they had to be reset manually. This seems to be generic problem with LineLink in that only power on and power off seems to solve strange problems. (It seems particularly prone in Fax and voice modes). I have personally managed to get the Linelink in these types of states but mostly when trying out undocumented or poorly documented commands voice commands.

My Modem only doesn’t connect at XXXX baud. Whats Wrong?

If the modem never connects to ANY modem at any speed check the obvious (i.e. cables are plugged in to correct places, phone cord is good etc). If you set your modem at 9600 bps and get a 9600 bps connection but can’t work above that speed I suspect you do NOT have hardware flow control working correctly. See cable , hardware handshaking and software setup section and not this section. If the modem works with at least one other high speed modem at all speeds but not all high speed modems you call continue reading here.

95% of the time the factory defaults work perfectly. 9 out of 10 times of the remaining 5% its you screwing up the software. But sometimes all hell breaks loose. The techniques that follow apply to all versions of the ROMS but are most useful on the 1.3 ROM modems.

Version 1.3 of the ROMS have real problems connecting at high speed to various other brands of modems (Telebits, Zooms, Supra, Microcom, Avtek). See the ROM/firmware section for details on how to determine which ROM you have.

** No real cure yet exists! We have bandaids only! **

Typically you get a connection at 4800 bits per second instead of 14400. Sometimes its no connection at all. Sometimes its works on dialing in but not out and sometimes its the reverse.

People in Australia and New Zealand are particularly prone to this problem, or maybe those "down under" are just more vocal!

If you get a connection at all then try this technique that people have used successfully in many situations:

Aftering connection you can try getting into command mode by escaping (i.e. typing + + + and then AT <return>) Then type ATO1. (That is a letter "O" not the number zero!) This tries to retrain equilization in the connection. It often produces a better connection! (i.e. 14400). This technique seems to help with ZOOMS and a few other brands on occasion.

If instead you try ATO3 instead of ATO1 above this forces the modems to renegotiate their speeds, protocols and compression. This technique gets a 14400 connection with Avtek modems which

```
  normally only get 4800 bps. It disconnects Telebits however!

  The above is easy and often effective "bandaid". You do have to
  get a connection though!


  These results strongly indicates there is a problem in either
  v32bis or v42bis negotiation!



  By trial and error Doug Bonar (bonar@lagrange.rutgers.edu) tried
  several settings I suggested based on other peoples previous
  attempts. He used a Linelink with 1.3 ROMS to call into a bank of
  Telebit Worldblazers modems.

  The Telebits have been one of the more troublesome cases. So the
  hope is that the experience here carries over elsewhere.

* The EXACT best initialization string he came up with is :

AT &F0 &F3 W1 L1 T N3 S37=9 S46=138 S48=0


* His comments are:

  " I get a 9600 baud, LAP-M, V.42BIS connection with the local
  Telebits Worldblazers.  Unfortunately, it seems to be somewhat
  unstable.  My modem ready light sometimes turns off and then
  carrier is lost.  I presume that something (line noise maybe)
  forced the modems to go into a recallabration of features, and
  that that bombs.  Basically, while the modem seems workable at
  9600 buad over the lines with Telebits modems, it is still not
  reliable."


* Explanation of elements in the string (for purposes of further
  experimentation):

&F0 &F3 - starts with factory defaults doing both &F0 and &F3
          MIGHT be overboard but who knows!
W1      - So modem reports what type of connection we get!
L1      - Just a low speaker volume control, I prefer loud myself
T       - Use touch tone dialing. (Personal preference)
N3      - This forces the modem to use the speed specified by
          register S38 when originating a call.
          I suspect N5 (the default) may not work since it allows
          fallbacks (i.e. the 4800 people usually get).
          I suspect that N0  (thats "N" and the number 0) might
          help This forces the speed to be specified by register
          S37 for both the originating and answering cases. This
          might be needed for when a Telebit calls a Linelink. It
          may also help when the Telebit asks to renegotiate the
          connection.
            Lets see if this helps the carrier drop problems.
            (I don't know!)
S48=0   - disables v42, v42bis feature negotiation.
```

```
S46=138- forces v42bis compression. s46=138 is the default so
         this is redundant. (Doug tried S46=136, i.e. no v42bis
         compression and it didn't help or hurt, so the
         compression itself looks like its not the problem but
         perhaps only the feature negotiation)
S37=9  - forces a maximum 9600bps connection.
         Trying S37=11 (i.e. a 14000K connection) DID NOT WORK!
         However if the above string works for you go ahead and
         try S37=11 at least once. It may work differently with
         N0 command even. (S37=10 is PROBABLY an illegal value).

  In THEORY I think the string that might be better is

AT &F &C1 W1 N0 S7=60 S10=30 S37=9 S48=0

  that SHOULD give a 9600 (v32), LAPM (v42), v42bis connection. If
  that works try:

AT &F &C1 W1 N0 S7=60 S10=30 S37=11 S48=0

  that SHOULD give a 14400 (v32bis), LAPM (v42), v42bis connection.
  Also you can add any personal preferences to the string like L2.

  Now for the rational on those choices. I already explained why N0
  should be tried. S7=60 gives more time to get initial connection /
  carrier. S10=30 gives more tolerence for longer periods of bad
  carrier. &C1   just lets the light on the modem tell you when
  carrier is lost.



  We need feedback on these settings!!  Tell me how they work or
  don't!


  The following are a typical crossection of cases, I am including
  these to see if anyone else brighter than I am can see some
  patterns or has some good ideas!


* Case 1: Mike Markzon  MARKZON%HWS.bitnet@CUNYVM.CUNY.EDU
  The problem I have is that when I try to connect to BBS's that use
  Zoom brand 14.4 modems I am only able to connect at 4800. I have
  tried to force the connection using the init string AT &Q5 S37=11
  N0. No connection takes place when I use this.

* Case 2: courtn@cs.uregina.ca
  When I connect to US Robotics, I don't seem to have much of a
  problem. I always seem to get a solid 14.4 connection, with no
  retraining or anything. With Zoom's, I connect at
  4800/ARQ/LAPM/V42BIS, and I stay at 4800, no retraining happens.
  (It is a solid 4800 connection though. I get no errors and don't
  lose carrier or anything like that). I've know some other
  LineLinker's have this problem too, but on the flipside of the
  coin, many LineLinker's connect with Supra's and other modems
  flawlessly, and absolutely love their LineLink's. In fact, there's
  was a thread on the Supra Fido echo about this very problem. One
```

sysop (who has a Supra) had two callers (who had LineLinks) that had problems connecting (same problem's I have), but he also had 4 other users with LineLinks that had no problems connecting. And they were all using the same init string and had the same config! Anyway, I've found a kind of half-assed solution to the problem. If, after I connect, I go to command mode (with the 3 plusses), then do a ATO1 (which tells the modem to return to data mode and initiate equalizer retrain equalizer sequence), I seem to get a solid 14.4 connection after that.

* Case 3: I.Orchard@irl.cri.nz (Ian Orchard)
  After a series of disasters with Linelink 144e modems, I'm wondering if I should bail out. I'm on to my 4th sample and it still won't raise it's carrier speed higher than 4800 baud when communicating with First Class or ARA. Comms with Zterm sometimes manage higher speeds but it's spasmotic. A small test file that other 144 modems (even other LineLinks) transfer in 15secs or thereabouts, takes me 45sec. I have tried different Macs, different software, different locations. No luck. (Sample #1 did have a different problem)

* Case 4: Similiar unknown modem. awaji@gokumi.j.kisarazu.ac.jp (AWAJI Yoshimasa)

* Case 5: Chris Riker CHRSRIKER@AOL.COM
  AOL tech support says that the LineLinks are having problems in some cities. They suggested I call D.C. where they know there are no Microcom modems. The connection was all I hoped it would be (except the long distance charges!). I belive the AOL people in that my LineLink is having trouble connecting with SprintNet's Microcom modems. Is there anybody else whose had problems wit Microcom modems? How did you get around it (strings please....)? I had a Microcom QX v.32 once and it did not like at all dealing with the v.42 query tone from any modem. I eventually got rid of it, cause it would just stop negotiating if v.42 even asked it if it had it. Wonderful piece of work that...

* Case 6: David A. Smith" <smithd@cs.csee.usf.edu>
  For dialing into the school here I have to set some S-Reg's, (I can put that doc up too) so that it doesn't connect using MNT protocol (We have Microcomm 28.8k's here and they SUCK!!!! they won't connect to normal v.42/bis modems (including zooms, Linelink, Hayes, etc) relialiby usless you force the v.42/bis settings)

* Case 7: ang@sortr.incyte.com (Angelo Delegeane)
  Using my LineLink 144e, I have called and connected to the Telebit T3000 on the Sun workstation at work. For security reasons, we have set the T3000 to callback the appropriate person after their password is entered. Thus, after being queried for my password and typing in the appropriate response, the T3000 hangs up and then tries to call me. I have tried both automatic and manual methods to answer the incoming call using both Zterm 0.9 and Microphone Pro and it seems that a link is never established with the T3000. I have tried linking up at 2400, 9600 and 14400 and haven't been able to make a link even though I have no problem establishing links on outgoing calls. My partner at work also purchased a

LineLink 144e and has the same problem (outgoing calls connect, incoming calls don't). We haven't tried linking up our modems to each other yet but that will be tried. [By the way, I don't see this problem with my SupraFAXModem.]

* Case 8: murchison@psu.edu (Penn state)
  Here at Penn State, we are experiencing problems between the LineLink and out Telebit T3000 modems. For reasons yet determined we cannot establish LAPM and/or V.42bis connections, and the LineLink falls back to MNP(1-4, 5). We do not want MNP to be used with the PPP dialup service and users should enter the following command to ensure that MNP does not get enabled: AT&F3\N5%C0 We are currently looking into a solution so that users of the LineLink will be able to participate in the benefits of LAPM/V.42bis connections with the Telebit T3000's.

* Case 9,10: ihochman@mail.sas.upenn.edu (Ian Hochman) tjprestero@ucdavis.edu (Timothy Prestero) writes: The modem dials fine. Once it gets to the connect phase, I get the familiar static of the connect phase. The static part goes through three sort of noise levels (at 14,400 connect speed or better), but on the third set of static, where my modem usually stops and connects , it keeps going until the other phone line hangs up. You're probably trying to connect to a Telebit 2500 or 3000 modem. Tech at Prometheus told me that the newer LineLinks (read: any manufactured later than 1993) are incompatible with the Telebits. They claim to be working on a fix, but I wouldn't hold my breath at $99 a pop.
  Note: Ian has both ROM version 1.0 and 1.3 Linelinks. 1.0 ROM Linelinks apparently don't have this problem , 1.3 ROMs do.

* Case 11: harry@hjwmac.DIALix.oz.au wrote:
  I'm having troubles connecting to a Rockwell chip'd MODEM (Avtek) at anything greater than 4800. I have successfully connected @ 14400 to various other MODEM's such as a Maestro 288FM, Netcomm M11F and a Dataplex 596 (all of which are Australian manufactured). The setup string I use is as follows ;
  AT&FS37=11M1W2B0\V1&R1

* Case 12: Orchard@irl.cri.nz (Ian Orchard)
  I'm on to my 4th sample and it still won't raise it's carrier speed higher than 4800 baud when communicating with First Class or ARA. Comms with Zterm sometimes manage higher speeds but it's spasmotic.

* Finally: From ROB WINIKE (Prometheus Tech support):

> My manager says ATI3 is the only command that gives the ROM
> version of the LineLink. The v.2.2 you are referring to must
> have something to do with Sierra's notation about voice commands.
> They just don't apply to the ROM that's used in the modem. I know
> that's true, because when we get non-connect problems with the
> v.1.3, we cross-ship a new LineLink with ROM v.1.0.

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Power Supply/ FCC license
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  The LineLink itself is in a plastic case so is more prone to RF
  noise than a modem in a metal case. The modem itself only has a
  FCC Class A license as opposed to a Class B rating. (Apparently
  this means commercial rather than residential use. )

  Keeping the modem away from other devices is a reasonable
  precaution though so far I personally have had no trouble in that
  area.

  The included power supply "brick" is a 120 volt AC input to 9 Volt
  AC, 1 amp, 15 watts output transformer.  Its UL listed , however
  one person reported that his power supply burned up (literally!).

  One person in Norway used a 9 volt DC, 300 milliAmp transformer.
  The modem responded to commands but the MR and CD light went out
  when the modem went off hook. Some people think the power supply
  is too weak, given that the modem works at all this grossly
  underpowered, this is probably just a wild conjecture at this
  moment.  No one has reported substituting a higher amperage power
  supply.



  Interference and RF noise could easily occur with any transformer
  so the idea that placing the transformer far away from other noise
  sources might help is again reasonable.

  People have cited following problems

* Modem stops working when nearby appliance turns on/off.

* Modem MR light goes off and stays off , or just flickers.

* AM station are being played over modem speaker.

* LineLink causes interference with television.

  The above examples represent real hardware problems. Specifically
  overloaded wall outlets with power spikes and RF noise. Plugging
  your LineLink into good noise/surge suppresser might help but
  garbage in garbage out still applys.  On my Linelink it has a 2200
  microfarad capacitor on the circuit board which was much larger
  than I expected which is good!

  If the MR light goes off for short periods of time (i.e. a few
  seconds say every few minutes) don't worry too much. Otherwise
  start thinking about where you might be getting noise and do
  something about it.


NOISE ON PHONE LINES
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  People have reported that :
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* Modem works with v42bis connections but not MNP

* Modem won't work over phone lines with appletalk on other phone line pair.

* Rewiring phone cable fixes problems.

* Long distance calls unreliable.

  Usually these symptoms are accompanied with the MR light going on and off.

  Some of the problems may be associated with the 1.3 version of the ROMS.

  The majority of "noise" problems seem to be poor software setup. Some "noise" problems seem to be incompatible modems on other end. Some seem to be real problems with the modems. The Linelink seems to be similiar to other modems near its price in handling noise. It may be slightly below average.

  Keep in mind there is a lot of noise and very limited bandwidth on many existing telephone lines. Note that ISDN will help in the future making present modems obsolete. Some telephone companies are now digitally compressing (lossy) so they can cram more calls into the available bandwidth while claiming better sound quality. This essentially translates into more (effective) noise from the modems point of view.

  The LineLink is MUCH better than a conventional 2400 bps modem or even a 9600 bps modem without V.42 error correction in its ability to handle noise on the phone line. All high speed modems are sensitive to noise, its only a matter of degree.

  On my modem I have successfully transferred data even when I pick up the portable phone and keep it off the hook. It retrains (MR light goes off and modems renegotiates, MR light comes back on). It then transfers at a slower rate. If I talk into the phone too long it will disconnect. This is exactly what it should do. I have even used it during lightning storms (Yeah I know I shouldn't do that!).

  Bottom line is if you are using average or better phone lines and don't expect miracles you should be quite happy.

  Noisy lines MAY give trouble. Avoid this modem if you do much long distance, unless you plan on buying , trying it and returning it if you are not satisfied. (Most people ARE satisfied)

Cables and Hardware Handshaking

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  Your modem "talks" to your modem at the serial port "DTE" speed
  typically 19200, 38400 or 57600bps set in your terminal program.
  Your modem then "talks" over the phone line to the remote modem at
  the "DCE" speed (typically 14400bps but compression can
  effectively increase the useful speed) and finally the remote
  modem can talk to the remote computer at a possible different
  "DTE" speed.

  Handshaking is a method for the modem to tell the computer to stop
  sending data to it or the other way around. Its needed because at
  the modems and computers are transfering data at different speeds.
  Note its not NEEDED at 9600bps and below though it sure helps.

  Imagine, a road ending at a river with a ferry crossing.  If the
  traffic on the road is light and slow so the ferry always makes it
  across in time for the next car you don't need a gate, or a stop
  sign or stop light for traffic!  If its heavy or fast traffic or
  if the ferry operators go out for lunch you better have one, or
  the cars will end up in the river!

  Software control has the computer and modem sends the DC1 and DC3
  characters and is called XON/XOFF flow control. Software control
  is less reliable than hardware flow control and also those two
  characters can't be used for other purposes.

  The analogy above would be stop lights and a gate at the ferry
  crossing are hardware flow control and stop signs are software
  flow control. Both serve the same purpose but stop lights and a
  gate are clearly better than stop signs in both speed and safety.

  Modern software allows you to use hardware flow control and there
  is little reason to use software flow control if you have an
  option. Unfortunately you may NOT have an option with some
  software. In any case hardware flow control uses two pins on the
  modem, CTS and RTS.


  The CTS pin on the modem is used to output a signal to the
  computer to indicate if the modem is ready or not to receive data.
  Since the modem is normally MUCH slower than the computer serial
  port at sending data this flow control is almost ESSENTIAL at
  speeds above 9600. This type of hardware flow control is called
  CTS hardware flow control.

  The computer outputs a signal that is received on the modem's RTS
  pin. This is used to indicate if the computer is ready to send or
  receive data. This type of hardware flow control is called RTS
  hardware flow control. Its not quite so critical as the CTS
  hardware flow control since computers are much faster than modems.
  However the computer may be busy doing something else and not have
  time available to get the data before it overruns the buffers.

  For data connections always use CTS and RTS flow control if
  available. However for Fax the situation is a bit trickier. The
  following information is from several sources:
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> During fax mode, the DTE-DCE port speed is 19200 bps.
> The DCE provides a speed buffer of 1024 bytes and provides
> DC1/DC3 (XON/XOFF) or RTS/CTS method of controlling the data
> into the buffer.  This flow control is controlled by AT&K3 or
> AT&K4 command. This method of data low control is available only
> for DTE to DCE direction of data. There is no provision for data
> flow control from  DCE to DTE.

  In english, DTE to DCE data means Mac to Modem data. This means
  the modem can signal the Mac to stop (via CTS or XON/XOFF). RTS
  isn't being used for flow control contrary to what the term
  "RTS/CTS method" might indicate. So for faxes in fax mode the RTS
  pin is not functional. This factoid will be important as we
  discuss hardware hangup later on the Macintosh.


  The modem also has a pin called DTR that can be set to hangup the
  modem (via command &D2) when its activated or go into command mode
  or other neat stuff.


  On a PC, Amiga, or Unix box you connect the RTS pin on the
  computer to the RTS pin on the modem, the CTS pin on the computer
  to the CTS pin on the modem, DTR to DTR etc etc.  Thats just a
  standard RS232 serial cable. Usually just called a  PC modem
  cable. PC users should just use factory defaults and add &D2&C1 in
  their init strings and set hardware handshaking, hardware hangup,
  hardware carrier detect, etc all ON in their programs.  But keep
  reading anyways if you use a Mac or bought a Linelink sold for use
  in the Macintosh market.


  On the Mac things are a bit of a mess (PC users don't gloat yet,
  at least we don't have to replace UART chips!) In 1984, Steve Jobs
  chose to use a subset of the RS422 standard when the Mac was first
  introduced and a nonstandard 9 pin connector (DB9). Macs since the
  MacPlus use a still weirder 8 pin mini-din connector (or a
  backwards compatable 8 +1  mini-din connector on AV's , PowerPCs
  and newer Quadras).  The names of the handshaking pins on a Mac
  are now called HSKout and HSKin (Handshake in and out). HSKout
  stands for handshaking out,  HSKin stands for handshaking in. In
  full hardware handshaking HSKout is used for RTS flow control and
  HSKin is used for CTS flow control.


  On the original Mac 128, 512K, and 512KE only have the HSKout
  (CTS) pin for handshaking. Later with the advent of the MacPlus
  the RTS pin was added.  Early documentation from Apple (i.e. the
  MacPlus) called the HSKout pin on the MACINTOSH side the DTR pin.
  The reason for that was that old 1200 and 2400bps modem cables
  used that pin to connect to the DTR pin on the modem side for
  hanging up the phone. RTS handshaking wasn't used at all at that
  time since the fastest speed you would ever likely use at the time
  was 9600bps.   That same HSKout pin is NOW being used for RTS flow
  control on a modern modem. So some old (and not so old!) software
  will refer to RTS handshaking as DTR handshaking!  Yes its
  confusing, which is probably why apple changed the names to HSKout
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  and HSKin.

  A correctly wired Hardware Handshaking Cable for a Macintosh is as
  follows.(Apple Recommended)  Zterm manual and the Apple Modem Tool
  have nicer pictures.

  Macintosh Mini DIN-8 (male end of cable that plugs into Mac)
>         6   7   8
>         o   o   o
>        o3   o4   o 5
>           o    o
>           1    2


> Mac DIN-8         Modem (DB-25)
> 1 (HSKout)    ->  4 (RTS) +  (optionally) 20(DTR)
> 2 (HSKin)    <-   5 (CTS)
> 3 (TxD-)      ->  2 (TxD)
> 4 (GND)      <->  7 (Signal Gnd)
> 5 (RxD-)     <-   3 (RxD)
> 6 (TxD+)          NO CONNECTION
> 7 (GPi)      <-   Pin 8 (DCD)
> 8 (RxD+)     <-   7 (Gnd)


  The above cable has no real disadvantages **IRREGARDLESS** of what
  modem you are using. It has many advantages which is why Apple has
  recommended this cable for years.



  Modem 20(DTR) pin ON the modem is used to hang-up the modem and/or
  go into command mode.  Pin 20 MUST obviously be hooked up to have
  hardware hang-up of the modem work. At any given time IF the modem
  is setup correctly and you have a cable like above or equivalent,
  you can use either RTS flow control or hardware hangup but not
  both.


  Software hangup works just fine 99% of the time so hardware hangup
  is VERY optional. RTS flow control is much more important in most
  situations so use it!


  Hard and fast rules on the Macintosh for data calls.

* You can always use &D0 in the init string (the default) and
  software hangups.

* If you use either &D1,&D2,&D3 then you must use &K0 (no flow
  control) or &K4 (software flow control) or corresponding /Q
  commands when using data calls.

* If you use &K3 (the default) then you MUST use &D0 (the default).

  Generally the simplest way to work is to set the modem to always
  ignore DTR (AT&D0 which is the default anyways) for data calls and
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always use CTS and RTS flow control. And always use software hang-up to hang up the phone. (See section "Escaping, Software Hangup and TIES") If you do this then fact pin 20 is hooked up is immaterial (and why it is labeled optional above).

For faxing, since RTS is ignored the rules change slightly. &D2 is quite safe in fax mode until you return to data mode. Also because the DTE (serial port) speeds are 19200 or less for fax Xon/Xoff flow control isn't so bad. Some fax software also doesn't do hardware flow control.

So far the above applies to ANY high speed modem on the Mac. The problem is the serial ports on the Mac, not the modem.

Now here is where it gets interesting in terms of the LineLink. There is a big mix up of cables, modems and misinformation.

For unknown reasons Prometheus generally sends out modems sold for the Macintosh market with pins 4 and 20 jumpered and a cable with only pin 4 or pin 20 connected. Thats equivalent to the apple recommended cable for purposes of using it on a Mac but bad news if you want to use your Mac modem on a PC or use the Prometheus supplied cable with another modem even a Linelink sold for the PC market.

There are at least 3 correct but different Mac to Modem cables that were shipped with the LineLink. At least 2 wrong styles also. Two "correct" cables require an internal jumper to be in the modem. I suspect that modems that shipped after roughly DEC 15 1993 will have the jumper. The jumper is reported to be blue but I strongly recommend you look carefully before messing with your modem, they may not all be BLUE! Instead use an ohmmeter to determine what the jumper does. If you don't know how you shouldn't be doing the modification!

The first cable I received was wired exactly as above except the Mac GPi pin was not connected to modem (DCD) pin. This is only a very minor inconvenience except when the modem is used unattended.

The second cable I received did not have the modem DTR pin hooked up. This second type of cable seems most common of those people who actually checked the wiring (though this may be biased sample). This is an OK cable if hardware hang-up is NOT used (i.e. default &D0). Its fine on most LineLinks that have internal jumper installed (see later). Do NOT use this cable on other modems if you want to use hardware hangup!

The third type of cable that has been reported to me is one where the modem RTS pin isn't hooked up but DTR is. This type of cable is real bad news!!! Yes it works fine on LineLinks with internal

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  jumpers but it won't on LineLinks without the jumper or almost any
  other modem. Do NOT use this cable on other high speed modems!




  Thats the actual observations. The following info is summary of
  info received from Milt Sagen at Prometheus.
> There are three cables whose inventory tracking numbers are
> CBL-06, CBL-10, "ZOOM cables". All SHOULD be wired as above
> except the jumper between 4 (RTS) and 20 (DTR) may or may not
> be present. CBL-06 cables will only work with the modems that
> have the internal RTS-DTR jumper. To determine if yours does
> look on bottom of modem. These modems are marked "LineLink 14.4
> (MAC)" on the label. Gpi is supposed to be hooked up on all
> cables that met specs. All cables are hardware handshaking.

  In my case my modem has "LineLink 14.4" on the label on the bottom
  of modem case. It should not have the jumper. Its factory default
  is &R0 not &R1 as the manual states.

From the manual
  &R0  PC Mode. DTR and RTS signals function normally.
  &R1  Mac Mode. When the modem is configured for bi-directional
  RTS/CTS flow control (&K3 or \Q3) the DTR signal is recognized as
  RTS by the modem. DTR and RTS signals function normally with all
  other &K or \Q settings.

  **ACTUALLY** &R0 and &R1 are equivalent , i.e. they both do
  nothing (Milt Sagen from Prometheus). Official word from
  Prometheus (Mark Smith) is "At this point, the &R command is not
  an implemented command.  It is one of those things that they
  planned to put in and so the documentation refers to the command -
  but the modem does not actually respond to this command in the
  manner described."


  Bottom line is that if you have a modem with label LineLink 14.4
  (Mac) on bottom any of the above cables should work since you
  should have the jumper internally. If you want to use the LineLink
  with a PC , then buy the PC version from MicroWarehouse and buy a
  cable built to Apple specs for your mac. (Your PC software
  definitely won't like the jumper ). If you have one of the
  earliest LineLinks then check your cable.

  Now to provide a speculative (but educated) guess as to the
  problems. The CBL-06 cable may have mac pin 1 to mac pin 20 (DTR)
  but rest like Apple recommends. Any one care to confirm? ASSUME
  CBL-06 cables were ordered with the intent that &R would be
  implemented and default set at &R1 (as per manual). ASSUME the
  cables were wired with Mac (HSKout)  ->  20(DTR). Which would have
  worked if &R1 were implemented. Now the cables and the modems went
  out without &R1 implemented some other cables (CBL-10 etc) were
  sent out with this first batch of modems. People who received
  CBL-06 cables couldn't use Hardware handshaking since RTS wasn't
  hooked up. (Ouch!!). ASSUME Prometheus has a ton of CBL-06 cables
  in the warehouse, they start manufacturing LineLinks with the
```

internal jumper connected i.e. "LineLink 14.4 (MAC)" these LineLinks work as they should with CBL-06 (or CBL-10 or ZOOM). All’s great except for the old stock with "LineLink 14.4" which gets mixed up.

End speculation , back to facts.

If the modem works and connects with another modem with init string AT&F&Q0, NO handshaking and terminal program set at 9600 bps at speeds up to an including 9600 bps, then the modem is probably OK. Also do the self tests mentioned elsewhere.

If at 19200 bps and AT&FW1L3&C1S7=60 as the init string if it doesn’t connect and stay connected using hardware handshaking then suspect a bad cable and a good modem

Prometheus was good about trying to get this straightened out, it was a real mess the first two months It actually dragged out far longer than it should have however. To be fair most modem manufacturers seem to get this wrong at least periodically and most sales droids in apple dealers are clueless and will sell you any cable that looks the same. Its a common , common problem!

Escaping, Software Hangup and TIES

Escaping is the process of making the modem going into command mode to accept modem commands when the modem is actually in data mode (i.e. transferring files etc).

In order not to accidentally trigger some nasty behavior in Linelinks and other TIES modems, I am going to write three pluses +++ as + + +, i.e. with spaces. This is only so the file can be easily uploaded, don’t include spaces when typing.

Using the notation in the manual:

<CR> represents the carriage return (or enter) key.
(ASCII code 13, Control M)
<GT> represents a guard time which is a delay before and after the escape sequence. The guard time is stored in register S12 in 50th of a second. Hayes standard has 1 Second (S12=50). LineLink has S12=40 by default. You can reset S12 to 50 if you like. Note that the S-register info on S12 given in the document on the Prometheus BBS contradicts the manual on the behavior of the second guard time.

The Hayes standard escape sequence "<GT>+ + +<GT>" lets you return to command mode without breaking your connection with a remote modem. So to escape you wait a second or two, type three pluses then wait a second or two. You will then see an OK (unless you were already in command mode to start!)

The Linelink also uses a second method of escaping called **Time

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  Independent Escape Sequence** (TIES) that consists of
           + + +AT<CR>
  typed at any speed with anything before or after it.

  It would be **IMPOSSIBLE** to upload this file with a Linelink if
  the TIES string in it because it would make the modem go in
  command mode! In other words if you are trying to transfer a file
  that "happens" to have this sequence of 6 ASCII characters it will
  stop in mid transfer. The program you are using is then likely to
  hang (because it still thinks the modem is in data mode).  This is
  dangerous behavior. There is no warning and if it happens on a
  file it happens each and every time. To be fair the half life is
  gigabytes of random ASCII data before you would expect to trigger
  the behavior. But real data is not random! None of this behavior
  is really that important in practice. Just be aware of the remote
  danger. Ignoring Hayes propaganda test files and documents on
  modems you are unlikely to trigger the behavior accidentally with
  real data. Avoid getting in the habit of using this second method
  of escaping since its also nonstandard.

  Rumor has it that TIES was created to avoid paying Hayes a royalty
  (3% of modem price according to a Hayes employee) on the patent it
  holds. For more details, look at the July 1993 issue of Byte ,
  page 184. "Escape sequences ..."


  Two nice things about TIES are that the escape sequence gets you
  the OK response message even if you start out in command mode,
  also the sequence is quick so that you don't have to wait very
  long.


  Do the following sequence for normal software Hangup
   1) Wait a second or two
   2) type + + +
   3) wait a second or two
   4) Type ATH then the return key.

  The notation that is used in the manual for this is
      <GT>+ + +<GT>ATH<CR>

  The Linelink is the only modem I have heard of that uses both the
  TIES and Hayes escape methods. It seems it produces some quirks!
  My experiments with the LineLink using Zterm produce the
  following. With S12=200 (the default value of 50 is too fast for
  me to type and be sure I am doing it right!), I got the following
  behavior

+ + +AT<CR>  escapes largely independent of where and when EXCEPT

+ + + +AT<CR>  doesn't escape.

+<GT>+ + +<GT>  doesn't escape either!


  The Linelink then has truly weird behavior when doing combinations
  involving four pluses in a row. That means the Linelinks will
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  escape when other modems would not escape (TIES) and will NOT
  escape in other situations that other modems would (four pluses in
  a row).


Setting up your linelink for the first time!
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  Obviously plug every thing in like the manual shows. The phone
  line from your wall goes in the LINE phone socket not the PHONE
  socket. (Easy to do when you aren't looking at the back!) Turn on
  the power etc.

  Load any communication program. If needed install your
  communication program(s) including any needed resources.

  When you first get your modem, do the following commands. Redo
  these commands if your modem "Misbehaves" for no apparent reason.

  If you are using a Commtoolbox based program (Like Communicate
  Lite or ClarisWorks or Sitcomm). Select the Serial Tool and NOT
  the Apple Modem Tool for these commands. Open a connection. (Which
  is now letting you "talk" directly to the modem I hope!) Other
  communication programs not based on the Commtoolbox will normally
  "talk" directly to the modem.


 ATZ
 AT&F
 AT&F0
 AT&F3
 AT&W0
 AT&W1
 AT&Y0

  The command ATZ resets the modem.  It resets data settings based
  on non-volatile memory settings. It does NOT reset all Fax and
  voice settings but it does reset some.  Furthermore it does NOT
  necessarily restore data factory defaults unless you do the above
  procedure.  The commands &F , &F0 and &F3 resets the active
  profile to factory defaults. Prometheus says they are identical
  but it pays to be paranoid at least once. AT&W0 and AT&W1 save the
  active profile to the two permanent storage locations
  (non-volatile memory) so next time you power on your modem (or use
  command ATZ) you will be at factory settings automatically. AT&Y0
  selects the first non-volatile memory settings as the default on
  next power up.

  **DO THE ABOVE OR YOU MAY REGRET IT!!** You have been warned!!



  The command AT&V will display the present settings. For reference
  on my modem at 57600 bps  (which was purchased in Sept. 93) at&v
  gives the following  for the ACTIVE PROFILE ( slightly reformatted
  to fit)
```

```
ACTIVE PROFILE: B1 E1 L2 M1 N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3
&L0 &P0 &Q5 &R0 &S0 &T4 &U0 &X0 &Y0 \C0 \G0 \Q3 \T000 \V1 \X0 %A000
%D2 %E1 S00:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:040
S08:002 S09:006 S10:014 S11:075 S12:040 S14:AAH S16:00H S18:000
S21:00H S22:76H S23:11H S25:005 S26:001 S27:49H S36:007 S37:000
S38:020 S46:138 S48:007 S49:010 S50:200 S63:000 S82:128


  There are some differences between shipping modems, you can
  compare it with the manual defaults, &R0 is commonly different as
  well as \V1.  Don't worry if you have &R1 instead. If \V0 is your
  default then anywhere you see &F in this FAQ use &F\V1. I will NOT
  include it since the vast majority of modems are set at \V1.

  You ~can~ subsitute &F plus your personal preferences for the
  default settings above. Specifically to reset with ~my~ personal
  preferences try the following


 ATZ
 AT&F\V1&C1W1L3
 AT&F0\V1&C1W1L3
 AT&F3\V1&C1W1L3
 AT&W0
 AT&W1
 AT&Y0

  where the reasons why I chose the string &C1W1L3 is explained
  elsewhere in the FAQ. S7=60 would be included also but isn't saved
  to nonvolatile memory on the Linelink.


Testing Your LineLink
---------------------
  How to test your modem . Most of Procedure is from tech support
  First this is a very incomplete test. If it fails send the cable
  AND modem back. If it passes you still may have a bad cable or
  more rarely a bad modem . First follow procedure in section
  "Setting up your linelink for the first time"

  Use provided Mac to modem cable. Turn power on Modem , Mac etc.
  You need not plug in phone line to do test. Start up terminal
  program.

  If you are using a Commtoolbox based program (Like Communicate
  Lite or ClarisWorks or Sitcomm). Select the Serial Tool and NOT
  the Apple Modem Tool. Open a connection. (Which is now letting you
  "talk" directly to the modem I hope!) Other communication programs
  not based on the Commtoolbox will normally "talk" directly to the
  modem.

  Set your terminal software to 9600 bps (or lower). 14400 bps won't
  work at all. 19200 will work on some of this but not all.  Don't
  enable hardware or software flow control in your software. {Should
  work with flow control but if your cable is miswired it will
  complicate the test of the modem }
```

```
The test procedure is shown below.

  I added some comments and put prompts "You>" and "Modem>" in.
  Don't type "You>" and "Modem>" or the comments.  + + + should be
  typed without spaces and a short delay before and after it. Type
  in carriage returns on input.
    You> Means you type the stuff that follows.
  Modem> Means the modem responds with this line.
  !      Means this is a comment I added to clarify what is going
  on.

  Excluding prompts and comments this is exactly what happened on
  mine (at 9600 bps)

  You>ATZ              !resets modem as if it was turned off
Modem>OK
  You>AT&F3            !loads factory default settings
Modem>OK
  You>AT&F             !loads factory default settings
Modem>OK
  You>AT&Q0            !This puts it in asynchrous mode.
Modem>OK
  You>AT S18=0         !Should be redundant
Modem>OK
  You>AT&T8            !Self test. Modem flashes MR light.
  You>+ + + AT&T       !escape + + + (No spaces) Turn self test off.
Modem>000              !000 means zero errors were detected.
Modem>OK
You  >AT&T1            !Another test where it echos what you type
Modem>CONNECT 9600
You  >This is stuff I typed in. + + +
                       ! Should echo everything you type until you
                       ! escape with + + + (No spaces)
Modem>OK
 You >AT&T             !Turn self test off.
Modem>OK
  You>AT&F             ! Just putting it back to factory defaults
Modem>OK

Typical Session
---------------

  The following is Hayes BBS's phone number which is obviously a
  good place to call to test your modem.  Please do try local phone
  numbers first and read some of Hayes advertising out of courtesy.

   Hayes BBS (800-874-2937).



  I used zterm, with hardware flow control on. Hardware hangup OFF.
  bps rate set to 57600 (try 19200 or 38400 on a slow mac). Here is
  EXACTLY as it appears on the Hayes BBS as I dialed in.

AT&FW1L3&C1S7=60
```

```
OK

ATDT 18008742937

CARRIER 14400

PROTOCOL: LAP-M

COMPRESSION: V.42BIS

CONNECT 57600
```

Note we have a LAP-M error correction and V.42BIS compression . The carrier is 14400 which means we have v32bis. The connection between my Mac and modem is 57600 (which is what I set it to). If you get different responses above it is very likely that the modem on the other end doesn't support one of the above standards, or is not set up correctly.

Know what you are dialing into. If you get a 9600 bps connection on a modem that someone claims to be 14.4K , maybe the modem on the other end doesn't use V32bis but an older proprietary format. Flow control problems at EITHER end often allow connections at lower speeds and unreliable connections at high speeds. As 28.8K modems become more common though who knows!

Basic Data Communication Software Setup on the Macintosh

Intoduction and Background

First read section about setting up your LineLink for the first time. In both the manual and this FAQ. Then precede. Be **sure** to start from factory defaults. You did read the above section "Setting Up your LineLink for the first time" right? Also remember some programs mess with your nonvolatile modem settings so it pays to be paranoid.

Any mac can handle 19200 bps comfortably (EVEN the 128, 512, 512KE). Even a MacPlus can comfortably handle 57600 bps if using finder, no appletalk on, disk cache below 128K etc. So start with 19200 bps and move up if everything works.

* In programs there is generally a dialog box that lets you input a string that is sent to initialize the modem. Call this the init string. You may have to type the string manually. Generally the string that works and gives you what you want is

```
AT&F

  a better string is

AT&FW1L3&C1S7=60

  &F  MUST be FIRST in the string after the AT.  (ESSENTIAL)
  W1  Gives more detailed info on the connection especially error
      control and compression.  May confuse very old and stupid
      programs that just look for CARRIER instead of NO CARRIER.
      but not very likely.  (VERY VERY useful)
  L3  Turns up the volume to highest level. (L2 is default, Very
      Optional)
  &C1 Makes the carrier detect light on modem do exactly that.
      More and more programs can also detect carrier (on the GPi
      pin) Hence its used (or needed) in some modern programs.
      For older programs its ignored.  In any case its helpful and
    can't hurt NO reason not to use it, I ALWAYS do

S7=60 means modem has 60 seconds when calling out to get
      a valid carrier before hanging up.  The default is 40
      seconds. My LineLink connects in about 17 seconds after the
      other modem answers the call so 40 seconds is usually
      enough. 60 seconds eliminates many problems and adds no new
      ones. (ESSENTIAL for some people). For international FAX
      calls S7=120 is suggested.
      Linelink documents indicate 60 is maximum, 90 seems to work
      but be conservative and try 60 before trying 90.


* Often the program needs a "Modem Reset" string. I generally use
  the same string as above possibly with H at the end to hangup.
  You can use ATZ (or ATZ1, ATZ2) but it **may** introduces problems
  in Fax or Voice. Some Fax and Voice settings are reset by ATZ and
  a few are NOT. You can end up in very unstable situation.



* If the program needs a "Hangup string" just use ATH.


  Also be aware some programs DON'T want the AT in the string (i.e.
  they put the AT in by default). Look at an example in the software
  manual.


* You want hardware handshaking enabled for both input and output.
  CTS handshaking is output hardware handshaking. RTS is input
  hardware handshaking. A few programs call this DTR handshaking
  (UGH).  If the program just has a setting called hardware flow
  control its about a 50/50 chance whether its CTS only or both CTS
  and RTS handshaking. The point is that ALL available hardware flow
  control should always be used IF available.

  One exception is on the Mac 128K, 512K and 512KE there is no
  HSKout pin so you can't use RTS handshaking on those models.
```

(Actually you can still set it but since the pin isn't there so it has no effect). People have reported running at 57600bps with a 512KE even with this handicap.

* Don't use SOFTWARE handshaking (also known as XON/XOFF flow control) unless Hardware Handshaking is NOT available. Add &K4 to init string of the offending program and use XON/XOFF flow control in software, in zmodem protocol use the "escape control characters" option. Now pray because you will need help for this to work reliably.

* Don't use both software (Xon/XOFF) and hardware handshaking !!!

* Don't use hardware hangup to hang up the phone for data calls use software hangup. (Might be called DTR hangup or such) Yes, DTR is used for two different things which is why there is such a mess on the Mac. (Apple also renamed the pinouts a couple of times!) A lot of people/software include &D1, &D2, &D3 etc in init string these are all some form of hardware hangup using the DTR pin. The mac output pin is being used for the RTS pin so its not available when doing high speed transfers! (&D2 is OK in the Fax software itself but don't use it in your high speed data programs!).

Generally if there is an option for hardware hangup the software already knows how to hangup with software so just turn off hardware hangup and don't go messing with the &D commands, leave it at the default of &D0! To manually use software hangup see section "Escaping, Software Hangup and TIES"

If you get garbage on your screen after the other modem answers
----

Double check to see if hardware handshaking is being used.

Double check the parity etc. used in terminal emulator /comm program.

Most computer systems use 8 data bits , 1 stop bit and no parity.

IBM mainframes commonly used 7 data bits and even parity.

Check to see if your terminal type is correct.

Generally Unix systems will use either VT52, VT100, textronix etc. If you are calling an IBM-PC or most bulletin board systems generally either TTY or ANSI or ANSI graphics will be the appropriate terminal type.

The voice mode does this also so try turning the modem off and

```
  disabling the voice software and see if that fixes your problems.





More exotic data settings
-------------------------
  Some people prefer to use W2 instead of W1. This could confuse
  some dumb programs.  Programs that autobaud generally look at the
  connect speed as the DTE (Mac) speed which is the only relevant
  info for the serial port connection to work. W2 returns CONNECT
  14400 even if the DTE speed is 57600. W1 gives the most
  information. W0 gives the least confusing information from the Mac
  programs point of view,i.e. minimal information. W2 gives less
  information than W1 and a different interpretation of CONNECT. If
  W2 works in your software then go ahead and use it if you like it.
  Largely a personal taste issue.


  If you want to disable v42bis data compression while still using
  error correction add S46=136 to the string.  Using v42bis
  compression will NOT significantly slow down data transfers even
  when sending pre-compressed data. Only MNP compression has that
  problem.  Disabling compression is not recommended except in
  unusual situations. Since ARA uses MNP IN SOFTWARE its usually
  recommended that v42bis be disabled in that case. (That almost
  always done in the ARA script file so don't look for it in any
  dialog boxes!).

  Disabling v42 (error correction) is almost always a bad idea in my
  opinion.




  If your phone line is an old leased PBX system or some other weird
  system you may need to add S63=x where x=0 to 15 and represents
  how much to decrease the carrier output. The default is 0 and
  should be increased by 3's.  Very unlikely to be needed. This may
  be needed in countries other than the USA also.


  If you are in the United Kingdom or HongKong add  &P1 to the
  string. Have no idea what other countries this applies to!

  You could save these settings using AT&W0. For instance
AT&P1&FW1L3&C1 S46=136 S7=60
AT&W0
AT&Y0
  Would save personal settings appropriate for someone in the United
  Kingdom who dislikes compression. Note S7=60 still needs to be in
  any future init strings since S7 register is **NOT** saved in
  non-volatile memory on the LineLink.
```

If you have a very noisy phone line you can add S10=30 to your init string. This allows up to (30-6)/10 = 2.4 seconds of really bad noise before losing your connection. The default is 0.8 seconds. Increase only if you must and only by as small amount as you can get away with!

Check section "My Modem only doesn't connect at XXXX baud" on problems with version 1.3 ROMS and for examples of more detailed control of speed, error control and compression features.

Macintosh System Software

Remember all software has bugs, until proven innocent!

Inits/Extensions/cdevs can cause problems and slow the system down. Mouse , appletalk have higher priority than serial port. Hence activity there can cause trouble in downloading/uploading. So if possible turn off appletalk and all inits as well as networking software.

If you are using system 6.x , use Finder instead of Multifinder.
If you are using system 7.0 , try 7.0.1 with system tuner 1.1.1

If you are using system 7.1

* Use a small disk cache less than or equal to 128K. (Set it in memory control panel). There is a known bug in Apple's disk cache. Not fixed in hardware update 3.0. This effects network software also. They claim its fixed in System 7.5.

* Avoid virtual memory if possible.

* Use hardware update 3.0. which includes fixes for the serial port on some models.

Generally , faster macs respond faster and have fewer problems. However, I have used a MacPlus by using system 6.05 under finder. The MacPlus is only 25% slower than a quadra 605 for downloads and uploads under favorable conditions.

Are there any system 7.5 tricks??

How do I set up Macintosh Program "XXX" for the LineLink?

MacKnowledge

```
  ** Warning!!!! MacKnowledge is not 32bit clean Warning!!!! **

* If you are using system 7 or later go to the memory control panel
  and turn off 32bit addressing!

* Install software as per instructions in manual. Start your Mac
  with extensions off (i.e. shift key held down if system 7.xx).

  Lots of people have been using the string that MacKnowledge auto
  configures for use in Macknowledge and other programs. **Come on
  people** look at the copyright (~1989!~) on the splash screen.

  Settings are under the "Phone" menu i.e selection "Modem Control
  and Configuration"

  On my modem after auto configuring MacKnowledge suggests
  ATL2M1X4Q0V0W1E1S0=0H0

  AT&FV0W1H0 would have done exactly the same thing and been much
  safer. V0 gives numeric responses which is what MacKnowledge
  REQUIRES which is unusual for modern software but common years
  ago.

  H0 hangs up, which isn't a bad idea to put in an init string but
  not a good idea if you switch between telecom programs on the same
  call. MacKnowledge suggests \N3\V1\Q3 for turning on error
  correction. N3 turns on MNP error correction but not V42 or LAPM.
  So real bad !!!

The right way to do it.

* First select Hardware Handshaking.

* Init string AT&FW1L3&C1S7=60 Nothing for either error string.

* If you want to be fancy
 \N6 for error control string
 \N0 for non error control string.

Actually why would you not want error control ?

Works fine even at 57600 bps.

  Not much good without zmodem protocol or commtoolbox features but
  it works fine as a terminal emulator and for xmodem transfers. Use
  this program to download other better communication programs such
  as zterm, TelefinderPro or Communicate Lite demo. Check out the
  Communicate Lite section especially. As of this writing Mark/Space
  was considering an agressively priced competitive upgrade to
  Communicate Lite for MacKnowledge owners.(Call for details).
  Competitive upgrades to other commercial software are Sitcomm
  ($45) and Microphone Pro 2.0 ($79). Also consider the shareware
  alternatives Zterm ($30 or $40) and Telefinder Pro ($15) which are
  quite good also but are not Comm Toolbox based.
```

```
ZTERM 0.9 or 1.0 beta
---------------------
  The zterm program and the zterm FAQ may be found on info-mac or
  umich archive mirrors as

/infomac/Communication/term/zterm-10b3.cpt
/infomac/Communication/info/zterm-faq-16.txt
/umich /mac/util/comm/zterm1.0b3.cpt.hqx


  as well as probably a zillion other places such as

<ftp://ftp.utexas.edu/pub/mac/comm/zterm-10b3.hqx>


  Zterm is a shareware terminal program that supports Xmodem,
  Ymodem, Zmodem file transfers. Automatic MacBinary format
  recognition. Very easy to use , highly reliable, good  (not
  excellent)terminal emulation. If you are going to use this read
  the manual and follow directions. Its a very good manual. Also get
  the zterm FAQ written by Leslie Jones. Between these two sources
  it covers most problems that can occur.



  For those of you who don't read manuals.
  Under the "Settings" menu select submenu "Connection" and do the
  following.
  TURN ON   Flow control: Hardware Handshaking
  TURN OFF  Flow control:  XON/XOFF flow
  Set bps to 57600 or 38400 (For a slow mac use 19200).

  Again under "Settings" menu select submenu "Modem Preferences"
  Set dial timeout to 60
  Turn OFF hardware hangup (DTR)

  So far everything was in the manual!


  For those who have hanging-up problems check what the "seconds to
  redial" box in the dialog which appears when dialing is done
  through the Dial menu, and if it is saying one or two seconds,
  then set it higher to say 5. BTW, you can still see the
  negotiation messages in Zterm if you manually dial using the ATDT
  command in the terminal window instead of using the dialout dialog
  box. Otherwise you won't see them.

  For initialization string.
          AT&FW1L3&C1S7=60^M
          AT&F^M  does work fine also but doesn't give you as much
          information.
  (the ^M is the way that zterm handles the return key)
```

```
  For deintialization string just use nothing. If you use MaxFax and
  want to experiment try AT&FW1L3&C1S7=60+FAA=1;+FCR 1 ^M If you use
  other Fax software or Apple Remote Access (ARA) and want to
  experiment try to duplicate its  FULL init string it wants.


  Fastest speed I have personally seen for compressable text files
  is
> 3000 bytes per second on MacPlus (2.5 Megs, System 6.05, Finder)
> 3400 bytes per second on a MacIIsi (5 Megs, System 7.01 tuned)
> 3800 bytes per second on Quadra 605 (6 Megs, System 7.1)

  For a compressed file the range is from 1200 bytes per second on
  the MacPlus to 1690 bytes per second on the Quadra.

  For binhexed compress files its rather disappointing i.e. the same
  as compressed files (it should be (8/6) times better i.e. 33%
  faster).

  The zterm faq and zterm manual cover most problems so read them.
  (Notice a pattern yet?)

  However one problem isn't covered and is common. If you are having
  trouble uploading to a unix system note the following.

NOTES from rz man page:

>  The Unix "ulimit" parameter must be set high enough to
>  permit large file transfers.
>  The TTY input buffering on some systems may not allow long
>  blocks or streaming input at high speed.  You should
>  suspect this problem when you can't send data to the Unix
>  system at high speeds using ZMODEM when YMODEM with 128
>  byte block works properly.  If the system's tty line
>  handling is really broken, the serial port or the entire
>  system may not survive the onslaught of long bursts of high
>  speed data.

  To fix the problem on the Unix end , buy the system administrator
  a dinner. In the mean time you can get it working but with VERY
  slow uploads. If you have this problem try Ymodem 128 byte
  protocal. If that works then go to the zmodem settings in zterm
  and set the window size to 128.  If that works then try 256, if
  that works then try 512 etc.





TelefinderUser TelefinderPro
----------------------------
  Telefinder-User is a FREE client to Telefinder Bulletin Board's.

  Telefinder-Pro is $15 shareware that is a client also and a fairly
  full featured terminal program.
```

```
  Both files may be found at

info-mac/comm/bbs/tele-finder-pro-222-to-223-updt.hqx
info-mac/comm/bbs/tele-finder-pro-222.hqx
info-mac/comm/bbs/tele-finder-tcp-host-demo.hqx
info-mac/comm/bbs/tele-finder-tcp-user.hqx
info-mac/comm/bbs/tele-finder-user-322.hqx


  Both programs have two default setting for the Linelink. Use the
  hardware handshaking setting i.e. " LineLink 144e-HH".  You access
  this in the Modem Port dialog (double click on the Modem Port
  icon). The settings are essentially &F.  You can customize it if
  you choose to &F&C1W1L3 or whatever.  The user interface is VERY
  professional, however it uses the same interface as the Mac's
  Finder. It MIGHT violate a lot of user interface rules. You will
  probably love it or hate it but probably nothing in between.


  While TelefinderPro ~appears~ to be much more sophisticated than
  zterm 0.9 or Communicate Lite its really not.   For instance,
  zmodem window size cannot be adjusted in Telefinder Pro, its also
  not comm toolbox based. Nevertheless TelefinderPro 2.2.2 would be
  an excellent choice for a terminal program, well worth the $15.




Microphone II version 4.0.3
---------------------------

   (Demo version is what I tried)

  Microphone is a full featured commercial telecommunication
  program.

  Go to Settings menu and select communications. Select Hardware
  Handshaking on. You can use Hayes V-Series/Ultra for the driver or
  just use init string AT&FW1L3&C1S7=60




MacKermit 0.99
--------------

  If you don't know what kermit is then you don't need this program.
  You can find it on info-mac archives or its mirrors. In directory
  info-mac/comm

  Set bps to 19200, or 38400 or 57600 Hardware flow control. ENABLE:
  DTR input flow control. ENABLE: CTS output flow control. Disable:
  Drop DTR on quit. Disable: Xon/Xoff flow control.

  You can type the init string
```

```
AT&FW1L3&C1S7=60

  in the terminal window or create a macro to make it easier.


Terminal 2.2
------------

  This program is only listed here since the "C" source code is
  available. It also lets you directly inspect the CTS value and
  toggle the DTR/RTS pin.  (Lets you partially check that your cable
  is correct).


  Terminal 2.2 is a free terminal program that supports Xmodem,
  Ymodem, Zmodem QuickB file transfer. Automatic MacBinary format
  recognition. Scripts written in a subset of C.   You even get C
  source code for the program!

  Where to get it?  You can find it on info-mac archives or its
  mirrors. In directory info-mac/comm

  Bad news is the terminal emulation is a plain TTY.  I.e it doesn't
  do ANSI BBS or VT102 or even VT52. However it is better than
  Macknowledge for file transfers since it supports Zmodem.

  I have used the program for Zmodem downloads and uploads and it
  works fine but is a little flaky in general. Its also hung on me
  more than a few times. Good enough for occasional use, not a
  program for every day use however.


  Again use  AT&FW1L3&C1S7=60 or plain AT&F.  You will type it
  manually each time or open the macro.m file with teachtext or any
  text editor and change the modem reset string ATZ to
  AT&FW1L3&C1S7=60.  You will still have to select it from the macro
  menu unless you write a script (I am not going to teach you C).

  Go to Options menu select Communications.  In the dialog box
  select the setting CTS & DTR. Try 19200 bps to start. You can try
  57600 bps but slower speeds may be needed to make this particular
  program work at all.


Prodigy
-------
  I tried version 2.1 of the software. First, set your chooser to
  your printer. Turn off the 68040 cache (if so equiped). Go through
  the idiotic installation.

  There is no modem specific info to modify (other than selecting
  9600 baud if the local phone number(s) support it).

  This is a joke right? Have fun runing a poor imitation of a
  "Windows 3.0" interface on your Mac. No desk accesories, control
  panel, standard dialog boxes etc.
```

```
America Online
--------------

  My experience was with version 2.1 of the Mac software as of May
  94.


  First the AOL Tech Support BBS is 1-800-827-5808

  You can download the current AOL software at 14.4K bps. (Free call
  and much faster than 2400 bps)

  There is an ftp site with the AOL software, the AOL FTP software
  and the complete set of modem drivers. The addresses are

ftp://ftp.aol.com/aol_mac/Install_America_Online_v2.5.1.bin
ftp://ftp.aol.com/aol_mac/READ_ME_for_Mac_AOL_2.5.1.txt

The windows software is
ftp://ftp.aol.com/aol_win/icn-aol-logo.gif
ftp://ftp.aol.com/aol_win/icn-text.gif
ftp://ftp.aol.com/aol_win/icn-write.gif
ftp://ftp.aol.com/aol_win/readme.txt
ftp://ftp.aol.com/aol_win/readme.wri
ftp://ftp.aol.com/aol_win/waol15.exe




  Follow installation instructions. Remember the Help menu (in the
  apple menu). Read the instructions there about modem settings.
  Create a modem setting as below.


  The "official AOL" linelink driver uses:

  Attention: AT
  Initialization: Leave it Blank
  Configuration:Q0E0V1X4 Reset:Z
  Enable Hardware Handshaking: &F&C1
  Disable Hardware Handshaking: &F&C1%C0&K0\N3
  Future Use String #1: Leave it Blank
  Future Use String #2: Leave it Blank


  These settings do work but they are not quite optimal. Quoting the
  Help file:

  The Initialization String is needed only if you must initialize
  your modem into the Hayes Command Mode.  Usually, this box is left
  empty.

  The Configuration String is used to optimize your modem settings
  for connection to America Online.

  The Reset String restores your modem to the settings it was using
```

before signing on to America Online. For reset I highly recommend you use &FW2L3&C1S7=60 instead of Z. You can also use &FW2L3&C1S7=60 for your "Configuration:" string. The "Z" can easily interfere with Fax/Voice mail.

If you have problems be sure to check you are calling a 9600 bps access number. Also as of April/May 94 they just don't have the network capacity to handle the load. So for your first attempts try calling on weekday in the morning or very late at night. If you get in occasionally with no problems , it is the network not the modem. Also the AOL software likes to think the serial ports are locked. So to avoid that reboot with no extensions on, start AOL and have fun. If you still are having trouble try disabling Error control i.e. add \N0 to Configuration string and forcing the modem to initiate at 9600 bps.

Communicate Lite and Communicate Lite Demo

```
Mark/Space Softworks
111 West Saint John, 2nd Floor
San Jose, CA 95113

sales 1-800-799-1718 and works from the US and Canada.

Techsupport 1-408-293-7299
Fax         1-408-293-7298
BBS         1-408-293-7290

Internet: mspace@netcom.com
AppleLink, AOL: MARKSPACE
eWorld: MarkSpace1
CIS: 73244,3333
```

Communicate Lite is now bundled with Linelinks and Prometheus manufactured modems. Unlike the previous communication software (Macknowledge) this is actually solid and modern.

See "Comm toolbox based applications" section for setup.

Macintosh Communication Software CURRENTLY supplied is Communicate Lite by Mark/Space Softworks. This is a very competent Comm Toolbox based program. It includes a current copy of the Apple Modem Tool, Serial Tool, the VT102 terminal tool, XModem file transfer Tool, and appropriate Apple Modem settings for the Linelink. Prometheus chose not to license the zmodem tool but there is a publicly available demo of the tool (fully functional except you can't upload). A discount coupon is included on the full zmodem tool when purchased directly from Mark/Space. ($19.95 plus shipping) The program is functional and the user interface is uncluttered, which is the way a term program should be in my opinion. The manual is a real printed one. 64 pages long. Has an index, table of contents, background info, tutorial and full reference. (Actually the Balloon Help in the program is quite sufficient!). Demo versions of Communicate Lite and other Mark/Space products can be obtained via the BBS. The most recent versions of support files and the demos can always be obtained via ftp at

ftp.netcom.com in directory pub/mspace

at present the relevant demo versions of the files are
ftp://ftp.netcom.com/pub/mspace/communicate-lite-demo-102.hqx
ftp://ftp.netcom.com/pub/mspace/zmodem-tool-demo-102.hqx

The updaters are
ftp://ftp.netcom.com/pub/mspace/communicate-lite-101-update.hqx
ftp://ftp.netcom.com/pub/mspace/zmodem-tool-101-update.hqx

Note: Versions 1.01 and 1.02 are identical except for the about box and other places with the company address and phone numbers. So don't worry about updating to 1.02 from 1.01.

You will also need the apple modem tool definitions if updating from a previous version.
ftp://ftp.netcom.com/pub/mspace/amt-modem-definitions.hqx

and while you are there pick up
ftp://ftp.netcom.com/pub/mspace/linelink-to-AOL-110.hqx
ftp://ftp.netcom.com/pub/mspace/pagenow-demo-091.hqx
ftp://ftp.netcom.com/pub/mspace/tge-tcp-tool-200.hqx

PageNow is a program for using your modem to call a text pager.

The demos can also be found on AOL (keyword "MCM"), AppleLink (Third Party Demos folder), CompuServe ("go maccom", download area 4) and GEnie and BIX (somewhere) as well as on the Mark/Space support BBS at 1-408-293-7290.

or you can ftp on info-mac archives or its mirrors as

info-mac/comm/term/communicate-lite-102-demo.hqx

The demo of the zmodem tool is

info-mac/comm/CommToolbox/zmodem-tool-102-demo.hqx

and on umich as

umich/util/comm/commtoolbox/markspacezmodemdemo1.02.sit.hqx
umich/util/comm/commtoolbox/modemdefinitions.sit.hqx

Mark/Space is also planning to have a Telnet tool and PC-ANSI tool out later this year.

The amount of scripting available in Communicate Lite is simple but adequate for simple logons. If you want more then get the Calypso Modem Tool which is free and use that (in theory at least) with Communicate Lite.

```
SITcom
------

  SITcom does sidegrades so SITcom can be had for $45 by "upgrading"
  from MacKnowledge.

  Sitcomm , FaxPro and Connectix utilities WERE bundled for $79.95
  at Macwarehouse (Catalog 34, Part # BND 0401 or 0402)

  My understanding is that SITcom is Comm toolbox based. I don't
  have the software personally. For setup then see "Comm toolbox
  based applications" section.



Termy
-----

  See "Comm toolbox based applications" section for setup.

  The major feature of this software is its free and CommToolbox
  based , also version 3.2 has many file conversions built in.


  You can get the most recent version from the Authors site as

ftp://nigel.msen.com//pub/vendor/ice/Termy-3.2.hqx

  Old version is on info-mac as

 info-mac/comm/termy-23.hqx




Claris Works 2.0 and 2.1
------------------------

  See "Comm toolbox based applications" section for setup.

  This a commercial "Works" package thats commonly bundled with
  Macs.


Comm toolbox based applications
-------------------------------
  First a program that just supports "ports" registered by the
  CommToolbox is NOT a CommToolbox application. (For instance Zterm
  is not CommToolbox).

  If a program uses the CommToolbox it can use any CommToolbox Tool.
  You can choose the tools you need and not install the tools you
  don't use. Programs don't need to be updated to use New tools.
  There are some unusual tools available (i.e. TCP, AppleTalk, ISDN
  etc). Many are free, unfortunately a few things are not free and
  some things don't even exist.
```

The Apple tools are "free" and usually included with other software. If they aren't you can get it directly from Apple. The directory is

<ftp://ftp.support.apple.com/pub/Apple SW Updates/Macintosh/ Networking & Communications/Communication Toolbox Tools/>

All the common tools (i.e. VT102, Xmodem, Serial Tool, TTY, Text) are in whats called the Basic Communications Setup. Whose current file name is BCS (1.1.1).hqx The Apple Modem Tool is usually needed and is file Apple Modem Tool (1.5.3).hqx There are other Apple supplied tools in that directory also.

The demo of the Mark/Space Z-Modem tool is at

info-mac/comm/CommToolbox/zmodem-tool-102-demo.hqx

For other tools (i.e. YMODEM , TCP, etc) check out directorys

<ftp://ftp.tidbits.com/pub/tidbits/tisk/CommToolbox/ umich/util/comm/commtoolbox/>

The Calypso Modem Tool adds CCL scripting to CommToolbox programs. (So if you can do extensive login scripting). The CCL modem tool does the same thing for the dialin scripts.

The modem settings of CommToolbox based programs are based on the modem tool settings ONLY. I will assume you are using the Apple Modem Tool. The way of accessing the modem tool might vary with program but will be the same after you have the tool selected.

Getting into command mode: The apple modem tool does not normally allow you to enter AT commands. So select the serial tool to do that. Select the speed , and open a connection. (In the menu for ClarisWorks, NOT the icon). You will need to do that to completely reset your modem to factory defaults but not much else.

The instructions for setting up are almost identical for ClarisWorks 2.0 and Communcicate Lite. Other CommToolbox programs are also similiar.

For Claris Works 2.0 after starting the program in communications mode go to the Settings Menu and select Connection. You now get a dialog box. Select the Apple Modem Tool under Method. You are now in the Apple Modem Tool.

The Linelink setting is already available in the Apple Modem Tool distributed by the Communicate Lite people (Mark/Space) and Prometheus. If you don't have that then do the following.

Under the pop up menu for "modems" select custom or modify menu. If you use modify menu, then name your new modem LineLink 144e or your favorite nickname.

Check the box for "Modem Auto-Buffers Connect Speeds". If there is a box for "Hardware Error Correction" check the box for it. Use

```
  initialization string AT&FW1L3&C1S7=60 ( or AT&F or whatever you
  REALLY think is better). Put nothing in for the "RING RESPONSE"
  string.

  Save your settings.  Thats all folks!


Hermes and MacKennel BBS
------------------------
  From billk@Kuentos.Guam.NET (Bill Kochman)
MacKennel:

Initialize:  ATS0=0Q0V0E0M0S2=1X4&C1W2&D0
Hang Up:     ATH0
Busy Out:    ATH1

  These are the strings which are included in the Line Link 144e
  driver included with Hermes II 3.1.1 which I'm now using.  The
  modem is set to its factory defaults as Lloyd suggests when using
  this driver:

BBS Initialize:          ATS0=0Q0V0E0M0S2=1X1&C1W2
Terminal Initialize:     ATQ0V1E1S2=43M1S11=50W1
Hardware Handshake On:   &K3&D0
Hardware Handshake Off:  &K4&D2
Answer Modem:            ATA
Lock Speed:              &Q5
Variable Speed:          &Q0
Reset:                   AT&F

  As far as the other Hermes pref settings, I have hardware
  handshake &allow crashmail both checked as well as DCD pin 7/chip.
  Min. baud rate is set to 2400 and max to 57600.


ARA - Apple Remote Access
-------------------------
  The linelink includes ARA scripts on the Macknowlege disk as well
  as the MaxFax disks. These apparently are OK but not great for ARA
  1.0. ARA 2.0  MAY be a problem. Checkout the demo version of
  Lineshare for newer scripts (not from Prometheus). Also there are
  some generic dial scripts you can get from ftp.tidbits.com. The
  documentation that comes with interslip covers a subset of the ARA
  scripts. Also check out the documentation on Calypso Modem Tool.
  You can use resedit to change the type of the ARA script file to
  TEXT. Edit it with a word processor, then change the TYPE back to
  what it was.  Generally, ARA works fine for most people or they
  just keep trying scripts for different modems until one works. One
  day real soon I may try to make a good one! (Sure you are!)



Internet programs and the Linelink (Macintosh)
==============================================

  The internet revolves around the TCP protocol. The TCP stack for
  the Mac is called MacTCP. To connect to the internet you need a
```

```
  slip or ppp account on a computer somewhere and a slip or ppp
  program on your mac and MacTCP.


MACTCP
------

  First like it or not you need MacTCP from Apple or a competing
  product. MacTCP is included with System 7.5 so you may already
  have it. The rest can be found for instance at info-mac archives.
  Directory to look in is info-mac/comm/MacTCP/



  MacTCP itself you will have to get legally. Once upon a time
  Eudora included MacTCP 1.x.x , though you weren't suppose to use
  it except with Eudora. If you don't have MacTCP and no site
  license at your location this is the cheapest way to get MacTCP
  2.0.x legitimately is to buy

   The Internet Starter Kit for Macintosh, by Adam C. Engst.
   Published by Hayden Books. ISBN# 1-56830-064-6. $29.95 U.S.A.

  The most current versions of the software included with that book
  (excluding MacTCP) can be found at

ftp://ftp.tidbits.com
<192.135.191.2>

http://www.tidbits.com/tidbits/

  you can also find many of these items at info-mac or umich
  archives or plugging a local site ftp.utexas.edu

  This book covers a lot of internet stuff. It includes a disk with
  MacTCP (2.02 at last printing)  , Fetch, Interslip, Telnet, etc
  etc. You can get just about everything you need from the book and
  disk. Its also reported to be very good introductory book. I have
  glanced at it in book stores and its pretty good (Adam can write,
  read tidbits!). You can get the book for less than $20 (such as
  Sam's clubs, MacWarehouse). Updaters from 2.0.2 to 2.0.4 are
  available online. Updaters to MacTCP 2.0.6 from 2.0.4 are also
  available.

info-mac/comm/MacTCP/mactcp-20x-to-204-updt.hqx
/info-mac/comm/tcp/mactcp-204-to-206-updt.hqx

<ftp://ftp.tidbits.com/pub/tidbits/tisk/tcp/
mactcp-204-to-206-updt.hqx>
<ftp://ftp.tidbits.com/pub/tidbits/tisk/tcp/
mactcp-20x-to-204-updt.hqx>



  The second edition is now available also and includes more of
  everything especially on slip and ppp. If you are clueless spend
  the $20 on the book. It will probably save you hours of
```

```
  frustration.

  In any case versions of MacTCP before 2.0.4 had what was known as
  the MacTCP timeout bug. If you are stuck using MacTCP 1.1.1 then
  use the following patch

 /info-mac/comm/mac-tcp-retrasmit-patch.hqx

  This is a little application that will alter the MacTCP driver to
  incorporate Peter Lewis' patch. You will need a virgin copy of
  MacTCP, version 1.1.1 for this process.



InterSlip
---------
  I have tried Interslip 1.0 , 1.0.1 and  beta version 1.0.2d2.

Use

* Hardware handshaking

* Speed of 57600 or 38400.

* An init string of AT&F&C1W1L3S7=60.

* For the dialing script use the built in Hayes Compatable Setting.

  For the gateway script and other settings read the Interslip
  documentation and ask your slip provider how to setup MacTCP and
  the gateway script accordingly. There are several other gateway
  and dialing scripts available at the above ftp site as well as the
  tidbits ftp site directory

ftp://ftp.tidbits.com/pub/tidbits/tisk/MacTCP/

The file names all start with "scr"

  The Hayes Compatable dialscript doesn't hangup the phone. If you
  must have that feature then consider the dialscript

scr-freds-zen-interslip-script.txt
scr-minimal-dialing-script.txt

  in the above directories. I also wrote one myself called
  RobustDialScript in directory

ftp://spinfree.cm.utexas.edu/MacSpecificFiles/InterSlipScripts/

  Interslip is very good but it has serious problems on its scripts.
  I found many bugs relating to the dialscript I made.  ARA files
  won't work as dial scripts in general contrary to the Interslip
  documentation because of those bugs. There seem to be similiar
  problems in the gateway scripting but not as severe. At least
  Interslip has scripting unlike MacPPP.

  In any case if it doesn't hook up to the server , it may require
```

```
  changing the provided login script.

MacSlip
-------

  MacSlip is commercial, made by a guy here at the University of
  Texas.

  I have used MacSlip 1.01, 2.0, 2.0.2, 2.0.4   note that 2.0.2 has
  some bad bugs so upgrade to 2.0.4 from other 2.0.x versions.

info-mac/comm/MacTCP/mac-slip-202-to-204-updt.hqx
info-mac/comm/MacTCP/mac-slip-203-to-204-updt.hqx

  I used hardware handshaking and AT&F&C1W1 as init string. You can
  also use the modem setup "Generic V32bis/V42bis". I had next to
  nothing to change in the gateway script. (I.e at most the same
  changes needed in Interslip).


  MacSlip has better scripting and MUCH, MUCH better script
  debugging than Interslip. Its also more configurable and faster.
  Ignoring price then MacSlip wins on all other counts.

MacPPP
------
  MacPPP is available on info-mac.

info-mac/comm/MacTCP/mac-ppp-201.hqx

  or

ftp://merit.edu/pub/ppp/macppp2.0.1.hqx


  Version  2.0 had a bug causing it to not send the modem init
  string if the "AT" was included in the modem init string.


  Settings I am personally using are

* Port Speed: 57600

* Flow control: CTS & RTS (DTR)

* Modem Init: AT&FW1L3&C1S7=90

* Modem Connect Timeout: 90 seconds

  Set Idle timeout to maximum amount of time you want your modem to
  be connected to your server without sending or receiving data. (15
  minutes is a good choice in my opinion).

  To have MacPPP detect the line drop, change the "Echo Interval" in
  ConfigPPP from "Off" to some number of seconds (20 is what works
  well for me).
```

```
  And all LCP and IPCP options set to default values.

  Use the terminal window for figuring out how to login. **THEN** do
  the Connect Script.



InterPPP and PacerPPP
---------------------

  Caveat: I know nothing personally about these products.

  InterPPP is a commercial product. For sales information and a demo
  check the same ftp site as InterSlip.

  PacerPPP is bundled with Pacer's PacerTerm 3.0. (Different
  company)

* InterPPP and PacerPPP support both SLIP and PPP

* InterPPP and PacerPPP support both IP and AppleTalk over PPP

* InterPPP and PacerPPP support (require) CCL scripts to describe
  the modem configuration (as does AppleLink and ARA). The scripts
  SHOULD be modified to use compression and error correction. I
  suspect dialing scripts made for InterSlip will work. So see that
  section.




Speed Comparisons
-----------------
  On a MacIIsi with MacSlip 1.0.1 or Interslip 1.0.1: File transfer
  rates of binhexed and compressed files are around 1200cps. For
  text files I think I saw a maximum of 2000cps.

  On a Quadra 605 with MacSlip 2.0.4 and MacTCP 2.04: File transfer
  rates of binhexed and compressed files are around 1400cps typical
  to just under 1600cps. For text files about 3400cps. This was with
  1500 byte compressed header packets.

  On a MacPlus (Finder, System 6.0.5, 2.5Meg)  MacSlip 2.0.4 and
  MacTCP 2.04. Essentially the same results as the MacIIsi with the
  older software.

  Keep in mind SLIP uses small packets (1500 bytes or less). Hence
  v42bis compression is not as useful as it normally is. I would
  disable v42bis compression on a MacPlus, Classic, SE via setting
  S46=136 in the init string and set the Mac's speed at 19200bps.
  This gives a more even and slower speed for the slower Mac to
  respond to. On faster machines I would stick with above settings.
  This may be Voodoo.
```

```
TIA (The Internet Adapter)
--------------------------
  SOFTAWARE CO. (Los Angeles, CA) 310-314-1466 (9-5 M-F, PST)

  TIA is a new Internet access utility that lets you use popular
  TCP/IP software such as Mosaic, Cello, and Eudora with a standard
  UNIX shell account. In essence it converts a shell account into a
  "pseudo-SLIP" account.

  TIA's web page is

http://marketplace.com/0/tia/tiahome.html

  You can get an email message containing TIA's own FAQ from

tia-FAQ-single@marketplace.com

  This is too difficult a subject for a short answer here. Luckily,
  Bill Arnett <billa@netcom.com> is compiling a FAQ for Macintosh
  users of TIA. He has a world wide web page you can ftp from

ftp://ftp.netcom.com/pub/billa/billa.html




FAX (and nothing but the FAX)
=============================

Macintosh Fax Software Comments
-------------------------------

  MaxFax is currently bundled with most modems being sold now. Since
  the Linelink is made by Prometheus previous buyers of Linelinks
  can upgrade to

  MaxFax 3.5.x ($19.95 Fax or $24.95 Fax/Voice Mail plus  $5
  shipping)

  Details in upgrade section.

  If you need Voice mail, MaxFax is the **ONLY** choice at present.


There are two big players in general purpose Macintosh Fax software:

FaxSTF 3.0 and Delrina Fax Pro 1.5


STF Technologies:
    FaxSTF 3.0 (Mail order Price is $30 to $40)
    AutoPak is about $55 more (which adds automatically printing
   incoming faxes rotations and optical character recognition)
```

```
Delrina:   Fax PRO 1.5 for the Macintosh ($55.95 at Mac'sPlace)
           $41 educational, about $26 in bundles.


  If you need character recognition then Delrina Fax Pro is a pretty
  clear choice. I don't think it supports ARA linesharing though.


The only Macintosh Fax shareware software is

  ValueFax:   The shareware fee for ValueFax is $20 for individuals
  and $25 for businesses. (Plus site licenses)

  Since its shareware you can try it at no risk and see how you like
  it. (There is a limit of about 30 Faxes without registering)



  On average these products seem to be pretty comparable in basic
  and not too basic Fax abilities. They do differ in advanced
  features.


MaxFax, ValueFax, and Delrina Fax Pro all work with the Linelink.


  FaxSTF had a horrible upgrade policy from FaxSTF 2.2.3.
  Specifically, the retail price was $59, the upgrade price was $39
  +$6 shipping. They got enough flack from owners to put out a free
  upgrade from 2.2.3 to 2.6.1.  HOWEVER NEITHER FaxSTF 2.6.1 or 3.0
  work with the Linelink. Old versions (i.e. 2.2.3) of FaxSTF work
  fine but are no longer available new.  ValueFax is better in my
  opinion than FaxSTF 2.2.3 so again forget FaxSTF unless you
  already have it. (See email in FaxSTF 3.0 section)


  There is a review of FaxSTF 3.0, and FaxPro 1.5 in MacWeek Feb 21,
  1994.  Highlights of the review are FaxSTF 3.0 had better
  interface and nicer output. FaxSTF 3.0 can "hand off" data calls
  to ARA or programs that support the comm toolbox. Note that a lot
  of programs don't use the comm toolbox. Delrina's FaxPro 1.5 had
  Optical Character Recognition which is only included with the Pro
  version of FaxSTF 3.0. Delrina's tech support was excellent,
  FaxSTF's was way below average.




Call Discrimination a.k.a. Adaptive Answer
------------------------------------------

  AT+FAA=1 enables calldiscrimination (otherwise called Adaptive
  Answer).


  Interestingly AT+FAA by itself returns codes consistent with the
  values listed for the the voice/fax/data discrimination.
```

In any case the Fax software does this command for you. So forget it.

LineShare

Old email message: LineLink DOES support "adaptive answering" and thus it works fine with LineShare (for fax/data combinations, for example, fax/ARA) - at least it is what we were told by users. We'll have a look at LineLink next week - if it really works we'll include LineLink scripts into the standard lineShare package, as well as support for MaxFax in voice/fax mode, i.e. you'll be able to use the modem to process incoming voice, fax and ARA calls, as you can do now with the original Prometheus modems.

Stalker Software, Inc butenko@crl.com (Vladimir A. Butenko)

Note: The demo version of Lineshare has specific settings for the Linelink now. MaxFax 3.5.x now has direct support for Lineshare but does not include it. You can get a demo version of LineShare from info-mac.

FaxSTF 3.0 has Lineshare support (and includes it??) but doesn't work on the Linelink. So again MaxFax is better choice. Unknown about Delrina FaxPro.

FAX bugs and misfeatures

Number 1 problem is MaxFax won't automatically answer Fax calls when in voice mail mode. (No problem if in Fax Receive/Answer mode). This is partially fixed with the new firmware/ROM 1.4.g (MAYBE!)

Number 2 problem (i.e. sending faxes don't quite complete negotiations) Easy fix is to add S7=60 (or S7=90) to init string. (Which is why its been recommended throughout this FAQ)

Number 3 problem it appears at moment is that ATZ resets the modem including some Fax and voice settings. This isn't really a modem problem but how software sharing a single piece of hardware interact. Some programs send ATZ without your knowledge (including the ARA script). There is no single fix, i.e. you have to get all your init strings to be compatable which may be impossible. (Note this is not LineLink specific problem) Best temporary fix is to reboot or pull up the MaxFax Status DA when finished using a hostile telecommunication program so Faxes can be received.

MaxFax and FaxSTF both suggest &D2 (I.e. use DTR to hangup) in the init string.

Generally you can set things up to work nicely for either data or Fax or Voice Mail but not for more than one at a time. Deinitializing strings MAY help but only a few programs have them.

ValueFax

To install follow instructions of package. Choose Class 2 for type of modem. (No other settings during installation!)

Reviewer: Loudon Campbell
First a Disclaimer: I beta tested ValueFax.

The beta version was fairly bug free and handled port conflicts with data programs much better than FaxSTF 2.x but not as well as MaxFax 2.x. I have yet to try the release version however. (Some rainy day)

The release version has been used by others with Linelinks. No major complaints so far (complaints on speed , lack of features).

I found ValueFax to have a very clean user interface , much better than FaxSTF 2.x. The user interface feels a bit like Eudora and has seperate windows for incoming, outgoing and pending faxes. It has good print output at least on a DeskWriter. Simple installation (perhaps too simple!). After use I didn't like is as much as MaxFax. But this may be personal preference. It has a few neat user interface features here and there though! It handles basic Fax operations ,including "mailing" lists and address books, but not stuff like OCR, voice mail or line switching with ARA. In feature set it does NOT compete with FaxSTF 3.0.x, MaxFax 3.x.x or Delrina FaxPro. It does win over FaxSTF 2.x.x ,in my opinion.

ValueFax will overwrite FaxSTF's files without warning. However FaxSTF installer will do the same thing to ValueFax's files. (They use the same names for some parts of the packages)

I think the Mac community has been waiting for a shareware Fax software package for quite a while. It is well worth trying since it is SHAREWARE.

Support is available via email to valuefax@netcom.com

Latest versions of this product can be found at ftp.netcom.com in the pub/valuefax directory. Also archived as /info-mac/app/value-fax.hqx

Its been reported that ValueFax changes nonvolatile modem memory. I have not confirmed that report. In any case it does take aggressive control over the modem when in use which some people don't like and some people do.

```
  Note that the upgrade to MaxFax 3.5.x for Linelink owners and
  Prometheus owners can be had for $19.95+ $5 shipping (Fax only).
  The fax/voice version is $5 more. The shareware fee for ValueFax
  is $20 for individuals and $25 for businesses. So for honest users
  in the short run you are not saving anything by using ValueFax
  over MaxFax.






PowerFax (System 7.5)
---------------------
  System 7.5 on CD-ROM (but not floppies?) includes Fax software
  (PowerFax) based on FaxSTF. I suspect the Linelink won't work
  since FaxSTF 3.0 doesn't work with the Linelink but I have no
  reports one way or another.

  However From: Jack W. Howarth, Ph.D. (NOT a Linelink user) If you
  are waiting on QuickDraw GX compatible fax software, you can just
  install PowerTalk and PowerFax off the System 7.5 CDROM. A bit
  overkill for just faxing but, hey, its free.  However PowerFax
  seems to be smarter about not letting programs lock up with
  accessing a serial port already in use (this is particularly true
  of MicroPhone II 4.0.2.) without using the Linemanager.


FaxSTF 3.0 Setup
----------------
  FaxSTF 3.0 once upon at time had a specific setting for a
  LineLink. It appears to have been removed recently. (Sept 94).

  However it does not receive Faxes for most people. It receives
  them but as garbage!


  Matt Boxberger receive the following response from FaxSTF tech
  support
> From:    STFtech@aol.com 29-JUN-1994 12:13:56.18
> To:    mdb@cvsd.cv.com
> Subj:    Re: Linelink (vs. Supra) support in FaxSTF
> ...
> However, 2.2.3 is no longer available.  We can only offer 3.0 and
> 2.6.1.  The LineLink and 3.0 are having major problems.  We have
> brought the LineLink back into testing, but they are not able to
> come up with a fix.  So the LineLink and future versions of 3.0
> are not looking bright.
> ...
> Lisa,
> STFtech

And my more recent email

> From: STFnet@aol.com
> Date: Wed, 2 Nov 1994 22:24:01 -0500
```

```
> Sender: STFnet@aol.com
> To: loudon@uts.cc.utexas.edu
> Subject: Re: Linelink and FaxSTF 2.6.x , 3.x
>
> Louden,
>   We have experienced receiving problems with the LineLink 144e
> modem and 2.6.1/3.X versions of our software.  At this time we
> are not sure when or if the modem will be supported in
> future versions. The modem, however, is still in Testing with
> our software and we continue to try and resolve the receiving
> problems.   Thanks!
> Bret
> STF Technologies



OK here's a chance to be on the cutting (oops bleeding) edge!

Updaters for fax-stf 3.x are

 /infomac/app/fax-stf-30-to-301b-updt.bin
 /infomac/app/fax-stf-new-modem-profiles.sit


FAXstf 2.6.1 Setup
------------------

  OK here's a another chance to be on the bleeding (oops cutting)
  EDGE! I have had the same problems as those reported in FaxSTF
  3.0. It sends but doesn't receive properly. See the FaxSTF 3.0
  section.

  There is a upgrade patch to version 2.6.1 from 2.2.3 that is free.
  It is on info-mac at

  /infomac/app/fax-stf-261-init-patch.txt
  /infomac/app/fax-stf-2x-to-226-updt.sit (Yes the file is
  misnamed!)



  If you get a copy that is not a disk image (which requires
  diskcopy or mungeimage) You will need to create  an installer disk
  named FaxSTF[tm] Installer and drag the contents of the folder to
  that disk (7 items).





FAXstf 2.2.3 Setup
------------------

The initialization string used on FAXstf 2.2.3 most commonly is
  AT\Q1&D2V1E
  NOTE: The "\Q1" part in the modem init string sets the modem to
  bidirectional XON/XOFF , that SEEMS to be required on this piece
```

of software. But remember that it STINKS for data connections so be sure all other data software resets the modem appropriately.

Many people add &F at BEGINING of FaxSTF init string.

WARNING WARNING WARNING- The &D2 part of init string has been associated with problems i.e. hangups and not receiving FAX's. You may not want to use it (i.e leave as factory default of &D0). It works either way so its your choice.

Note that FaxSTF 2.x really takes over your modem for receiving Faxes. Expect problems, be sure your ordinary communications programs reset the modem to correct settings when you use those programs (i.e &D0 is reset, hardware handshaking ON, etc!).

Directions are from David Hartman Fax Settings for FaxSTF: (also Jack Z. Sun and others)

1. Make sure you have version 2.2.3 of the FaxSTF software.

2. Install the software from scratch. That means reboot with extensions off (i.e. shift key down for system 7.x). Note: you may want to move any phonebooks or coverpages you have previously created out of the FaxSpoolfolder before you install since the install will trash them.

3. In the installation, you'll be presented with a dialog window which will allow you to select either the modem model or driver type. Click on the "Driver Type" radio button and then select "Class 2 for Sierra based modems" (i.e. "PN2388 for Sierra based modems").

4. The next dialog is the standard install dialog. Click on the Install button to install all of the software AND the driver.

5. You'll have to reboot your computer after the install. Make sure that your modem is turned on before the reboot or the modem won't be found and initialized.

6. Go to the Chooser and select the FaxPrint driver. Click on the SetUp button.

7. In the SetUp dialog, click on the Fax Modem icon. You'll see a number of settings, but the most important ones to look for are the send and recieve bps rates. These should be set at 9600bps or if available AND IT WORKS 14400bps .

8. Click on the Fax Software icon. Make sure that the "ON" radio button is highlited. If it's not, go back to Step 2. I don't know why, but in MY experience with this software, if the software isn't turned on AFTER the install then something didn't go right and you'll have to re-install :

9. Click on the Modem Init icon and make sure that the modem init string says "AT\Q1&D2V1E" (no quotes in actual string). NOTE: The

"\Q1" part in the modem init string sets the modem to
bidirectional XON/XOFF , thats needed for this software but
remember that it STINKS for data connections so be sure all other
data software resets the modem appropriately.

10. That’s it! You’re ready to rock and fax!

Comment from STF tech support: IF you are getting blank pages
under 2.2.3, you were probably recieving at 14.4, try putting it
down to 9600.

MacCommCentre 1.0.1

Comments from : Timothy David Chipman <tchipman@is.dal.ca>

I currently use a purchased copy of faxSTF 2.2.3, so some
comparisons are made to that as my standard. A friend of mine
recently bought a modem with this software included, but he
dosen’t use it, so I thought the least I could do was see how it
worked with the linelink (mine is rev.1.3 old roms)

* Installed package takes up about a meg of disk space. Installed
  onto HD using defaults, auto modem detect sucessfully determined
  that my LineLink was a Type II and installed the apropriate
  driver. <Nice!>
* Sucessfully recieved a 2 page fax from a microsoft fax-back
  server. Only complaint - it was slow: it took approximately 5
  minutes to recieve the fax, and when I checked my FaxSTF results,
  it took less than 2 minutes. Humm... speed *appeared* to be 9600
  baud, I *think* (the info was not displayed at recieve, nor
  recorded clearly anywhere, such as the log file..)
* Claims to support 14,400 baud S/R but from my previous point, I
  suspect that this isn’t the case with the LL144e.
* I didn’t have anyone around to experiment with sendfax,although I
  am certain that if it recieved a 2pgfax no prob, then send is a
  piece of cake.
* Claims to have voice discrimination, but it has screeched in my
  ear while talking to people if the modem was left turned on... so
  this feature appears not to work..
* I had some "funny" stuff happen to my system while MCC was
  installed. MCC attempts to add a "Fax" item to the bottom of all
  apps’ file menu, but this appeared mainly to append junk to the
  menus. Not impressive.

Overall: Since I own a copy of STF that works fine at 9600, I will
continue to use that. MCC offers me no benefits. Possibly newer
rom linelinks would getthe benefits of faster (14,400) faxing, and
call discrimination, which Stf 2.2.3 does not support with my
current setup, however this is not certain.

QuickLink II - FAX software

The following is courtesy of Darryl Harvey Email: djh@shell.portal.com

The setup for the LineLink 144e and QuickLink II Fax was simple.

The software came with a Practical Peripherals PM14400FMXT modem. The software was installed with this modem and I just plugged the LineLink in it's place and it all worked 100% (Send & receive - High & Low res)

Actual setup string is: AT&FE1L1V1X4&C1&D0S0=0S7=60

There appears to be some times when the modem locks up, but a power reset fixes it up.. I have not traced it down yet, but I am not to worried about it as it only happens when I want to send... I am not convinced it is the software causing it anyway.

For $99, you can't expect everything working 100%.Would I recommend it? If it was all you could afford, and willing to put up with the occasional compulsary power reset. YES.

BTW: I am not too crazy about Fax software anyway, they all seem to do things to your modem ports that other software doesn't like. I just test them out and then remove it from my disk.. If you could run fax software without the required "background" program, it would be better (ie: send only, no need to monitor port for incoming receive)

Note that after this posting by Darryl , he bought MaxFax with voice and has contributed elsewhere in the LineLink FAQ.

WinFAx Lite (For IBM PC)

Source: Chuck Browning

The init strings for the IBM (generic class 2 fax) is:
AT&F&C1&D2S7=90

MaxFax 3.3.x SETUP

Read the manual cover to cover after installation and trying it. It answers most questions.

First if you are upgrading to the voice version of MaxFax from the Fax version of MaxFax throw away all your preference files , MaxFax init etc into trash. In other words do a clean reinstall.

MaxFax is very easy to install. Just boot without extensions. Double click on the installer. Follow directions. (You will be

```
  asked to send your registration via Fax) Next start up the MaxFax
  application If you are using the Fax only version of MaxFax (i.e.
  MaxFax 3.3.1s) Select Class 2 in the modem setup in the
  application.  The init string will default to &D2. I highly
  recommend at present to NOT use &D2 but either S7=60 or possibly
  &FW1L3&C1S7=60 (for consistency)


  If you are using  Fax only version of MaxFax (i.e. MaxFax 3.3.1L)
  Select Fax (or Voice or whatever your preference) The init string
  is blank by default. I highly recommend at present to use either
  S7=60 or possibly &FW1L3&C1S7=60

  You can also try S7=90 in either string or S7=120 for
  international calls for either version.

  The motivation is based on trying to be as consistent as possible
  and the following email.



The following are (almost) quotes of Milt Sagen (a MaxFax author):



When does MaxFax send the init string?

>When it initializes the modem for receiving and just before
>sending a fax.

  What happens when MaxFax answers the phone? Does MaxFax also send
  the init string for instance when a call comes in and the serial
  port is free?

> No, not if the RING is detected - if it detects garbage because
> the modem was switched off then on and thus the dce-dte speeds
> don't match, it will send an initialization string. Otherwise,
> It just answers and looks for an +FCON.

On reboot?

> No.  If MaxFax is set to Send/Receive it will send an
> initialization string during the first accRun (whichever
> application - typically the finder -which calls SystemTask)


What is the init string you send?

> I don't rely on any settings of the modem. If I absolutely need
> them then I set them when I initialize the modem in the fax
> software.  For example MaxFax must have v1 set and s0=0.  Some
> settings may help MaxFax send a fax such as setting s7 to 60 or
> greater, but in general I've found in the past that, with
> exception of international calls the default value of 30 was
> sufficient.  However, I'm beginning to believe that 60 or more is
> better with the LineLink. We send ATV1E1 "users init string" s0=0
> I believe and then we send some other strings for class 2
```

```
> such as AT+FAA=1;+FCR=1 etc.

  My own experiments indicate it does so when you open the DA and
  click on the popup menu containing send , send/recieve etc.

> Yes that will cause it do so although the version which supports
> voice won't cause this to happen.

> Note that we didn't actually change MaxFax in anyway to work with
> the LineLink as a fax and data modem."



Fifth question: Is &D2 really NEEDED in MaxFax init string?

>I haven't seen anything to suggest that it is.



End quotes from Milt Sagen.

  At the moment I have found that some programs do ATZ which resets
  the modem including Fax/Voice. This includes the ARA script
  included with the LineLink. On the Fax only version of MaxFax
  opening the DA resets the Fax to correct values. Seems to do the
  same on the voice if you change types.  In other words get in the
  habit of pulling up the MaxFax Status DA after quiting the program
  and reselecting the Fax Receive/Send or Voice S/R .




Slick program with lots of bells and whistles **Nice** job guys.


MaxFax 3.3.x Software REAL BUGS
-------------------------------
The following are documented bugs (i.e. verified by someone at
 Prometheus).

  Bug1: (Bug hit many people!) Upgrading from MaxFax 3.3.1S  to
  MaxFax 3.3.1L should be done from a clean install (ie. delete old
  application and most importantly the preference files). Otherwise
  you will get various bugs.

  Bug 2: (Bug found by Darryl Harvey and others, fixed I think in
  3.3.1L) There was a bug in one (or more) versions of MaxFax where
  if you enter more than 18 characters for the Fax name the program
  or MaxFax init hangs. So if you keep the fax name short, all is
  OK.  Darryl also believes Bug 4 below is a manifestation of the
  same bug. So try keeping the Fax name to less than 18 characters.

  Bug3: (Bug hit Loudon Campbell) "We did find a problem with
  viewing faxes on 68LC040's which includes the 605.  What would
  typically happen is a person would view a fax and then close and
  sometime later elbombo. We fixed it on the version of MaxFax which
  supports voice on the LineLink (i.e. MaxFax 3.3.1L version or
```

later.). The funny thing is the bomb only occurs on machines with LC040 such as the Performa 475 and the Quadra 605."

Bug 4: Victor E Aldridge III reports the following info from Prometheus: Some systems running System 7.1 seem to crash during Startup for no explainable reason. Even removing all extensions and non-System cdevs (excepting the MaxFax INIT) will not stop this from occuring. This occurs in versions of MaxFax earlier than 3.2.4, and was fixed in 3.2.4, though the developers have no idea what was fixed. This 'fix' was 'unfixed' in the upgrade to 3.3.1, which mostly included coding to increase the abilities of the program for Powerbook users. As I said, the developers at Prometheus do not know what is causing the problem, and no pattern has been discerned among the affected systems. The only alternative for those affected is to downgrade to 3.2.4. The Prometheus tech (I actually got through) I was talking to shipped it out 'blue label' at no charge to me, and the computer now boots fine with all my original extensions installed. Also see Bug 2.

Bug 5: Roger B. Marks reports "a fax received while File Sharing is on leads to a hung system". (I have no confimation of this one!)

MaxFax and Voice Mail
=====================

This is most actively changing area so there are no quick fixes. If you are thinking of trying to modify MaxFax using resedit to increase volume , use call discrimination etc you will positively need the voice mail documentation.

User Comments, 1.4g ROMS and MaxFax 2.5.x

3.5.1 was first version of MaxFax that supported all Linelinks, 3.5.0 was specific to 1.4g ROMS. I am unsure but 3.5.2 or later is probably current November 1994??

Prometheus SAYS the modem will now really discrimate between Fax and Voice via the CNG Fax tone. The program has more mailboxes and control over those mailboxes, better coversheet editing, and new bells and whistles.

The following are responses I have had. Whether they are typical I don't know!

Christoper Thomas was disappointed in the MaxFax software due to
conflicts with America Online and various setup problems. He did
say the modem more or less performed as advertised ignoring these
problems. He switched to a Hayes Accura but has the following
comment:
> The voice quality was about the level of a telephone which makes
> sense. I was recording in medium. I had to turn the volume up
> quite a bit though, the input volume that is.

Comments by Ty Bower <bower@louie.udel.edu> who has MaxFax 3.5.0
and the 1.4g ROMS.

> So far, it seems to work quite well. The voice mail works
> (mostly) great, and I use it quite a bit. As you noted, it is a
> little 'deaf', and my soft-voiced friends occasionally have
> trouble. I tried adjusting the input level in the voice config
> menu, but all it seems to do is alter the volume of the saved
> incoming messages. I'm using an old Mac II. I think the quality
> is more than acceptable, (almost good, in fact) but still
clearly
> computer-generated. Not as bad as a microcassette, not as
> good as a standard audio cassette. But, under normal
> circumstances, it seems like a good modem at a fair price.

Arthur W. Utay, writes:

> I bought a Promodem 144E with voice (V3.5) not too long ago.
> The idea was to combine both a voice answering machine and fax
> machine on the same phone line. Additionally, I'd have use of a
> high speed modem for those occasional surfs on the net.
> I like the graphical interface of the software, but truth be
> told, my modem is at Prometheus even as I write this getting a
> complete going over. Seems I've had nothing but problems since I
> bought the modem (this includes a replacement) My problems
> include: (I have a Quadra 660AV which may be driving the
> situation)

* Fax machine is unable to recognize CNG tones from more than 5
  different namebrands of fax machines (HP, Toshiba, Cannon, Sharp,
  etc) if in the dual Voice/Fax mode. In the fax only mode it
  receives and transmits perfectly.

* If I'm working on my Quadra and the phone rings, the software
  disables the keyboard even if the answering machine hasn't kicked
  in. For example, I pick upthe phone on the second ring. The
  software is set to answer after 4 rings, but that doesn't matter.
  The keyboard disables, the phone answering icon pops up,and
  sometimes regaining control is acheived only by rebooting.

* Their are known bugs in the volume and quality of the incoming and
  outgoingmessages. Prometheus says they're working on it.

* The tech support people at Prometheus (Toni and Clinton) are
  great, except getting through to them is a major problem. As I
  said, they had me send back my unit for a thorough checkout. I
  believe the problems stem from the unique Quadra 660AV interface I

still like the GUI and believe once they fix these and other bugs it'll be a great unit.

User Comments and Pointers 1.0 or 1.3 ROMS and MaxFax 2.3.1L

Comments in this section are circa Febuary 1994.

The following info is a summary of info and comments from Darryl Harvey (djh@shell.portal.com) Marshall Levin (mlevin@nyx10.cs.du.edu) and Rich (rglewis@mit.edu)

(Darryl 's comments)

Well it all works fine... No problems at all.. The modem is a little deaf and that can result in early hang ups of the voice mail, but if you speak loud and clear, the message is loud and clear. It does have limitations (ie: can't return to the main mailbox if you have previously selected a mailbox or section..)

The volume settings are not adjustable;

It does take a long time to compress/decompress messages, I have only tried it in "best" mode, maybe select "good" would improve this?

Other things worth noting:

Cannot record a greeting from a telephone connected to the modem, you must have a sound imput device on your Mac, use a remote phone, or import a sound file from another source. Could be a hassle for some Mac users that do not have a microphone on their Mac.

The modem does not automatically detect an incomming fax when in voice mode. The caller must manually enter 77# on the keypad to enable a fax receive mailbox. (This is the preset function, it could be changed, but still has to be manually entered)

This is the _ONLY_ way to make the LineLink answer in Fax mode if Voice Mail is enabled and MaxFax is running. So from your Fax machine, turn up the volume level, listen to the start of the message and then enter 77#, the LineLink WILL enable fax receive and your Fax should notice this and start sending.

: Along the same line, how would one make a send a fax from one : LineLink to another LineLink (with the receiver running in the voice : mode)? How would you send the 77# once the receiver answers?

Same as from a normal fax machine.. Put a suffix in the dial string. Make it pause, then dial 77#. May not work 100% but it could work.. All you would have to do is pause long enough for the remote LineLink to pick up the phone and start it's message.

A few more things about the modem and voice software that may be useful to know:

You must have the Max Fax software running on your mac or else the modem will only answer in fax mode (if set to Voice/SR fax). It does not function in the background. It will happily sit in the background until a voice message comes in, then it will come to the foreground and take control of your mac.

To determine if you have the correct software for voice, an easy way to find out is to look at the modem configuration section. The Fax only software allows you to choose the modem type.. The Voice option software has this hard set to LineLink and you cannot change it (it is greyed out).

(Now Rich's comments)

* The message plays back at a barely audible level. The settings for changing this are "grayed-out" and are unavailable.

* The sound quality on the recorded message is poor.I got AIFF Recorder off the net and recorded a crystal clear AIFF message, which I then attempted to import it. The message was played back at half speed in MaxFax (although with good sound quality). The MaxFax manual reports that a program called Sound Editor can be used with MaxFax,but I can't locate this program (any ideas?).

4.The time that a caller has to leave message is about 7 seconds. I started by choosing the unlimited option for message length, which allowed a 1-2 second message. Then I chose the 3 minute message length from the settings file, which allowed a 7-10 second message.

I called MacWarehouse and they gave me the init string (I had no init string before) AT&F&D2S7=120, which does not work. I think I know why. MaxFax appends this init string to its own, and I'm resetting the factory settings in this string. In any event, this string causes the modem to go on and off line indefinitely. So I tried &D2S7=120 as the init string, which, as yet, I haven't had time to observe the results (except for problem 4, which it did not cure).

(Now Marshall's comments)

Basically, I am quite satisfied with the product. It is well worth $99 + $39. It is certainly NOT professional quality, but I'm not trying to run a business here (and I certainly wouldn't recommend doing so with the LineLink). I use the voicemail feature infrequently, the fax features on a fairly regular basis, and the data features almost constantly.

If I didn't have the patience or know-how to mess with the configuration, or I were planning on using the system professionally (where I had to rely on it for my livelihood) I'd

```
  most certainly spend an extra $100-$150 and get a better system.
  But for the mostly-data, casual user who wants the features for
  occasional non-demanding personal use and doesn't mind fiddling
  with the configuration until it works right, this modem and
  software really is a steal ($140 for 14.4 fax/voice/data modem).




Fax recognition during voice mail (1.0 or 1.3 ROMS)
---------------------------------------------------
Quotes from Chris Baker (a coauthor of MaxFax)

  What doesn't work with a LineLink modem is being able to detect
  Fax CNG tones while the outgoing message is being played.  The DSP
  firmware in the LineLink doesn't support it.

  Regarding DTMF and CNG detection: I can't tell you exactly what is
  going on in the DSP but it comes down to not having enough tone
  detectors to do both DTMF which requires 8 tone detectors (4 row
  and 4 column).  To detect CNG, the DSP would need another tone
  detector for the 1100 khz CNG tone.  My understanding is that
  either there is not another tone detector available in the DSP or
  there in not enough horsepower to both do voice sound
  decompression (CVSD 4 to 1) and do 9 tone detectors at the same
  time.

  We are working very hard with Sierra to get them to improve this
  situation as not having CNG detection durring outbound voice is a
  detriment to the product.


  Concerning the problem with the modem not falling back to data
  mode if you speak or make noise into the phone, I am not sure why
  that seems to happen but we have reported it to the firmware
  engineers at Sierra and they are lookin into it.  AT the moment it
  looks like a firmware bug and will have to be fixed with a
  firmware change.


Amiga Software
==============

This section will hopefully improve in a few months!

AVM'n'Fax
---------

This is voice mail and Fax for the Amiga.

  From courtn@cs.uregina.ca I use AVM'n'Fax myself (which comes with
  the fax software efax).  During the installation, it set the
  proper fax init string for my LineLink.  Here it is:
  V1X4&K3&C1&D2&R0S0=0

General Amiga
-------------
```

Use of &D2 is fine on an Amiga.

As a rule of thumb keep speeds at 38400 or below.

If you are getting a lot of overflows, try to reduce the number of colors on your term program to 4 or 2. If you don't have a AGA Amiga, more than 4-8 colors can lock out the chip memory just enough to mess up your transfers.

VLTjr is reported to be the fastest Amiga term program, an improvement over Term.

FTP (File Transfer Protocol) Gopher, Internet

FTP via America Online

America Online offers Usenet, Gopher/WAIS and now FTP.
They CLAIM WWW and telnet coming later this year.

You can ftp the AOL software itself from ftp.aol.com

AOL has FTP available in open beta testing and it works. To access this latest AOL Internet Tool use Keyword FTP. Read the documentation and the introduction to the internet (please!!!). AOL plans on setting up their own private mirrors of info-mac and umich so be sure to use mirror sites of favorite ftp sites and not the originals.

URL 's (Uniform Resource Locator)

The World Wide Web (WWW) uses Uniform Resource Locators (URLs) to specify the location of files on other servers. Its also a handy shorthand. Some newsreaders and setext readers let you click on a URL and hit a key or pull down a menu to connect to that resource!

A URL includes the type of resource being accessed (e.g., gopher, WAIS), the address of the server, and the location of the file. The syntax is:

scheme://host.domain/path/filename

where scheme is one of

```
http    means the file is on a World Wide Web server
gopher  means the file is on a Gopher server
```

```
ftp     means the file is on a ftp server
WAIS    means the file is on a WAIS server
news    a Usenet newsgroup
telnet  a connection to a Telnet-based service
```

If filename is ommited it means a directory.

Examples

gopher://spinfree.cm.utexas.edu/

means use gopher to connect to the internet site spinfree.cm.utexas.edu at the gopher root directory.

ftp://ftp.aol.com/aol_mac/Install_America_Online_v2.5.1.bin

means use ftp to connect to internet site ftp.aol.com the file named Install_America_Online_v2.5.1.bin is then in directory aol_mac

Site names and URLs are often placed in brackets <>. This is done by convention if the URL is longer than a line of text. The site address is also commonly placed in brackets.

For folks new to ftp

If your mac is hooked up via SLIP or PPP or ethernet to the internet then just use Fetch, X-ferit, Gopher ,Anarchie , Telnet, NetScape, Mosaic, MacWeb or who knows what on your Macintosh, Windows or OS2 machine. Of course you may need to get these programs to your computer so the following may still be useful once in your life.

The following assumes you are connected to a unix machine connected to the internet.

Generally after logging into your unix machine you simply type ftp "the sitename" which gets you a prompt something like ftp>

When ftp prompts you for a username and password, send "anonymous" as the username, and your email address as the password, for me it would be loudon@uts.cc.utexas.edu. Use your real email address as a matter of courtesy. Help usually lists available ftp commands. Most common are cd (change directory), ls (list directory), get (get the file from the ftp site to your local unix box) and quit.

Imagine I give you an URL of
ftp://ftp.aol.com/aol_mac/Install_America_Online_v2.5.1.bin

To get that file here is a typical sample UNIX ftp session:

```
ftp ftp.aol.com
Connected to ftp.aol.com.
220 ftp FTP server
 (Version wu-2.4(3) Wed Jun 29 08:27:45 EDT 1994) ready.
Name (ftp.aol.com:loudon): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password:
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd aol_mac
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
Install_America_Online_v2.5.1.bin
READ_ME_for_Mac_AOL_2.5.1.txt
226 Transfer complete.
ftp> get Install_America_Online_v2.5.1.bin
200 PORT command successful.
150 Opening BINARY mode data connection for
Install_America_Online_v2.5.1.bin (1428224 bytes).
226 Transfer complete.
1428224 bytes received in 17 seconds (80 Kbytes/s)
ftp> ascii
200 Type set to A.
ftp> get READ_ME_for_Mac_AOL_2.5.1.txt
200 PORT command successful.
150 Opening ASCII mode data connection for
 READ_ME_for_Mac_AOL_2.5.1.txt (981 bytes).
226 Transfer complete.
1017 bytes received in 0.16 seconds (6.2 Kbytes/s)
ftp> quit
221 Goodbye.

  The above site defaults to binary mode, most sites start in ascii
  mode so thats somewhat unusual. On the above site the macintosh
  files are stored as Macbinary (.bin in the file name is the tip
  off) so the file was transfered via binary (the default on that
  site). I had to change to ascii mode (by typing ascii) **BEFORE**
  I got the plain text file (.txt in the file name is the tip off).
  If the file had ended in .hqx or .uue or .doc I would have assumed
  I needed ascii mode for those files also. If it had ended in .sit,
  .zip, .cpt, .exe, .sea, .z, .Z,  I would have assumed I needed
  binary mode, you change mode by typing binary before transfering
  the file with get. If the file ended up corrupted when I got it I
  would have tried the other transfer method a second time.


Now suppose I gave you a URL of

 gopher://spinfree.cm.utexas.edu/

then on a unix box just type

 gopher spinfree.cm.utexas.edu
```

```
  then follow the menus  down to the file you want. Gopher
  understands file types so you don't have to worry on that count.
  (can't get much easier than that without a mouse!).

Now suppose I gave you a URL of

 http://www.apple.com/

then on a unix box just type

 lynx www.apple.com
or if you have a fancy Xwindows graphics display perhaps
 Mosaic www.apple.com

then follow the menus down to the file you want.


  Hopefully the files are now on your unix box. You then download
  using xmodem, zmodem ,kermit or whatever (using either ascii or
  binary mode depending on above). sz, xmodem ,kermit are usually
  the unix program names.

  On a Mac get the current version of Stuffit Expander (preferably
  with DropStuff Enhancer) and just drag the file onto it and
  generally it knows what to do with it.  If you are a unix user
  grab mcvert from info-mac and use it on your unix box to save
  download time. Etc.




FTP SITES
---------

  The two biggest archives of Macintosh software on the internet are
  info-mac, whose site name is
  ftp://sumex-aim.stanford.edu/info-mac
and umich, whose site name is
  ftp://mac.archive.umich.edu/mac/

  Many mirrors (i.e. copies) of these sites exist and you should use
  a mirror site close to you instead of the original site. The
  original sites are overloaded with requests for files so its
  pointless to even try.

In this faq and other mac documents if you see

 infomac/whatever

it means ftp to one of the info-mac mirror archives


Info-Mac Archive Mirror Sites

 ftp://ftp.info.au/micros/mac/info-mac/
```

```
 ftp://ftp.univie.ac.at/mac/info-mac/
 ftp://ftp.ucs.ubc.ca/pub/mac/info-mac/
 ftp://ftp.funet.fi/pub/mac/info-mac/
 ftp://ftp.jyu.fi/info-mac/
 ftp://ftp.ibp.fr/pub/mac/info-mac/
 ftp://ftp.cs.tu-berlin.de/pub/mac/info-mac/
 ftp://ftp.rrzn.uni-hannover.de/pub/info-mac/
 ftp://ftp.uni-kl.de/pub/info-mac/
 ftp://ftp.uni-stuttgart.de/pub/systems/mac/info-mac/
 ftp://ftp.hawaii.edu/mirrors/info-mac/
 ftp://ftp.technion.ac.il/pub/unsupported/mac/info-mac/
 ftp://ftp.iij.ad.jp/pub/info-mac/
 ftp://ftp.center.osaka-u.ac.jp/info-mac/
 ftp://ftp.u-tokyo.ac.jp/pub/info-mac/
 ftp://ftp.fenk.wau.nl/pub/mac/info-mac/
 ftp://ftp.nus.sg/pub/mac/
 ftp://ftp.lth.se/mac/info-mac/
 ftp://ftp.sunet.se/pub/mac/info-mac/
 ftp://nic.switch.ch/mirror/info-mac/
 ftp://ftp.edu.tw/Macintosh/info-mac/
 ftp://imftp.mgt.ncu.edu.tw/pub/mac/info-mac/
 ftp://src.doc.ic.ac.uk/packages/info-mac/
 ftp://amug.org/info-mac/
 ftp://ftp.pht.com//mirrors/info-mac/
 ftp://grind.isca.uiowa.edu/mac/infomac/
 ftp://mrcnext.cso.uiuc.edu/pub/info-mac/
 ftp://ftp.uu.net/archive/systems/mac/info-mac/
 ftp://wuarchive.wustl.edu/systems/mac/info-mac/


This information is also available as info-mac/help/mirror-list.txt


In this faq and other mac documents if you see

 umich/whatever

it means ftp to one of the umich mirror archives which are

 ftp://ftp.info.au/micros/mac/umich/
 ftp://ftp.bhp.com.au/mac/mirrors/umich/
 ftp://anl.anl.fr/pub/mac/umich/
<ftp://info2.rus.uni-stuttgart.de/afs/umich.edu/group/itd/archive
/mac/>
 ftp://athene.uni-paderborn.de/pcsoft3/mac/
 ftp://ftp.technion.ac.il/pub/unsupported/mac/umich/
 ftp://ftp.inter.spin.ad.jp/pub/Mac/Merit.mirror/
 ftp://ftp.iij.ad.jp/pub/mac/umich/
 ftp://ftp.u-tokyo.ac.jp/pub/mac/umich/
 ftp://ftp.sunet.se/pub/mac/mirror-umich/
 ftp://nic.switch.ch/mirror/umich-mac/
 ftp://nctuccca.edu.tw/Macintosh/umich-mac/
 ftp://ftp.ccu.edu.tw/pub/mac/
 ftp://src.doc.ic.ac.uk/packages/mac-umich/
 ftp://archive.orst.edu/pub/mirrors/archive.umich.edu/mac/
 ftp://ftp.pht.com//mirrors/umich/
 ftp://grind.isca.uiowa.edu/mac/umich/
```

```
 ftp://wuarchive.wustl.edu/systems/mac/umich.edu/

Use
 ftp://mirror.archive.umich.edu
which automagically connects you to its mirror sites.


  Other sites of special interest to Macintosh Communications are
  the tidbits archive
  ftp://ftp.tidbits.com/pub/tidbits/tisk/


  and plugging a local site that has a lot of communication and
  virus stuff

  ftp://ftp.utexas.edu/pub/mac/    (previously
  microlib.cc.utexas.edu)

and finally for Linelink owners of course

  ftp://spinfree.cm.utexas.edu/

and the Mark/Space site (Communicate Lite people)

  ftp://ftp.netcom.com/pub/mspace/





Info-Mac Mail Server(s)
-----------------------
ricevm1.rice.edu (IP number 128.42.30.2)      (mailserver only)

  Most Info-Mac files are available from LISTSERV@RICEVM1.RICE.EDU,
  the same LISTSERV that handles the Info-Mac Digest.  You can
  retrive Info-Mac files by sending an email message with a body
  containing:

$MACarch  GET    filename.filetype

to "Get an Info-Mac file". Other commandes include:

$MACarch  Help

to "Get help about $MACARCH" and

$MACarch  INDex

to "Get a list of Info-Mac files"


  You can get the above information and more by sending a message
  with the command

HELP
```

```
  in the body of the message - on a line by itself to
  LISTSERV@RICEVM1.RICE.EDU.

Warning: Remember to "turn off" your signature when mailing (.sig)


FAQ (Frequently Asked Questions) on other things
------------------------------------------------

  In general, when searching for a FAQ, always check rtfm.mit.edu in
  pub/usenet. For instance for the FAQ for comp.sys.mac.comm look in
  pub/usenet/comp.sys.mac.comm and you'll find the four-part
  posting.
     rtfm.mit.edu: pub/usenet/comp.sys.mac.comm/c.s.m.c_FAQ_[1_4]
                                                c.s.m.c_FAQ_[2_4]
                                                c.s.m.c_FAQ_[3_4]
                                                c.s.m.c_FAQ_[4_4]

E-mail on Internet, CompuServe and America Online
=================================================

  To send e-mail FROM CompuServe TO an Internet address, all you
  have to do is use the address:

INTERNET: recipient address@domain

  That is, just put INTERNET: in front of the Internet address. So
  my internet address on Compuserve would be INTERNET:
  loudon@uts.cc.utexas.edu

  To send e-mail FROM Internet TO CompuServe, just use the
  CompuServe ID number, with the comma changed to a period, followed
  by  @compuserve.com.  For instance,

12345.6789@compuserve.com

To send email to an AOL address from the internet its recipient@aol

  To send email from AOL to internet the information is. send to
  'user@domain'

So to send email to me from AOL send to loudon@uts.cc.utexas.edu
```

1.18 LineLink 144e COMMANDS

```
Date: Sun, 1 May 1994 05:29:14 -0600
From: squish@nwu.edu (Shishin "Squish" Yamada)
Subject: LineLink 144e Commands.txt (v1.0 submission)


"LineLink 144e_commands.txt"
version 1.0
4/29/94
Sent to LineLink 144e mailing list & info-mac archives
```

```
by:     Shishin "Squish" Yamada
          squish@nwu.edu
          squish@das.harvard.edu

This document uses a mono-spaced font (Monaco) that contains tabs that
are 8-spaces wide (looks nice on our unix box). You may have trouble
viewing this document if your font and tabs are not of a similar size.

This document is a list of modem commands for the Prometheus-made "LineLink
144e" modem. It is a v.32 data/fax/voice modem sold for $99(US) through
MacWarehouse (tel:1-800-255-6227) that has attracted a lot of attention
lately. Please see related files such as the "lineline-144e-faq" for more
general information about the modem and its use, if you don't already own
one. The FAQ provide helpful information, while this document is inteneded
only for owner reference purposes (not very handy without the modem).

This document is compiled from several sources. The information contained
herein is assumed to be correct, but it is used at your own risk. The sources
include the LineLink manual, Hayes modem command sets, Supra modem command
sets, Global Village modem command sets, and Fax Class 1/2 documents. Aside
from indirectly quoting manuals from modems I have purchased, I found some
information through Internet, and in general found the Prometheus BBS to
be lacking (for LineLink Mac users).

The LineLink modem comes with a "near-useless" 28 page manual. The manual
has very little technical info about its command set. This manual lacks
information about commands such as "%An" registers S16, S18, S21, and S22.
As far as I have been able to gather, the complete modem command set is:
---------------------------------------------------------------------------

Command Mode:
=============
The LineLink modem must be in command mode before commands are typed. The
modem enters the command mode when it is turned on or reset, when it loses
a connection or when it is in the data mode and the escape sequence is
generated.

Data Mode:
==========
The LineLink modem is in the data mode after it makes a connection with
a remote modem and sends appropriate the CONNECT response. Everything it
receives from the DTE is considered data that it sends over the telephone
line to the remote modem.

The following comments apply to the modem commands that follow:

  - Commands can be entered in a string, with or without spaces. The "delete"
    or "backspace" key will be ignored by the modem.

  - A command line can contain one command or a series of commands, but
    cannot exceed 40 characters in length.

  - Commands that accept numeric arguments, when not specified, will default
    to 0. Numeric values are denoted by the variables "n" or "r"

  - The AT (attention) command preceds all commands (except A/).
```

```
  - Your command line must end with a <CR> (except when using A/).

  - The escape sequence "<GT>+++<GT>" lets you return to command mode without
    breaking your connection with a remote modem. <GT> represents a guard
    time which is a delay before and after the escape sequence.

  - Factory default settings are denoted with an asterisk, and are stored
    in non-volatile memory.

Direct Commands         Description
===============================================================================
AT                      Attention command prefix (precedes all except A/)
A/                      Repeat last command.
<GT>+++<GT>             Escape Code sequence. The guard time <GT> must be set
                        using register S12. This sequence is thus preceded and
                        followed by a minimum time period of no transmission.
<CR>                    Carriage Return. Terminate current connection attempt
                        during the dialing or protocol negotiation process.


Command         Description
===============================================================================
A       Answer command. Causes modem to go off-hook, in the answer mode,
        without waiting for a ring.
Bn      Communication Standard.
          B0 = CCITT V.21 (300 bps) & V.22 (1200 bps)
         *B1 = BELL 103 (300 bps) & Bell 212A (1200 bps)
          B2 = CCITT v.23. Originating TX=75, RX=1200. Answering TX=1200, RX=75.
          B3 = CCITT v.23. Originating TX=1200, RX=75. Answering TX=75, RX=1200.
Cn      Carrier.
          C0 = Transmit carrier signal OFF.
         *C1 = Transmit carrier signal ON.
D       Dial Command. Puts the modem in the originate mode and the dial
        modifiers that follow tell the modem what, when and how to dial.
          T = Dials using tones (DTMF).
          P = Dials using pulses.
          , = Pauses (time specified by register S8) before continuing.
          W = Waits (time specified by register S7) for second dial tone.
          @ = Wait (time specified by register S7) for "quiet answer."
          ! = Issues a hook flash  and modem goes on-hook for 0.5 seconds.
          ; = Return to command state after dialing.
          Sn = Dials stored number in register n (0-3).
          L = Dials the last number.
En      Modem echos commands:
          E0 = Echo OFF.
         *E1 = Echo ON.
Hn      Hook Switch.
          H0 = Force modem on-hook (hang up).
          H1 = Force modem off-hook.
In      Identification Codes.
          I0 = Display 3-digit product ID code.
          I1 = Display ROM checksum value.
          I2 = Return OK response (ROM checksum, display ERROR if problem).
          I3 = Display ROM firmware revision level.
          I4 = Display configuration settings.
          I6 = Display chipset DSP version codes (undocumented).
Ln      Speaker Volume.
```

```
          L0,L1 = Low volume.
         *L2    = Medium volume.
          L3    = High volume.
Mn      Speaker On/Off.
          M0 = Speaker always off.
         *M1 = Speaker on until carrier detected.
          M2 = Speaker always on.
          M3 = Speaker on after dialing and until carrier detected.
Nn      Negotiation.
          N0 = When originating or answering, force line speed in register S37.
         *N1 = When originating, start auto-line feed at DCE speed in register
               S37. When answering, auto-line feed regardless of register S37.
          N2 = Same as N1 with the addition of V.23 protocol.
          N3 = When originating, force line speed given in register S37.
          N4 = Same as N3.
          N5 = When originating, start auto-line feed at DCE speed in register
               S37. When answering, force line speed given in register S37.
On      On-Line Mode.
          O0 = Return to data mode.
          O1 = Return to data mode and initiate equalizer retrain sequence.
          O3 = Go to on-line state, initiate CCITT V.32bis re-negotiation.
P       Set default dialing mode to PULSE. Sets S14 bit 5 (P,T undocumented).
Qn      Result Codes (on/off).
         *Q0 = Result Codes ON.
          Q1 = Result Codes OFF.
          Q2 = Return Result Codes when originating, but NOT when answering.
Sr?     Display s-register. Display current setting of s-register r.
Sr=n    Set r-register. Set the value of s-register r to value n.
T       Set default dialing mode to TONE. Clears S14 bit 5 (P,T undocumented).
Vn      Result Codes (type).
          V0 = Return numeric result codes.
         *V1 = Return verbal (word) result codes.
Wn      Negotiation Messages (on/off). W2 is undocumented.
         *W0 = Negotiation progress messages OFF.
          W1 = Negotiation progress messages ON. Result code is DTE rate.
          W2 = Negotiation progress messages ON. Result code is DCE rate.
Xn      Call Progress Messages.
          X0 = Call progress messages (CONNECT, NO CARRIER, and RING)
          X1 = Call progress messages and connection speed.
          X2 = Call progress messages, connection speed and DIALTONE detection.
          X3 = Call progress messages, connection speed and BUSY detection.
         *X4 = Call progress messages, connection speed, DIALTONE and BUSY.
Yn      Long Space Disconnect (on/off).
         *Y0 = Long space disconnect OFF.
          Y1 = Long space disconnect ON.
Zn      Stored User Profiles.
          Z0 = Resets and recall stored user profile 0.
          Z1 = Resets and recall stored user profile 1.

&Cn     Carrier Detect (DCD) options.
          &C0 = DCD always on.
          &C1 = DCD follows carrier state (ON when remote carrier present).
&Dn     Data Terminal Ready (DTR) options.
         *&D0 = Modem ignores status of the DTR signal.
          &D1 = Modem returns to command mode after an on-to-off DTR transition.
          &D2 = Modem goes on-hook, turns off auto answer, and returns to
                command mode after an on-to-off DTR transition.
```

```
          &D3 = Modem resets and returns to command mode after an on-to-off DTR
                transition.
&Fn     Reset modem to factory defaults stored in non-volatile memory.
          &F0 = Recall factory default settings.
          &F3 = Recall factory default settings.
&Gn     Guard tones for CCITT operations (not used for BELL operation).
         *&G0 = Disable guard tones
          &G1 = Generate 550 Hz guard tone.
          &G2 = Generate 1800 Hz quard tone.
&Jn     Telephone Jack connection. Not functional!
&Kn     Set DTE port Flow Control (can also be set with \Qn command).
          &K0 = Disable DTE flow control.
          &K1 = Return ERROR.
          &K2 = Return ERROR.
          &K3 = Enable bidirectional flow control (RTS/CTS).
          &K4 = Enable Software flow control (XON/XOFF).
          &K5 = Enable Transparent (XON/XOFF) Software flow control.
&Ln     Leased-Line option. Undocumented (defaults to &L0)!
&Mn     Same function as &Q(0-3) settings.
&Pn     Pulse dialing MAKE/BREAK ratios.
         *&P0 = Make/break ratio is 39%/61% (US/CANADA).
          &P1 = Make/break ratio is 33%/67% (UK/Hong Kong).
&Qn     Asynchronous/Synchronous operation.
          &Q0 = Asynchronous operation (must use for V.23 connection).
          &Q1 = Synchronous Mode 1: Async dialing using AT commands, switch to
                Sync mode after dialing.
          &Q2 = Synchronous Mode 2: Dial telephone number stored in location 0
                after an off-to-on DTR transition (use with Sync terminals).
          &Q3 = Synchronous Mode 3: Use telephone to manually originate a Sync
                call, and enter Sync mode after off-to-on DTR transition.
          &Q4 = Return ERROR.
         *&Q5 = Make connection using V.42bis Async Reliable Mode.
          &Q6 = Make connection using standard Async buffered Data Mode.
&Rn     PC/Mac Flow Control options (contrary to manual, &R0 is default).
         *&R0 = PC Mode. DTR and RTS signals function normally.
          &R1 = Mac Mode. When configured for bidirectional flow control, DTR
                is recognized as RTS by the modem.
&Sn     Data Set Ready (DSR) options.
         *&S0 = DSR always on.
          &S1 = DSR active when modem is in Data Mode.
&Tn     Modem Test Command Selection.
          &T0 = End test in progress.
          &T1 = Perform Local Analog Loopback Test.
          &T3 = Perform Local Digital Loopback Test.
         *&T4 = Accept a remote modem request for Digital Loopback Test.
          &T5 = Ignore a remote modem request for Digital Loopback Test.
          &T6 = Perform a Remote Digital Loopback Test.
          &T7 = Perform a Remote Digital Loopback with self-test.
          &T8 = Perform Analog Loopback Test with self-test.
&Un     Trellis Coding (on/off).
         *&U0 = Trellis coding ON (V.32 9600bps only).
          &U1 = Trellis coding OFF.
&V      View Active Configuration of s-registers and stored phone numbers.
&Wn     Store Active Profile.
          &W0 = Save active configuration as profile 0.
          &W1 = Save active configuration as profile 1.
&Xn     Synchronous Transmit Clock Source. Not supported! Default is &X0.
```

```
&Yn      Select Stored Power-Up Configuration Profile.
          *&Y0 = Load profile 0 after reset or power-up.
           &Y1 = Load profile 1 after reset or power-up.
&Zx=n    Store telephone number n into register x (0-3). Up to 36 characters.

\Cn      Set MNP Buffering Method.
          *\C0 = No buffer used while establishing a reliable connection.
           \C1 = Buffer data for 3 seconds untill 200 characters are received
                 or until modem detects a Sync character. Modem switches to
                 standard (non-reliable) operation if buffer fills with data.
           \C2 = This command is used with the auto-reliable fall-back character
                 command %A. Data is not buffered while establishing a reliable
                 connection. Modem falls back to standard buffered operation
                 upon detection of the auto-fallback character.
\Gn      Set modem port flow control during standard buffered mode connection.
          *\G0 = Turn OFF port flow control.
           \G1 = Turn ON port flow control (use if the modem is receiving data
                 from the remote system faster than it can process it).
\Kn      Set Break Control. Set n from 0 to 5 (default is 5).
\Nn      Request link type. This is the type of connection in Async mode (&M0).
           \N0 = Standard Mode (non-MNP, buffered data).
           \N1 = Direct Mode (non-MNP, data not buffered).
           \N2 = Reliable Mode (MNP operation).
           \N3 = Auto-Reliable Mode (MNP if remote MNP modem, else standard).
           \N4 = LAPM Reliable Mode (V.42bis).
           \N5 = Auto-Reliable LAPM and buffered mode.
          *\N6 = Auto-Reliable LAPM, MNP, and buffered mode.
\Qn      Set DTE port flow control (alternative to the &Kn command).
           \Q0 = Disable DTE flow control.
           \Q1 = Bidirectional software flow control (XON/XOFF).
           \Q2 = Unidirectional hardware flow control (CTS).
          *\Q3 = Bidirectional hardware flow control (RTS/CTS).
           \Q4 = Unidirectional software flow control from modem (XON/XOFF).
\Tn      Inactivity Timer. Set n from 0 to 90 mins. (default is 0 - disabled)
           If no data activity during set time, then modem will disconnect.
\V       MNP Result Codes.
          *\V0 = MNP Result Codes OFF.
           \V1 = MNP Result Codes ON.
\X       Set XON/XOFF pass through flow control. Only effective for standard
           buffered connection with XON/XOFF (\Q1) flow control enabled.
          *\X0 = Modem will act on XON\XOFF received from the local DTE, but
                 will not pass XON/XOFF to the remote modem.
           \X1 = Modem will act on XON\XOFF received from the local DTE, but
                 will also pass XON/XOFF to the remote modem. This allows the
                 local DTE to XON/XOFF the remote DTE through the established
                 modem link.

%An      UNKNOWN COMMAND??? (0 <= n <= 255). Not listed in manual.
%Cn      MNP5 Data Compression.
           %C0 = MNP5 Disabled.
          *%C1 = MNP5 Enabled.
%Dn      Dictionary Size (used for MNP5 data compression?).
           %D0 = 0.5 kbyte dictionary.
           %D1 = 1 kbyte dictionary.
          *%D2 = 2 kbyte dictionary.
%En      Auto-Retrain.
          %E0 = Disable auto-retrain.
```

```
        *%E1 = Enable auto-retrain at 2400 bps when line quality is poor.


S Registers     Decription
===============================================================================
S0      Number of Rings to Auto Answer (0-255. Default is 0 = disabled).
S1      Count incoming rings (0-255). Resets after 8 secs after last ring.
S2      Escape Code character (0-255 Default is 43 "+"). Values greater
          than 127 disable the feature, preventing a return to command mode,
          unless a hang-up or DTR transition takes place.
S3      Carriage Return Character <CR>. (0-127. Default is ascii 13). Used
          to signal the end of the command line string in command mode.
S4      Line Feed Character <LF>. (0-127. Default is ascii 10). Used when
          the modem sends Result Codes. Cannot be totally disabled.
S5      Backspace Character <BS>. (0-32, 127-255. Default is ascii 8).
S6      Wait for Dialtone (2-255. Default is 2 seconds). When the modem
          executes a dial command. This tells how long to wait after going
          off-hook before beginning to dial.If the modem doesn't receive a
          dialtone before S6 elaspes, then will get a "NO DIALTONE" response.
S7      Wait time for carrier. (1-120. Default is 40 seconds). This tells
          the modem how many seconds to wait for a remote modem's carrier
          signal before hanging up and returning a "NO CARRIER" response.
S8      Pause time for comma. (0-255. Default is 2 seconds). The amount of
          time to pause each time the modem encounters a comma in the dial
          command line. This is useful when dialing through a PBX or to stop
          call-waiting (ATDT *70,555-1212).
S9      Carrier Detect response time. (1-255. Default is 6 tenths seconds).
          This is how long the remote modem's carrier (in 1/10 seconds) must
          be present, so it cannot be mistaken for a busy signal, ring, or
          voice. Increasing the time reduces the chances the modem will
          mistake line noise for a carrier signal.
S10     Carrier Loss Time. (1-255. Default is 14 tenths seconds). This is
          the time (in 1/10 seconds) between the loss of a remote modem's
          carrier signal and the LineLink disconnecting. The value can be
          increased to ignore carrier dropouts on a noisy line, or they
          can be reduced to make the modem automatically hang up and allow
          call-waiting calls to ring through. To ignore the Data Carrier
          Detect and have the LineLink act as if the remote modem's carrier
          is always present, set this value to 255. Setting this to a value
          less than the value in register S9, causes the modem to disconnect
          when it detects a momentary carrier loss, because register S10
          expires before the carrier respone time expires.
S11     Touch-Tone (DTMF) Dialing Speed. (50-255. Default is 75 ms). This
          is the speed of dialing (in milliseconds) during which the DTMF
          tones are held for each digit (it does not affect pulse dialing,
          which is fixed at 10 pulses per second).
S12     Guard Time Value. (0-255 in 1/50 seconds. Default 40/50 seconds).
          This sets the guard time <GT> delay required before and after the
          escape code sequence (usually "<GT>+++<GT>") before returning to
          the Command mode.
S14     Bit-mapped register (default value is 170) that provides the
          following functions (equivalent commands shown in parentheses):
          Bit 0,2: Disaply Result Codes.
                       Bit0    Bit2    AT Command
                       0       0       (Q0)
                       0       1       (Q1)
                       1       0       (Q2)
```

```
          Bit 1: Echo commands to DTE.
                   0 = Do not echo commands (E0)
                   1 = Echo commands (E1)
          Bit 3: Word or number responses.
                   0 = Send number responses (V0)
                   1 = Send word responses (V1)
          Bit 4: Accept/Ignore commands.
                   0 = Accept commands.
                   1 = Ignore commands
          Bit 5: Default Dialing method.
                   0 = Touch-Tone (T)
                   1 = Pulse (P)
          Bit 6: Reserved for later use.
          Bit 7: Answer/originate operation.
                   0 = Answer (A and R)
                   1 = Originate (D)
S23     Bit-mapped register (default value 7) that provides the following
          test functions (equivalent commands shown in parentheses):
          Bit 0: Remote modem request for Remote Digital Loopback Test.
                   0 = Ignore request (&T5)
                   1 = Grant request (&T4)
          Bit 1,2,3: DTE speed (auto-detect by modem).
                        Bit1    Bit2    Bit3    DTE Speed
                        0       0       0
                        0       0       1       300 bit/s
                        0       1       0       1200 bit/s
                        0       1       1       2400 bit/s
                        1       0       0       4800 bit/s
                        1       0       1       9600 bit/s
                        1       1       0       19.200 bit/s
                        1       1       1       38,400 bit/s
          Bits 4,5: Parity setting (auto-detect by modem).
                        Bit5    Bit4    Parity Setting
                        0       0       Even parity
                        0       1       Space parity
                        1       0       Odd parity
                        1       1       mark parity
          Bits 6,7: Guard tones.
                        Bit7    Bit6    Guard Tone Type
                        0       0       Guard tones disabled (&G0)
                        0       1       550 Hz guard tone (&G1)
                        1       0       1800 Hz guard tone(&G2)
                        1       1       Reserved for later use.
S25     DTR Delay. When command &M1 is in effect, this specifies the number
          of seconds (default = 5) that the modem waits after a connection
          has been made before examining the DTR signal. This delay allows
          an asynchronous terminal to be detached from the modem and a
          synchronous terminal connection made while remaining in the Data
          Mode. After this delay S25 reverts to hundredths of seconds.
S26     RTS/CTS Delay. This is the number of 1/100 seconds (default is 1)
          that specifies the time delay between RTS and the CTS response.
S27     Bit-mapped register for Test Functions (default value is $49H).
          The equivalent commands are shown in parentheses:
          Bit 0,1,3: Communication operation.
                Bit3 Bit1 Bit0  Command
                0    0    0     Asynchronous operation (&M0,&Q0)
                0    0    1     Synchronous operation after dialing (&M1, &Q1)
```

```
                0    1    0     Synchronous terminal support (&M2, &Q2)
                0    1    1     Manually originate synchronous call (&M3, &Q3)
                1    0    0     Not valid
                1    0    1     Asynchronous error control (&Q5)
                1    1    0     Aysnchronous buffered mode (&Q6)
                1    1    1     Not valid
          Bit 2: Leased Line Option.
                0 = Dial up line (&L0)
                1 = Leased line (&L1)
          Bit 3: Reserved for later use.
          Bit 4,5: Synchronous timing selection.
                Bit5    Bit4    Command
                0       0       Modem give sync TX clock on EIA pin 15 (&X0)
                0       1       Modem accepts ext sync clock (&X1)
                1       0       receive clock (slave timing) (&X2)
          Bit 6,7: Communication Standard.
                Bit 6   Bit7    Command
                0       0       CCITT V.21/V.22 (B0)
                1       0       BELL 103/212A (B1)
                0       1       CCITT V.23 (B2)
                1       1       CCITT V.23 (B3)
S30     Automatic Timeout (in tens of seconds). This specifies the number of
          seconds the modem waits with no activity, before disconnecting (in
          10 second increments). Default is 0, which disables it.
S36     Negotiation Fallback. When the initial attempt to connect in error-
          control mode fails, this specifies what occurs next (default = 7).
                0 = Hang up
                1 = Attempt a direct asynchronous connection
                                    (&Q0)
                2 = UNKNOWN???
                3 = Attempt an asynchronous connection using automatic
                                          speed buffering (&q6).
                4 = Attempt a CCITT V.42 Alternative Protocol connection
(MNP 2-4); if
                     (MNP 2-4); if negotiation fails, hang up.
                5 = Attempt a CCITT V.42 Alternative Protocol connection
                     (MNP 2-4); if fails, attempt a direct async connection.
                6 = UNKNOWN???
                7 = Attempt a CCITT V.42 Alternative Protocol (MNP 2-4).
          Note: The selected fallback option can be initiated immediately
with S48.
          For example, a connection attempt using the MNP can be forced by
setting
          S48=128 and S36=5 or 7.
S37     Maximum DCE Line Speed S37 selects the speed (for all modes except
          CCITT V.24bis) at which the modem attempts to connect with a
          remote modem; the speed selected will be the highest DCE speed
          supported by both modems (see S93 for CCITT V.25bis modes).
                0  = Speed of last AT command issued
                1  = 75 bps
                2  = 110 bps
                3  = 300 bps
                5  = 1200 bps
                6  = 2400 bps
                7  = 4800 bps
                8  = 7200 bps
                9  = 9600 bps
```

```
            10 = 12000 bps
            11 = 14400 bps
S38     Delay Before Forced Hangup. This specifies the number of seconds the
          modem waits when in error-control mode (&Q5) before disconnecting
          (default is 20). This occurs after receiving the command to hang up
          or a DTR on-to-off transition. If set to 0, the modem does not wait
          for data in the buffers to clear (gives NO CARRIER response). If
          the register is set to a value between 0 and 254, the modem will
          wait the number of seconds, or until all data has been transferred,
          before hanging up. If set to 255, the modem will not hang up until
          all data is transferred.
S39     Bit-map of Negotiation state (AT-Command N).
                Bit5    Bit4    Bit3    AT-Command
                0       0       0       (N0)
                0       0       1       (N1)
                0       1       0       (N2)
                0       1       1       (N3)
                1       0       0       (N4)
                1       0       1       (N5)
S46     Compression Error Protocol Selection (values are only 136 or 138).
          Default is 138 (affects v.42/v.42bis mode).
                136 = Disable Compression.
                138 = Enable Compression.
S48     V.42 Feature Negotiation (values of only 0,7, or 128). This defines
          whether feature negotiation is to be performed by the modem. The
          feature negotiation process allows the modem to ascertain the
          remote system's capabilities. If these capabilities are already
          known and negotiation is not necessary, this can be skipped.
                0   = Disable Negotiation, proceed with LAPM.
                7   = Enable Negotiation (default).
                128 = Disable Negotiation, fallback per S36 setting.
S49     Minimum Buffer Size (in bytes). Default is 10 bytes. This specifies
          the minimum size of the buffer used in error-control or automatic
          speed buffering mode. Should be less than S50.
S50     Maximum Buffer Size (in bytes). Default is 200 bytes. This specifies
          the maximum size of the buffer used in error-control or automatic
          speed buffering mode. Should be greater than S49.
S63     Leased-Line carrier power level in dBm (0-15. Default is 0). This
          specifies a carrier level value that is not to be exceeded.
S82     Break Signaling Technique (values of only 3,7, and 128). This gives
          a method of break signal handling for CCITT V.42 communications:
          in-sequence, expedited, and destructive. Break signals provide a
          way to get the attention of the remote host. The break type used
          depends on the application.
                3   = Expedited signaling used regardless of sequence in
                      transmitted and received data; current data integrity
                      is maintained.
                7   = Destructive signaling used regardless of sequence of
                      transmitted and received data; data in process at that
                      time is destroyed.
                128 = In-sequence signaling used as data is transmitted and
                      received; data integrity is maintained ahead of and
                      immediately after the break.
S86     Connection Failure Result Code (values of 0, or 4-15). This helps to
          determine the cause of a connection failure. When the modem issues
          a NO CARRIER result code, a value is written to this S-register.
          To read this register following the connection failure, issue an
```

```
          ATS86? <CR>. The modem will report one of the values below.
                0  = Normal hang up; no error occurred.
                4  = Physical carrier loss.
                5  = Feature negotiation failed to detect presence of another
                     error-control modem at the other end.
                6  = Other error-control modem did not respond to feature
                     negotiation message sent by this modem.
                7  = Other modem is sych-only; this modem is async-only.
                8  = Modems could not find a common framing technique.
                9  = Modems could not find a protocol in common.
                10 = Incorrect feature negotiation sent by other modem.
                11 = Sync information (data of flags) not received from
                     other modem. Modem waited 30 seconds before hanging up.
                12 = Normal disconnect initiated by other modem.
                13 = Other modem did not respond after many transmissions of
                     the same message. Modem made 10 attempts, then hung up.
                14 = Protocol violation occurred.
                15 = Compression failure.

          Note: Multiple occurences may contribute to a NO CARRIER message;
          Register S86 only records the first event that occurred.

=================
The LineLink firmware DOES support caller ID detection.  The modem will
display the caller id it receives from the phone co.  The only problem
is the modem will then crash and require a powercycle to get it back
because the LineLink lacks a relay switch on its board.

To try the caller ID yourself do the following: enter "AT#VS4" <CR> after
the OK. Set the port speed to 19.2k and enter "AT#CC1" <CR> to display
formatted caller id output.
=================

FAX Commands:

The following fax commands assume the baud rate is set at 19.2k. These
commands have not yet been fully tested, but appear to comply to most
Class 1 and Class 2 fax-modems. Fax commands are like "AT" commands,
and must be preceded by the "AT" string (ie AT+FAA=1).

FAX commands of special interest are:

        +FAE=n  (CLASS 1 Only) Adaptive Answer / Silent Answer Mode Control
                 0       Disable Both
                 1       Adaptive Answer ONLY
                 2       Adaptive Answer & Silent Answer
                 3       Silent Answer ONLY
        +FAA=n  (CLASS 2 Only) Adaptive Answer / Silent Answer Mode Control
                 0       Disable Both
                 1       Adaptive Answer ONLY
                 2       Adaptive Answer & Silent Answer
                 3       Silent Answer ONLY

Connection Result Codes:

Numeric Verbose
0       OK
```

```
1       CONNECT                 (300 bps)
2       RING
3       NO CARRIER
4       ERROR
5       CONNECT 1200
6       NO DIALTONE
7       BUSY
8       NO ANSWER
9       CONNECT 0600
10      CONNECT 2400
11      CONNECT 4800
12      CONNECT 9600
13      CONNECT 7200
14      CONNECT 12000
15      CONNECT 14400
16      CONNECT 19200
17      CONNECT 38400
18      CONNECT 57600
19      CONNECT 115200          (Not Currently Supported on MOST models)
22      CONNECT 1200/75         (Models with v.23 support only)
23      CONNECT 75/1200         (Models with v.23 support only)

24      DELAYED
32      BLACKLISTED
33      FAX
35      DATA

40      CARRIER 300
44      CARRIER 1200/75         (Models with v.23 support only)
45      CARRIER 75/1200         (Models with v.23 support only)
46      CARRIER 1200
47      CARRIER 2400
48      CARRIER 4800
49      CARRIER 7200
50      CARRIER 9600
51      CARRIER 12000
52      CARRIER 14400

66      COMPRESSION: CLASS 5    (MNP 5)
67      COMPRESSION: V.42BIS    (BTLZ)
69      COMPRESSION: NONE

70      PROTOCOL: NONE
77      PROTOCOL: LAP-M         (V.42)
80      PROTOCOL: ALT           (MNP)
+FC     +FCERROR
```

1.19 LineLink S-Registers

```
S Register List
for LineLink 144e


S0  Auto-answer
```

```
  Range       Default

   0-255 rings   0      This register determines the
                number to rings the modem will
                count before automatically
                answering a call.  A value of 0 will
                prevent the modem from
                answering.  Values from 1 thru
                255 are the number of rings the
                modem will count before
                answering.  The default value is 0.

S1   Count Incoming Rings
   Range      Default

   0-255 rings   43      This register counts the number of
                incoming rings.  When the value in
                this register equals the value in
                Register S0, the modem answers.
                This register resets approximately
                8 seconds after the last ring.

S2   Escape Character
   Range      Default

   0-127 ASCII   43      Register S2 sets the ASCII value of
                the escape characters, used to
                switch the modem from Data
                Mode to Command Mode without
                losing the connection to the
                remote modem.  Values greater
                than 127 disable the escape
                feature, preventing a return to the
                Command Mode.  If the modem
                will be used to automatically
                answer incoming calls, either
                disable the escape characters of
                set them to a value other than
                that used by the originating
                modem.  To return to Command
                Mode with the escape characters
                disabled, the remote modem must
                hang up or an ON-to-OFF
                transition of the DTR interface
                signal must occur with the &D1,
                &D2, or &D3 command in effect.

S3   Carriage return character.
   Range       Default

   0-127 ASCII   13      Register S3 sets the ASCII value of
                the carriage return (end-of-line)
                character.  This is the character
                used to end the command line
                (and have the modem execute the
                line) and also the character that
                appears after the modem sends a
```

```
                 response.

S4   Line feed character.
   Range       Default

   0-127 ASCII   10      Register S4 sets the ASCII value of
                 the line feed character.  The
                 modem sends the  line feed
                 character after a carriage return
                 only when word responds are sent
                 (v1command in effect).  If a line
                 feed characters is not
                 wanted,change the register value
                 to a null character ( the line feed
                 character cannot be totally
                 disabled).

S5 Backspace character.
   Range      Default

   0-32, 127 ASCII   8      Register S5 sets the ASCII value of
                 the backspace character.  This
                 character is both the character
                 created by pressing the Backspace
                 key and the character echoed to
                 move the cursor to the left.  To
                 change the register value, assign
                 an ASCII value between 0 and 32,
                 or greater than 127.  Do not use
                 values between 33 and 126 since
                 they correspond to printable
                 ASCII characters.

S6   Wait for dial tone.
   Range      Default

   2-255 seconds   2      When the modem executes a Dial
                 command line with the X0, X1, or
                 X3 response set in effect, Register
                 S6 tells the modem how long to
                 wait after going off hook before it
                 dials the first digit in the Dial
                 command line.  This feature is
                 convenient when it takes linger
                 than two seconds to obtain a dial
                 tone.  If the modem does not
                 detect a dial tone when the tome
                 in Register S6 elapses, you will
                 receive the NO DIALTONE (or 6)
                 response.
```

```
S7   Wait time for carrier.
   Range       Default

   1-60 seconds   40      Register S7 tells the modem how
                  many seconds to wait for a remote
                  modem’s carrier signal before
                  hanging up.  the register value can
                  be increased if the modem does
                  not detect a carrier within the
                  specified time.  If the modem
                  detects a remote carrier signal
                  within the specified time, it sends
                  a CONNECT response and enters
                  Data Mode.  If it does not detect a
                  remote carrier signal within the
                  specified time, it sends the NO
                  CARRIER (or 3) response, hangs up
                  and returns to the Command
                  Mode.

S8   Pause time for comma.
   Range       Default

   0-255 seconds   2      Register S8 tells the modem how
                  many seconds to pause for each
                  comma (,) it encounters in a Dial
                  command line.  The comma is used
                  when dialing through a PBX or
                  other special telephone service to
                  wait for an outside telephone line.
                  An alternative to changing this
                  register value is to include more
                  than one comma in your command
                  line.

S9   Carrier Detect response time.
   Range       Default

   1-255      06      Register S9 tells the modem how
   1/10 seconds         long the remote modem’s carrier
                  signal must be present so the
                  modem does not mistake the
                  signal for a busy signal, ring, or
                  voice.  The factory setting requires
                  the modem to listen to the carrier
                  signal for at least 0.6
                  seconds before recognizing it.
                  Increasing the time in this register
                  reduces the chances that the
                  modem will mistake noise such as
                  a busy signal or voice for a carrier
                  signal.  For example, entering a
                  value 15 means that the remote
                  modem’s carrier signal must be
                  present for 1.5 seconds for the
                  modem to recognize it.
```

```
S10    Carrier loss time.
   Range       Default

   1-255      14      Register S10 sets the time
   1/10 seconds         between the loss of a remote
                  modem’s carrier signal and when
                  the modem disconnects.  This
                  allows the remote modem’s carrier
                  signal to momentarily disappear
                  from the telephone line without
                  the modem disconnecting.  the
                  factory setting can be changed to a
                  higher value when a noisy
                  telephone line that might interfere
                  with the remote modem’s carrier
                  signal.  To have the modem ignore
                  the Data Carrier Detect status and
                  act as if the remote modem’ s
                  carrier signal is always present,
                  set the value to 255.  Assigning a
                  value smaller than the value in
                  Register S9 causes the modem to
                  disconnect when it detects a
                  momentary carrier less, because
                  Register S10 expires before the
                  carrier response time expires.


S-Register               Description
S11   Range      Default

   50-255 ms   75      Register S11 controls the speed of
                  the Touch-Tone (DTMF) dialing.
                  Increasing the register value to
                  255 slows the dialing rate to 1.9
                  digits per second.  Do not select a
                  value less than 50 milliseconds.
                  (Register S11 has no effect on
                  pulse dialing, which is fixed at 10
                  pulses per second.)

S12   Return to data mode timer.
   Range      Default

   0-255 1/50 seconds   40   Register S12 controls the time
                  delay before typing the escape
                  characters.  Register S12 controls
                  the time before returning to data
                  mode after receiving escape
                  characters unless "AT" command
                  is received.

S14   Functions
   Range       Default
   Bit Mapped   170      Register S14 is a bit-mapped
                  register and provides the
```

```
                  following functions (equivalent
                  commands are shown in
                  parentheses):

            Bit 0&2   Bit0   Bit2   AT Command
                  0    0    Q0
                  0    1    Q1
                  1    0    Q2

            Bit 1    Echo commands to DTE
               0    Do not echo commands (E0)
               1    Echo commands (E1)

            Bit 3    Word or number responses
               0    Send number responses (V0)
               1    Send word responses (V1)

            Bit 4    0   Accept commands
               1     Ignore commands

            Bit 5    Dialing method
               0    Touch-Tone (T)
               1    Pulse (P)

            Bit 6    Reserved c

            Bit 7    Answer/originate operation
               0    Answer (A and R)
               1    Originate (D)

S23   Test functions
   Range       Default

   Bit Mapped   007      Register S23 is a bit-mapped
                  register and provides the
                  following test functions
                  (equivalent commands are shown
                  in parentheses):

         Bit 0       Response to remote modem request for
               Remote Digital Loopback Test
               0     Ignore request (&T5)
               1    Grant request (&T4)

         Bits1, 2, 3    DTE speed
               3    2    1
                    0    0    0
               0    0    1    300 bit/s
               0    1    0    1200 bit/s
               0    1    1    2400 bit/s
               1    0    0    4800 bit/s
               1    0    1    9600 bit/s
               1    1    0    19.200 bit/s
               1    1    1    38,400 bit/s

         Bits 4,5    Parity setting
               5    4
```

```
              0   0   Even parity
              0   1   Space parity
              1   0   Odd parity
              1   1   mark parity

        Bits 6,7   Guard tones
              7   6
              0   0   Guard tones disabled (&G0)
              0   1   550 Hz guard tone (&G1)
              1   0   1800 Hz guard tone(&G2)
              1   1   Reserved

S25   DTR Delay.
   Range      Default

   0-255 seconds   5      If the &M1 command is in effect,
                  Register S25 specifies the number
                  of seconds that the modem waits
                  after a connection has been made
                  before examining the DTR lead.
                  This delay allows a asynchronous
                  terminal to be detached from the
                  modem and a synchronous
                  terminal connection while
                  remaining in the Data Mode.  After
                  this delay S25 reverts to
                  hundredths of seconds.

S26   RTS/CTS Delay
   Range      Default

   0-255 hundreds   001   Sync Mode only.  Register S2
   of seconds            specifies the time in hundreds
                  of second increments, of the
                  delay between RTS and the CTS
                  response.

S27   Test Function
   Bit mapped      49H   Register S27 is a bit-mapped
               register and provides the following test
               functions (equivalent commands are
               shown in parentheses):

            Bit 0,1,3   Communication operation
3   1   0
0   0   0   <M>Asynchronous operation (&M0,&Q0)
0   0   1    Synchronous operation after dialing (&M1, &Q1)
0   1   0   Synchronous terminal support (&M2, &Q2)
0   1   1   Manually originate synchronous call (&M3, &Q3)
1   0   0   Not valid
1   0   1   Asynchronous error control (&Q5)
1   1   0   Aysnchronous buffered mode (&Q6)
1   1   1   not valid
            Bit 2      0 Dial up line (&L0)
                  1 Leased line (&L1)

            Bit 3      Reserved
```

```
            Bit 4,5    Synchronous timing selection
5   4
0   0   Modem provides synchronous transmit clock on EIA pin
      15 (&X0)
0   1   Modem accepts external synchronous clock (&X1)
1   0   receive clock (slave timing) (&X2)

            Bit 6 & 7   Bit 6   Bit7   AT Command
            0      0         B0
            1        0         B1
            0      1         B2
            1      1         B3

S30   Automatic Timeout.
   Range      Default   Register S30 specifies the number
   0-255      0      of seconds the modem waits
                  without activity, before
                  disconnecting.  Timing is in 10
                  second increments.
```

```
S36   Negotiation Faltback
   Range      Default

   0-7         7      When the initial attempt to
                  connect in error-control mode
                  fails, S36 specifies what should
                  occur next.

                  0   Hang up
                  1   Attempt a direct
                     asynchronous connection
                     (&Q0)
                  2
                  3   Attempt an asynchronous
                     connection using automatic
                     speed buffering (&q6).
                  4   Attempt a CCITT V.42
                     Alternative POrotocol
                     connection (MNP 2-4); if
                     negotiation fails, hang up.

                  5   Attempt a CCITT V.42
                     Alternative Protocol
                     connection (MNP  ); if
                     negotiation fails, attempt a
                     direct asynchronous
                     connection.
```

```
                  6
                  7   Attempt a CCITT V.42
                     Alternative Protocol
                     connection (MNP
                     compatible); if negotiation
                     fails, attempt an
                     asynchronous connection
                     using automatic speed
                     buffering.

Note: The selected fallback option can be initiated immediately with
S48.  For example, a connection attempt using the MNP can be forced
by setting S48=128 and S36=5 or 7.



S37   Maximum DCE Line Speed

                  S37 selects the speed (for all
                  modes except CCITT V.24bis) at
                  which the modem attempts to
                  connect with a remote modem; the
                  speed selected will be the highest
                  DCE speed supported by both
                  modems (see S93 for CCITT
                  V.25bis modes).

                  0    Speed of last AT command
                     issued
                  1   75 bps
                  2   110 bps
                  3   300 bps
                  5   1200 bps
                  6   2400 bps
                  7   4800 bps
                  8   7200 bps
                  9   9600 bps
                         10   12000 bps
                  11   14400 bps

S38    Delay Before Forced Hangup

   Range       Default

   0-255      20      S38 specifies the number of
                  seconds the modem waits when in
                  error-control mode (&Q5) before
                  disconnecting after receiving the
                  command to hang up or an on-to-
                  off transition of DTR.  The range
                  for this register is 0-255 seconds;
                  the default to 20 seconds.  If the
                  register is set to 0, the modem
                  does not wait for data in the
                  buffers to clear (gives NO CARRIER
                  response).  If the register is set to
                  a value between 0 and 254, the
```

```
                  modem will wait the number of
                  seconds, or until all data has been
                  transferred, before hanging up.
                  (If data clears gives of response, if
                  not gives NO CARRIER response).
                  If the register is set to 255, the
                  modem will not hang up until all
                  data is transferred.

S39   ATN Command Bit Map
               Bit 5   Bit 4   Bit 3   AT Command
               0   0   0   N0
               0   0   1   N1
               0   1   0   N2
               0   1   1   N3
               1   0   0   N4
               1   0   1   N5

S46   Compression Error Control protocol Selection
   Range      Default

   136,138      138      Register S46 enables d
                  13   No compression
                  138 Compression

48   Feature Negotiation Action
   Range      Default

   0, 7, 128      7      Register S48 defines whether
                  feature negotiation is to be
                  performed by the modem.  The
                  feature negotiation process allows
                  the modem at ascertain the
                  remote system's capabilities.  If
                  these capabilities are already
                  known and negotiation is not
                  necessary, this feature can be
                  bypassed.

                  0    Negotiation disabled.
                     Modem assumes the remote
                     modem is configured
                     properly to make a
                     connection, bypasses the
                     detection and negotiation
                     phases, and proceeds with
                     the protocol selected by
                     Register S46.
                  3   Reserved
                  7   Negotiation enabled.
                  128   Negotiation disabled.  Forces
                     immediate fallback as
                     specified in Register S36.
                     Can be used to force the
                     V.42 alternative protocol
                     (compatible with MNP),
                     bypassing the detection and
```

```
                    negotiation phases.

S49   Buffer Lower Limit
   Range      Default

   0-255      10      S49 specifies the minimum size of
                  the buffer used in error-control or
                  automatic speed buffering mode.
                  The range is 1-255 bytes; the
                  default setting is 10.

S50   Buffer Upper Limit
   Range      Default

   0-255      200      S50 specifies the maximum size of
                  the buffer used in error-control of
                  automatic speed buffering mode.
                  The range is 2-255 bytes; the
                  default setting is 200.

S63   Private Circuit Carrier Level
   Range       Default

   0-15         0      S63 specifies the carrier power
                  level in dBm for leased line
                  operation.  This register specifies a
                  carrier level value that is not to be
                  exceeded.  The range of this
                  register is 0-15 (0 to - 15 dBm).
                  The default setting is 0.

S82   Beak Signaling Technique
   Range      Default

   3, 7, 128      128      S82 selects a method of break
                  signal handling for CCITT V.42
                  communications: in sequence,
                  expedited, and destructive.  Break
                  signals provide a way to get the
                  attention of the remote host.  The
                  break type used depends on the
                  application.

                  3   Expedited signaling used
                     regardless of sequence in
                     transmitted and received
                     data; data integrity
                     maintained.

                  7   Destructive signaling used
                     regardless of sequence of
                     transmitted and received
                     data; data in process at time
                     is destroyed.

                  128   In sequence signaling used
                     as data is transmitted and
```

```
                     received; data integrity
                     maintained ahead of and
                     after break.



S86   Connection Failure Cause Code
   Range      Default

   0, 4-15      None      S86 helps determine the cause of
                  a connection failure.  When the
                  modem issues a NO CARRIER
                  result code, a value is written to
                  this S-register.  To read this
                  register following the connection
                  failure, issue ATS86? <CR>.  The
                  modem will report one of the
                  values below.

                  0   Normal hang up; no error
                     occurred.
                  4   Physical carrier loss.
                  5   Feature negotiation failed to
                     detect presence of another
                     error-control modem at the
                     other end.
                  6   Other error-control modem
                     did not respond to feature
                     negotiation message sent by
                     this modem.
                  7   Other modem is sychronous-
                     only; this modem is
                     asynchronous-only.
                  8   Modems could not find a
                     common framing technique.
                  9   Modems could not find a
                     protocol in common.
                  10   Incorrect feature negotiation
                     message sent by other
                     modem.
                  11   Synchronous information
                     (data of flags) not received
                     from other modem.  Modem
                     waited 30 seconds before
                     hanging up.
                  12   Normal disconnect initiated
                     by other modem.
                  13   Other modem did not
                     respond after many
                     transmissions of the same
                     message.  modem made 10
                     attempts then hung up.
                  14   Protocol violation occurred.
                  15   Compression failure.

Note: Multiple occurences may contribute to a NO CARRIER message;
S86 records the first event that occurred.
```

1.20 FAX and DATA modems with voice Mail

VoDaFax

EXTENDED AT COMMANDS

FAX & DATA MODEMS
WITH VOICE MAIL AND BUSINESS AUDIO CAPABILITY

REV 2.31 December 1993

Note that this is the final document describing the command set supported by the 3.15(a-z) series firmware. The final firmware in this series is 3.15V1 1.

This document is for use by developers of application software to support Sierra Voice and fax modems. It represents the production released commands implemented as of December 1993 and is intended for use with our ST 4743 chipset which supports Class 2 9600 fax , 2400 data , MNP and V.42bis as well as voice. Caller ID and Business Audio are also supported.

Sierra's command set has been field proven and is used in production VoDaFax devices. Sierra modems that support this command set will include the string "voice 2.3" in the response to ATI4.

Revised December 1993

PURPOSE OF DOCUMENT

This document specifies Sierras VoDaFax product firmware and software interface for addition of voice processing functions to Sierras Fax and Data chip set ST4743.

REFERENCE DOCUMENTS

530001 2400bps modem commands & S-register guide.
530002 EIA 2388 class 2 command summary.

FUNCTIONAL REQUIREMENTS

The VoDaFax product offers the features outlined in the following sections. These include the ability to send and receive Voice and DTMF signals from the telephone line, to record and play back voice messages through the local telephone set, and to identify incoming calls as voice, fax or data.

SIERRA DEMO HARDWARE

A PC compatible, tested circuit card will be provided by Sierra for software developers. This PC card uses the ST4743 chip set and includes a hardware RAM buffer of at least 32Kx8. Demos include facility for local telephone power and so the 'phone may be used for record and playback. Provision for Caller ID is also built in and is supported by the firmware.

Serial demo boards are also available in very limited number for developers. These are configured to include caller ID and voice relays for local record and playback using the local telephone. Headset support and ability to detect local phone off hook and line reversal are also available .

PC INTERFACE

The product communicates with the host (PC) through the parallel PC bus or serial COM port, or through DMA. Products with DMA interfaces will also be capable of communicating through a COM port. This will allow the use of existing fax and data software. DMA is only required for voice transmit and record modes. The serial interface operates using a maximum serial rate of 115Kbit/s. With 2:1 compression and 4800 s/s the data rate is a maximum of 24000 bps. including start and stop bit overhead. With our CVSD compression the data rate is only 18250 bps. including start and stop bit overhead. This allows a Microsoft Windows COM driver interface to operate at a data rate of 19200 bps, (This is the maximum data rate guaranteed to work with a 16C450 UART and Windows by Microsoft). DMA interfaces allow the higher sampling rates of 9600 samples / second and 11025 samples / second to be used without compression, in the background, from DOS or Windows. DOS foreground only applications can use 4800 s/s w ithout compression, setting the data rate to at least 57600 bps or 9600 s/s without compression, setting the data rate to 115200 bps.

The COM port interface is used with a software FIFO option to reduce interrupt overhead. In the serial mode, the CTS signal will be used to control data flow from host (DTE) to DCE. Optionally <XON><XOFF> may be used (with caution). ACK will be used to coordinate data transmission from DCE to DTE.. See flow control section for further discussion on this area.

DMA INTERFACE

All boards contain serial COM port interfaces, be they stand alone RS 232D or internal parallel cards. Additionally, higher-end boards will contain DMA interfaces for handling the high data bandwidth requirements of uncompressed voice.

To use the DMA interface from within voice mode, the application must specify a DMA block size with the #VBSn command and a DMA channel with the #VCH=n command. The voice stream initiated by a voice record or play command will then be redirected by the DCE to the internal or host UART scratch pad register. DCE hardware will ensure that DMA acknowledges from the DTE will be decoded to the scratch pad register.

See Appendix E, DMA Handshaking, for more information.

ON-BOARD BUFFERING

RAM will be used for buffering of the voice data when in the transmit or receive mode . Normally the product will be used with 8-32K x8 RAM on the card which is also used for data compression and error correction. The voice buffer is set to 16K, allowing for 1.5 seconds of buffered voice to be held on the DCE, at 11K s/s.

EXTENDED AT COMMANDS SUMMARY

The product will respond to the following extended AT commands and will configure the chip set accordingly. Each command consists of an ASCII string started by AT and terminated by a carriage return and line feed (<CR >,<LF>).

In voice transmit modes as in fax modes, the DTE shall signal the DCE to enter command mode by dropping DTR. The DCE will respond to DTR according to the AT&Dn instruction.

Command mode may be entered from voice receive mode by the DLE sequence <DLE> <ETX> as detailed in appendix B, or by dropping DTR. The DCE will respond to DTR according to the AT&Dn instruction.

```
    AT# Cmd             Action

        VSn             Activate voice mode (DTE rate n)
        VSV             Transmit voice data, listen for DTMF
        VD0             Transmit voice data
        VD1             Receive voice data
        VT1             DTMF receive enable
        VT0             DTMF receive disable
        VSI=?n           Sets silence end of message timer. (100ms)
        VSS=R           Set sample rate to R
        VQS             Request available sample rates
        VQS?            Request current sample rate
        VSM=C           Set CODEC mode to C
        VQM             Request CODEC modes
        VQM?            Request current CODEC mode
        VSC=X           Set compression mode to X
        VQC             Request compression mode available
        VQC?            Request current compression mode
        VH=X            Activate relay X
        VST=0/1 Set silence threshold -43dBm/-47dBm
        VC=0,1          Disable, Enable <DLE><CAN>
        VB=f1,t         Send tone beep of frequency f1  (x10 Hz)
                        and duration t (x100ms)
        VF=n            Set FIFO size ( default =64)
        VRA=n           Ringback goes away timer (100ms)
        VRN=n           Ringback never came timer (100ms)
        VG=xxx  Gain setting in voice receiver - default = 119
        VSD=0,1,2       Silence deletion control (disable, 1sec, 0.5sec)
        VL=n            Set run-length encoding
        VAA=n           Select Auto answer modes
        VAA?            Query auto answer modes
        VBS=n           Specify data transfer via DMA (n=block transfer size).
        VQB             Request list of available DMA block transfer sizes.
        VQB?            Request current setting for DMA block transfer size.
        VCH=n           Set DMA channel.
        VBO=M   Set binary offset mode.
        VQO?            Query binary offset mode.
        VM=M            Microphone command.
        VSP=P           Snoop command.
        VQP?            Query snoop mode.
```

```
        VNH=n   Set hook behavior for fax and data calls within voice calls.
        VQH?            Query hook behavior for fax and data calls within voice ↩
           calls.
        VZ=M            Set audio mode.
        VQZ?            Query audio mode.

RESPONSE CODE SUMMARY

The product will return brief responses to all AT commands.  Each response
 will consist of an ASCII string and will be preceeded by, and terminated by
 a carriage return and line feed (<CR>,<LF>).  There are no terse responses
 in voice mode.  The following are the responses that may be returned by the
 product.

        Response                                Reason

        CONNECT         Entered Voice TX or RX mode
        OK                      Command accepted and initiated
        ERROR                   Error condition, illegal command
        #VQS:(S1-Sx)            Available sample rates
        #VQS=S          Current selected sample rate
        #VQM:(C1-Cx)            Available CODEC modes
        #VQM=?C          Current selected CODEC mode
        #VQC:(M1-Mx)            Available compression methods
        #VQC=?X          Current selected compression method
        #VH=?X                   Current selected relay(s)0
        #VDn                    DTMF digit received
        #VTO                    Telephone went off hook
        #VTH                    Telephone went on-hook
        #VCON           Connect modem in voice mode.
        #VQB:(X1,X2,...Xn)      Available DMA block transfer sizes
        #VQO=?O          Current selected binary mode
        #VQP=?P          Current snoop mode
        #VQZ=?M          Current audio mode
        #VC=?n                   Current cancel control - DTMF abort control mode
        #VDG                    Fax detected when #VAA=?129 or 130
        #VDD                    Fax detected when #VAA=?4

AT COMMANDS/RESPONSES SYNTAX

The following section details the proposed AT commands and the responses
 returned after a command is executed.  All AT commands should be followed
 by carriage return and line feed. All responses will be followed by a
 carriage return and line feed.

If "ERROR" is received as a response to a command or a command string, you
 must rexecute that command or command string to ensure that the modem will
 behave as expected.

Voice commands will begin with AT#V. (AT+ is reserved for EIA standards use)

Commands are divided into two groups, CORE commands and CORE+ commands.
 CORE commands are VoDaFax commands which have been supported since the
 advent of 2.01 V.22bis firmware.  CORE+ commands include the more advanced
 voice features such as DMA, and microphone commands which were developed
 under the 3.15(a-z) program.  WaveFax modems use the CORE+ command set in
 addition to the CORE set.
```

CORE COMMANDS
CORE commands are available on V.22bis modems with 2.01 firmware, or above.
CORE commands are available on V.32bis modems with 1.00 firmware, or above.

VOICE MODE ACTIVATION

This command is used to put the DCE in the voice mode. Upon entering this mode, the sampling rate is set to 9600s/s (or the rate last set by AT#VSS=? <rate> command) and the Mu Law compression algorithm is set. The DTE should delay at least 250 miliseconds after #VSS, before executing another command.

```
Syntax:         #VSn
        n       DTE Rate
        0       Return to data mode
        1       115.2bit/s
        2       57.6kbit/s
        3       38.4kbit/s
        4       19.2 kbit/s

Response:               OK  (Returned at the old rate)
```

RECEIVE VOICE DATA

This command initiates voice data sampling and receiving. The sampled data will be moved to a holding buffer. If an external RAM buffer is present it will be used, otherwise 100bytes of internal RAM will be used. In parallel configuration, the controller will start feeding received bytes into the UART RXD register.

```
Syntax:         #VD1
Response:               CONNECT
                        data received <DLE><ETX>
```

TRANSMIT VOICE DATA & RECEIVE DTMF

This command initiates voice data sampling and transmission to the D-A. The data is sampled at the set sample rate. DTR will be high for the data to be transmitted. The DTE data will pass through a buffer in the DCE to await transmission. If an external RAM buffer is present it will be used, otherwise the internal RAM will be used. DTR low indicates end of data. The DCE will transmit all remaining buffered data when DTR drops low or <DLE><ETX> is received, and then goes to command mode.

```
Syntax:         #VSV
Response:               OK
                        CONNECT
                         transmission
                        OK
```

TRANSMIT VOICE DATA (Do not report DTMF)

```
This command  is the same as VSV except no DTMF detection will be performed.

Syntax:         #VD0
Response:               OK
                        CONNECT
                        transmission
                        OK


FIFO COMMAND

Syntax:         AT#VF?  Returns maximum FIFO size in bytes.
Response:       X
        Where X is a decimal number indicating the size of the FIFO in bytes
.

Syntax:         AT#VF=?n Sets receive FIFO block transfer  size  to  n
                bytes (32,64,128,256)
Response:       OK

Syntax:         AT#VF=?0 Disables FIFO
Response:       OK
The default flow control after "ATZ" is VF=?1 i.e. FIFO block transfer size
 =? 64 bytes.
See appendix A for a description of how to use the FIFO command with  flow
control.


RECEIVE GAIN SETTING

Syntax:         #VG=?x
Response:       OK

The gain can be set in the range  -6.2dB to 20.8dB in 256 steps.  This
 command will set the initial gain level.  Default value is 119 (6.4dB).

This command should be used with caution on DSP codes prior to CBD.  The
 following information desribes the limitations of #VG under various modes.

Mu-Law and CVSD modes
Codes prior to CBD only support DTMF detection under Mu-Law or CVSD with the
 receive gain setting set to 60 or below.  Receive gain settings of 61 or
 above may not reliably detect DTMF.

Linear mode
Codes prior to CBD divide the receive gain setting into 4 possible gains,
 0-63, 64-127, 128-191, and 192-256.  DTMF will be detected using any gain
 from 0 to 256, however the actual gain will vary as follows:

        Setting         Gain

        0-63            0dB
        64-127          6dB
        128-191         9dB
        192-256         12dB
```

RUN LENGTH ENCODING

Syntax: #VL=?0,1
Response: OK

Run length encoding , if enabled, will compress equal valued samples (typically silence) and encode the data as follows: <DLE><L><Char>##H. Where ## is the byte count in Hex.

SILENCE DELETION CONTROL

This command is available in UART mode only, i.e. when #VBS=?0.

Syntax: #VSD=?0,1,2
Response: OK

0 Disabled
1 One second of silence is not compressed.
2 One half second of silence is not compressed.

This command is not recomended for use. It encodes silence periods with one <DLE><S> for every 256 consecutive bytes of silence. The codes are re-expanded on playback. Thus this command as actually implemented as a silence encoder, useful for conserving disk space, but not for truncating long periods of silence.

END OF MESSAGE TIMER

Syntax: #VSI=?n
Response: OK

End of voice message will be detected by silence for a period of time set in a register set by AT#VSI=?n (100ms). At this time, the DCE will drop DCD and send <DLE><ETX> and go into command mode.

DTMF RECEIVE ENABLE (In command mode)

This command enables the reception of DTMF tones when the modem is in command state.
(See VSV command for DTMF detection during voice transmission.)

Syntax: #VT1
Response: OK

DTMF RECEIVE DISABLE

This command disables the reception of DTMF tone during voice data transmission.

```
Syntax:         #VT0
Response:       OK

*** [This is the default condition in voice mode]


SAMPLE RATE SETUP

This command sets the sample rate. 8000Hz is the default value upon entering
 the voice mode.

Syntax:         #VSS=?R
Response:       OK
        where R =?       0       4800
                        1       7300    .......(SC11094 + CBB OR BETTER DSP CODE)
                        2       8000    .......(SC11092,4 ONLY) ***[default]
                        3       9600
                        4       11000   .......(SC11094 + ABH OR BETTER DSP CODE)
                        5       22000   ........[Not yet available]
                        6- 9 reserved


SAMPLE  RATES AVAILABLE

This command requests the sample rates available by the DCE.

Syntax:                 #VQS
Response:               #VQS:(4800, 9600, etc)
                        More values may be added depending on chip set.


CURRENT SAMPLE RATE INQUIRY

        This command requests the current selected sample rate.

Syntax:                 #VQS?
Response:               #VQS=?R
        where R =?       0               4800
                        1               7300  (SC11094 only)
                        2               8000  (SC11092,4 only)
                        3               9600
                        4               11000  (SC11094 only)


CODEC MODE SETUP

This command sets the CODEC mode.

Syntax:         #VSM=?C
Response:       OK
        Where C =?       0       8 Mu Law        *** [default]
                        1       8 A-Law         .......[Not yet available]
                        2       8 LIN
                        3       10LIN
                        4       12LIN           .......[SC11094 only]
                        5       14LIN           .......[Not yet available]
                        6       16LIN           .......[Not yet available]
```

```
                        7- 9    reserved


AVAILABLE CODEC MODES

This command requests the available CODEC modes.

Syntax:         #VQM
Response:       VQM:(8 Mu Law, 8LIN, etc)


CURRENT CODEC MODE INQUIRY

This command requests the current CODEC mode selected.

Syntax:         #VQM?
Response:       #VQM=?C
        Where C =?       0       8 Mu Law
                        1       8 A-Law
                        2       8 LIN
                        3       10 LIN
                        4       12LIN
                        5       14LIN
                        6       16LIN
                        etc


COMPRESSION MODE SETUP

This command sets up the compression algorithm.

Syntax:         #VSC=?X
Response:       OK
        Where X =?       0       No compression          *** [default]
                        1       CVSD14.4
                        2       ADPCM 32 CCITT G.721    [Not yet available]
                        3       GSM 13                  [Not yet available]
                        4       SPC (Sierra proprietary compression)
                        5       VSELP  (PN2398)         [Not yet available]
                        6       MACE     3:1 (Apple CPU only)
                           [Requires special driver from Sierra]
                        7- 9    reserved

COMPRESSION MODES AVAILABLE

        This command requests the available compression algorithms.

Syntax:         #VQC
Response:       #VQC:(No Compression, CVSD14.4, ADPCM 32,GSM 13, CELP 4, etc
.)

CURRENT COMPRESSION MODE INQUIRY

This command requests the current selected compression algorithm.

Syntax:         #VQC?
Response:       #VQC=?X
```

```
        Where X =?       0       No compression
                        1       CVSD14.4
                        2       ADPCM 32
                        3       GSM 13
                        4       SPC
                        etc as above
```

RELAY CONTROL

The DTE uses an integer, the <X> subparameter, as a label to identify a set of relays to energize.

```
Syntax:         #VH=?X
Response:       OK

Where   X =?     0       DCE on-hook.  Relays unenergized.
                        Local phone connected to Telco.
                1       DCE off-hook.  Hook relay energized.
                        DCE connected to Telco.
                2       DCE on-hook.  Local relay energized.
                        Local phone connected to DCE.
                3       DCE off-hook.  Hook and Local energized.
```

Hook status inquiry

```
Syntax:         #VH?
Response:       #VH=?X
        Where X =?any number from 0-3.
```

RINGBACK TIMERS
RINGBACK GOES AWAY TIMER

```
Syntax: #VRA=?n
Response:       OK
        Where n is a value from 1 to 256 representing steps of 100 ms.
        Default value =? 60.
```

RINGBACK GOES AWAY INQUIREY

```
Syntax: #VRA?
Response:       #VRA=?n
        Where n is a value from 1 to 256 representing steps of 100 ms.
```

RINGBACK NEVER CAME TIMER

```
Syntax: #VRN=?n
Response:       OK
        Where n is a value from 1 to 256 representing steps of 100 ms.
        Default value =? 80.
```

RINGBACK NEVER CAME INQUIREY

```
Syntax: #VRN?
Response:       #VRN=?n
        Where n is a value from 1 to 256 representing steps of 100 ms.
```

These timers are used to generate the #VCON response to indicate that a remote phone has answered. The #VCON response will be issued when either of these timers reaches 0.
E.G. If you expect the call setup to take 10 seconds, and you assume that the ring period is 6 seconds, then you would set #VRN=?100 and #VRA=?60. If the remote picks up before ringback is generated, #VRN will time out first, giving the response #VCON. If one or more ringbacks occur before the remote picks up, #VRA will time out 6 seconds after the last ring, (in this example), and report #VCON. #VRA will only cause a #VCON response if there has been at least one ringback.

SET AUTO ANSWER MODE
It is expected that the user will set S0 to the number of rings required before going off hook. When S0 is set to a value other than 0, then the modem will automatically go off hook in response to the number of RING events specified by S0. It is not recomended to use #VAA with the ATA command.
Syntax: #VAA=?n

VAA bit 7 determines fax answer (0) or report only (1)

n	+FAA=?	Answer mode
0	0	Software election
0	1	Fax or Data
1	0 or 1	Fax or Voice
2	0 or 1	Fax, Data or Voice
3	0	Data or Voice
129	0 or 1	Fax/Voice : Report +FCNG (#VDG in voice mode) if Fax, #VCON if voice
130	0 or 1	Fax/Data/Voice: Report +FCNG if fax,
4	0 or 1	Fax/Voice : Report #VDD if Fax, #VCON when the line is automatically taken off hook in response to the number of RING events specified by S0.

Mode 4 (VAA) (Only available in the CORE+ command set)
Mode 4 is valid in voice mode only. Mode 4 is valid only at 11025 s/s. #VCON is reported when the line is taken off-hook in response to the number of RING events specified by S0.
The OGM is expected to be played out with a #VSV command at this point. The first #VSV executed after an automatic answer will behave as follows: 1,2,3,4,5,6,7,8,9 and CNG are detectable during the first 4 seconds. 0,1,2 ,3,4,5,6,7,8,9,*,# are detectable from the end of the first 4 seconds of OGM or from the end of the first detected DTMF or CNG tone, until play mode is exited. DTMF is reported as #VD{number} where {number} may be as specified above. CNG is reported as #VDD.

All subsequent #VSV’s will behave as described in this document until another automatic answer occurs.

CORE+ COMMANDS
CORE+ commands are available on V.22bis modems with 3.15(a-z) series firmware, or above.
CORE+ commands are available on V.32bis modems with 2.0 series firmware, or above.

```
DTMF QUALIFICATION TIMER
Syntax: S18=?n
Response:       OK
Where n is a number representing the number of 10ms intervals the controller
 will use to qualify DTMF.

In Data mode, S18 is the modem test timer.  The factory default is 0.  When
 the modem enters voice mode, it will save the setting of S18 and set S18 to
 3.  The S18 register then becomes the voice mode DTMF detect qualification
 timer.
 DTMF detection is done by the DSP over a period of 15 ms.  If at the end of
 this period, DTMF energy is still present, the DSP will report its presense
 to the controller.  The controller will further qualify the DTMF for the
 number of 10ms time intervals specified by the S18 register.  If S18 is set
 to zero, no qualification of the DTMF will be done by the controller.


DMA DATA TRANSFER
This command instructs the DCE on whether to transfer data via the serial
 port or via a DMA channel.  n=?1-3 specifies that data will be transferred
 via DMA.  n=?0 specifies that data will be transferred via the serial
 port.  Values of n=?1-3 specify specific DMA block transfer rates.  The
 default value for n is 0.  See appendix D for more information on DMA data
transfers.
SPECIFY DMA DATA TRANSFER RATE
Syntax  #VBS=?n
                        n       DMA block transfer size (or mode)
                        0       NO DMA  (pass data through serial port)
                                ***[default]
                        1       1K block
                        2       2K block
                        4       4K block

DMA DATA TRANSFER BLOCK SIZES AVAILABLE
This command requests the DMA data block sizes supported by the DCE.
Syntax  #VQB
Response        #VQB:(0,1,2,...etc)
        Where the numeric codes are:
                                        0       No DMA
                                        1       1K block
                                        2       2K block
                                        4       4K block
N.B. Block sizes within the list are separated by commas.  Block size codes
 are listed in ascending order, starting with 0.

CURRENT DMA DATA TRANSFER BLOCK SIZE
Syntax  #VQB?
Response        n
        Where n is 0,1,2 or 4.
DMA CHANNEL SELECT
Syntax  #VCH=?n
        Where n is 0,1,2, or 3
        The codes for n correspond directly to DMA channels, i.e. code 1 is
 DMA channel 1, etc.
Response        OK
```

BINARY OFFSET

This command sets the type of binary the voice data will be composed of. If AT#VBO=?0, then the DCE shall pass only 2's compliment voice data to the DTE; AT#VBO=?0 also implies that the DCE only expects 2's compliment voice data from the DTE. Setting AT#VBO=?1 means that the DCE shall pass only offset binary voice data to the DTE. AT#VBO=?1 also implies that the DCE only expects offset binary voice data from the DTE.

```
Syntax:         #VBO=?M
Response:       OK

Where M =?       0       2's compliment  ***[default]
                1       Offset binary
```

CURRENT BINARY MODE INQUIRY

This command requests the current selected binary mode.

```
Syntax:         #VQO?
Response:       #VQO=?M
        Where M =?       0       2's compliment  ***[default]
                        1       Offset binary
```

MICROPHONE COMMAND

This command is used on boards which contain hardware support for an external microphone. AT#VM=?0 is the default state and implies that the voice stream will be recorded from either the local phone or from the line. AT#VM=?1 causes the voice stream to be recorded from the microphone.

```
Syntax: #VM=?X
Response:       OK
        Where X =?       0       Input is from local phone or line.  ***[default]
                        1       Input is from microphone.
```

INPUT SOURCE INQUIRY

```
Syntax: #VQI?
Response:       #VQI=?X
        Where X =?       0       Input is from local phone or line.
                        1       Input is from microphone.
```

MICROPHONE AVAILABILITY STATUS

This command verifies the presence of microphone firmware. This command does not verify presence of microphone hardware.

```
Syntax: #VQI?
Response:       #VQI:X
        Where X =?       0       Microphone is not available.
                        1       Microphone is available.
```

MONITOR MODE

If supported by your hardware, the monitor command will allow the DCE to monitor DTMF energy on the line while in the on-hook state. AT#VSP=?0 is

```
 the default state and will not report DTMF on the line in the on-hook
 condition.  AT#VSP=?1 activates monitor mode and will allow the reporting
 of DTMF on the line while on-hook.
Syntax: #VSP=?X
Response:       OK
        Where X =?       0       No Monitoring   ***[default]
                        1       Monitor mode

MONITOR MODE INQUIRY

Syntax: #VQP?
Response:       #VQP=?X
        Where X =?       0       No monitoring
                        1       Monitor mode


HOOK BEHAVIOR CONTROL UNDER VOICE
Data and fax calls from within voice mode may be made without dropping the
 line.  #VNH controls whether the DCE shall  hang up the Telco line if the
 handshake fails or if the DCE performs some other operation that would have
 normally resulted in a hangup of the phone line.  #VNH can be used to make
 data or fax connections from within voice calls.

SET HOOK MODE
Syntax: #VNH=?X
        Where X =?       0       Hook behaves normally.
                        1       Line is not dropped after data or fax call.

HOOK MODE INQUIRY
Syntax: #VQH?
Response:       #VQH=?X
        Where X=?        0       Normal mode
                        1       No line drop mode.


AUDIO MODE
Audio mode is used to perform "Business Audio" type functions.  Audio mode
 is used by the Windows Wave input and output drivers in order to play and
 record 11K uncompressed "Business Audio" type files.  Audio mode may also
 be used by applications programs that wish to perform Wave input and output
 operations.  Audio mode differs from voice mode in the following ways:

(1) You must have both a DMA and a COM port interface to support Audio Mode.
(2) There is no inband <DLE> signalling in audio mode.  The DCE does not
 append <DLE> codes to the voice stream during record mode, and the DCE does
 not interpret <DLE> codes within the voice stream on playback.  DTMF
 detection is not supported through inband signalling.  All result codes are
 passed through the COM port.  The voice stream passes through the DMA inter
face.
(3) Playback and record modes can only be aborted manually, i.e. by dropping
 DTR.  Playback and record modes can not be aborted by inband signalling or
 by timeouts.
(4) After executing the Audio Mode command, the system defaults are:
        a) #VBS=?4       ;DMA block size of 4K
        b)#VSS=?4        ;Sampling rate of 11.025 K s/s
        c)#VSM=?2        ;Linear mode
        d)#VBO=?1        ;Binary offset mode
```

(5) Upon executing the Audio Mode command, the current voice mode settings are saved. Upon leaving Audio mode, these voice mode settings are restored .

Syntax: #VZ=?1 ;enter audio mode
#VZ=?0 ;re-enter voice mode, restoring original settings.
Response: OK

AUDIO MODE INQUIRY
Syntax: #VQZ?
Response: #VQZ=?M
Where M=? 1 Audio mode
0 Voice mode

BUFFER CANCEL ENABLE
This command has two effects.
This command controls the DCE behaviour after reception of a DTMF in transmit mode. If n=?0 then when a DTMF tone is received in the voice transmit mode, the modem will report the digit, terminate the transmission and go into command mode with an OK prompt. When n=?1, then when a DTMF tone is received in the voice transmit mode, the modem will report the digit but will not terminate the transmission. This first effect only occurs when in UART mode, i.e. #VBS=?0.

Effect 1, present in UART mode only:

Syntax: #VC=?n
Response: OK

0 In voice transmit mode, after receiving a DTMF tone, the modem will report the digit, terminate the transmission, XOFF the DTE, clear the buffer and go to the command mode with an <OK> prompt.

1 In voice transmit mode, after receiving a DTMF tone, the modem will report the digit, but will not terminate the transmission. The DTE may at any time issue <DLE><CAN> to pause the transmission, clear the buffer and resume transmission. The DTE may issue <DLE><ETX> to terminate transmission and return to command state.

The DCE will send silence in the case of data underrun.

Effect 2, present in both UART and DMA mode:

#VC controls the buffer cancel enable flag in both UART and DMA mode.

Syntax: #VC=?n
Response: OK

Where n=? 1 <DLE><CAN> will flush, (throw away), the voice buffer.
0 <DLE><CAN>will not flush the voice buffer.
Default=? 1

```
INQUIRE DLE CAN ENABLE
Syntax: #VC=??
Response:       #VC=?n
        Where n=?       1       <DLE><CAN>will flush the voice buffer.
                       0       <DLE>.<CAN>will not flush the voice buffer.


CALLER ID

        AT#CCn
                n=?0 CID disabled
                n=?1 Formatted single message data will be decoded and sent
                    to the DTE
                n=?2 Unfomatted data will be streamed to the DTE.

CID COMMAND OUTPUT STRING FORMATS

Ref:    TA-NWT-000030
        NIS S107-1

Note that CID commands will work in both voice and data modes.

AT#CC0  CID DISABLE

AT#CC1  CID Enable with formatted output and checksum checking.
                This command only supports single message format.
                Output strings look like:
                <CR><LF>RING<CR><LF>
                DATE=?<SP>05/26<CR><LF>
                TIME=?<SP>15:05<CR><LF>
                CID=?<SP><SP>2146999612<CR><LF>

If the checksum received is not correct, no data will be displayed.  If the
 caller is from an area that does not support caller ID, the display will
 show CID=?O.  If the caller has suppressed the dial number, you will see
 CID=?P

AT#CC2  CID enable with raw data output:
                <CR><LF>RING<CR><LF>

The raw data format is composed of a series of parameter codes and parameter
 lengths, each of which is followed by some data bytes, the number of which
 is described by the length parameter.  There are seven parameters described
 in NIS S107-1 Issue 2.  E.G. time has a parameter code of 1.

EXAMPLE PARAMETERS USING MULTIPLE MESSAGE FORMAT

Note that the presence of each of these parameters is optional.  The lables
 are suggested by NIS S107-1, and appear to be in general use, however
 instance designation is at the discretion of the service provider.

                1       =?       Time
                2       =?       Calling number
                3       =?       Number which must be dialed to reach
                                calling party
                4       =?       Reason for absence
```

```
            5               Reason for redirection
            6               Call qualifier
            7               Name
```

Appendix A
FLOW CONTROL

PARALLEL MODE FLOW CONTROL -COM PORT MODE
In the parallel application, flow control is achieved through the RXD REGISTER EMPTY BIT. The DTE will also set DCD. The routine looks at this bit before writing a new byte into the receive register. The bit gets cleared every time the CPU reads the RXD BYTE .

CTS from DCE is used for data flow control When the DCE is ready to receive the voice data it will set CTS true. When the buffer is at the high mark, CTS will go false. When the buffer is at the low mark, CTS will go true.

PARALLEL MODE FLOW CONTROL - DMA PORT MODE
When DMA is used, there is no need for flow control in the DMA channel because both the DTE and the DCE are aware of the block size being transferred. Individual bytes are not lost because handshaking is performed between the DMA controller and the DCE firmware.

SERIAL MODE FLOW CONTROL
In the serial mode, there is no feedback mechanism like the RXD bit so another method of flow control is required. When the DTE accepts a byte, the application sends an ACK character to the COM port UART. This is then sent to the modem. The modem will detect the ACK and send the next group of bytes. (It does not have to wait for the entire character to be received, The start bit would be sufficient as the DTE will only send a character if it has cleared the UART or if it is requesting a change to command state. The latter will be done by <DLE><ETX> or by dropping DTR. The DCE will examine the character and identify this after the complete character is received.)

The suggested method for using serial mode flow control is as follows: Upon receiving an interrupt from the host UART, indicating that the first byte from the FIFO is ready to be retrieved, the DTE should disable interrupts from the host UART. The DTE should then send an ACK character to the DCE, remove the received byte from the host UART and poll the UART line status register, watching for the next byte to come in. The DCE will have a new byte ready approximately every 30 microseconds. The DTE should draw the same number of bytes as set by the #VF FIFO command. After removing the last byte, the DTE should re-enable interrupts from the host UART.

Some serial ports include a FIFO (eg.,16C550 or Hayes buffered interface) and can store several bytes in the port. . The DCE will send 1 byte to the DTE and then wait for <ACK> (any character will do) Then it will send a block of data The number of bytes will be equal to the FIFO parameter set by the AT#VF=?xn command.

APPENDIX B
DECEMBER 1993
RESPONSE CODES

General rules in DMA mode for DLE responses:

Responses are shielded and reported differently in different modes.

1) Command mode.

These responses are reported to the UART, without <DLE> shielding:

#VDG,#VTO, #VTH, #VD<NUMBER>, RING, BUSY,#VCON,NO CARRIER, NO DIALTONE

2) Record and playback mode.

These responses are BOTH embedded in DMA data, and reported through the UART. The <DLE> shielding is included in both the UART, and the DMA data report.

<DLE><ETX>, <DLE>VDT, <DLE>#VD<NUMBER>

These responses are reported through the UART only, with <DLE> shielding.

<DLE>#VTO,<DLE>#VTH, <DLE>RING

These responses are embedded in DMA data only, with <DLE> shielding.
<DLE>L, <DLE><DLE>, <DLE>D, <DLE>R

These responses may be sent in the DMA data stream from the DTE to the DCE during playback mode, with <DLE> shielding.

<DLE><CAN> ,<DLE><ETX>

3) Unsupported responses
These responses are not supported in current firmware.

<DLE><S>, <DLE><Q>

COMMAND MODE RESPONSE CODES

FAX DETECTED
This response is returned when fax calling tones are detected during an auto-discriminate answer when using #VAA=?129 or #VAA=?130.
Syntax: #VDG
This response is returned when fax calling tones are detected during an auto-discriminate answer when using #VAA=?4.
Syntax: #VDD

LOCAL HOOK CHANGE

This response is returned only when the hook status changes (i.e. from on-hook to off-hook or vice versa).

Syntax: #VTO ;Off-Hook

```
        #VTH            ;On-Hook
```

DTMF TONE RECEIVED

This response is returned only when a DTMF tone is received.

Syntax: #VDn
Where n =? 0,1,2,3,4,5,6,7,8,9,* or # for DTMF

RING RECEIVED
UART mode behaviour.
This response is returned when a ring has been received. The response is generated by the on-time or "mark" of the ring signal.
DMA mode behaviour:
This response is retuned when a ring has been received. The ring is assumed to be envelope detected, and is qualified by the presence of off time in excess of 1 second. This allows distinctive rings to be detected as single ring events, and disallows discrimination between different distinctive ring types.
Syntax: RING

BUSY RECEIVED
This response is returned when busy tone has been detected on an outbound call for 5 seconds.
Syntax: BUSY

VOICE CONNECTION MADE
This response indicates that a voice connection has occured. On incomming calls, #VCON indicates, under #VAA rules 129 and 130, that a voice-fax or voice-fax-data discrimination has occurred, and that voice has been detected. When #VAA =?4, #VCON indicates that the modem has gone off hook in response the number of RING events set by S0. It is expected that the #VCON response will be used by DTE applications to know when to begin to play the OGM.
On outbound calls, #VCON indicates that the remote side has answered the phone. There is no outbound call discrimination between remote voice, data, and fax devices.
Syntax: #VCON

REMOTE SIDE NEVER ANSWERED
In voice mode, this response is generated when during an outbound call, the period of time set by S7 expires before the remote phone is answered.
Syntax: NO CARRIER

DIALTONE NOT FOUND
This response is generated when during an attempted outbound call, dialtone is not detected.
Syntax: NO DIALTONE

EMBEDED <DLE> COMMANDS

```
END VOICE PLAYBACK
<DLE> <ETX>

Syntax:
<DLE><ETX>
Valid in:
Voice playback mode.
Used for:
Ending voice playback mode by command from DTE. Effect:
Voice playback from the DCE is terminated.  The voice command state is
 entered.  The data rate is that formerly specified by the #VSn command.


CANCEL BUFFER
<DLE> <CAN>

Syntax:
<DLE><CAN>
Valid in:
Voice playback mode.
Used for:
Clearing the buffer.
Effect:
Voice playback is paused, the buffer is cleared, and voice playback is then
resumed.



EMBEDED <DLE> RESPONSE CODES

REPORT END OF MESSAGE
<DLE><ETX>

Syntax:
<DLE><ETX>
Valid in:
Voice record mode.
Used for:
The DCE uses this to mark the end of a message. <DLE><ETX> is appended to
 the end of voice record files by the DCE.  The DCE will recognize the
 <DLE><ETX> sequence on playback and return control from playback mode to
 voice command state.

Effect:
Voice command state is entered.


REPORT DIAL TONE
<DLE>#VDT

Syntax:
<DLE>#VDT
Valid in:
Voice record mode.
Used for:
```

Reporting dial tone detection.
Effect:
None. This is a report only.

REPORT LOCAL PHONE OFF HOOK
<DLE>#VTO

Syntax:
<DLE>#VTO
Valid in:
Voice record mode, Voice playback mode.
Used for:
Reporting local phone off hook.
Effect:
None. This is a report only.

REPORT LOCAL PHONE ON HOOK
<DLE>#VTH

Syntax:
<DLE>#VTH
Valid in:
Voice record mode, Voice playback mode.
Used for:
Reporting local phone on hook.
Effect:
None. This is a report only.

REPORT RUN LENGTH ENCODING
<DLE>L

Syntax:
<DLE>L<"byte"><"byte count">
Valid in:
Voice record mode, Voice playback mode.
Used for:
Reporting embedded run length encoding.
Effect:
This indicates that a number, (indicated by "byte count") (in hexadecimal), of successive "byte"'s was detected in the voice record stream, and replaced by this report. This is embedded by the DCE during voice record mode. This report is reinterpreted by the DCE during voice playback mode.

REPORT SILENCE DELETION
<DLE>S

Syntax:
<DLE>S
Valid in:
Voice record mode, Voice playback mode
Used for:
Reporting 256 bytes of continuous silence.
Effect:

This indicates that 256 bytes of continuous silence has been replaced in the voice record data stream with the report "<DLE>S". The DCE embeds this report in voice record mode. The DCE reinterprets this report in voice playback mode.

REPORT QUIET DETECTED
<DLE>Q

Syntax:
<DLE>Q
Valid in:
Voice record mode.
Used for:
Reporting that a message contains no voice energy, only quiet. This is distinguished from silence, which is the absence of voice energy after voice energy is received. Hence a valid message may end in silence, and a message reporting quiet may be regarded as not valid.
Effect:
The DCE uses this to mark a recorded voice stream as containing no voice energy.

REPORT RING
<DLE>RING

Syntax:
<DLE>RING
Valid in:
Voice record mode, Voice playback mode.
Used for:
Reporting an incoming "ring" on the line.

None. This is a report only.

REPORT <DLE>
<DLE><DLE>

Syntax:
<DLE><DLE>
Valid in:
Voice record mode, Voice playback mode.
Used for:
Reporting the occurrence of the character <DLE> within the voice record or playback stream.
Effect:
The DCE embeds an extra <DLE> with every occurrence of <DLE> in the voice record stream. The DCE strips the embedded <DLE> out of the voice playback stream as the voice is played back.

REPORT DTMF DEFINITELY DETECTED + IDENTITY
<DLE>#VD<"number">

Syntax
<DLE>#VD<"number">
Valid in:

Voice record mode, Voice playback mode.
Used for:
Reporting the presence and type of detected DTMF in the voice stream. The DTE can optionally use this report to help remove DTMF energy from the voice stream.
Effect:
The DCE embeds this report at the end of a confirmed DTMF energy burst within the voice record stream. "number" can be any of the following: 0-9, a-d, or # or *.

REPORT DTMF POSSIBLY DETECTED
<DLE>D

Syntax
<DLE>D
Valid in:
Voice record mode, Voice playback mode.
Used for:
Making a mark as near to the beginning of DTMF energy within the record data stream as possible. In playback mode, the DCE will not return any DTMF result codes to the DTE during the period after it encounters a DTMF energy start marker, (<DLE>D), and before it sees either a DTMF energy release marker, (<DLE>R), or a DTMF result code, (<DLE>#VD<"number">). The DTE can optionally use this marker to help remove DTMF from the voice stream.
Effect:
This report is embedded in the voice record stream as near as possible to the beginning of DTMF energy.

REPORT RELEASED DTMF DETECTION
<DLE>R

Syntax
<DLE>R
Valid in:
Voice record mode, Voice playback mode.
Used for:
Canceling the report of a detected DTMF. This marker indicates that the DCE did not detect DTMF for a valid length of time. In playback mode, the DCE will not return any DTMF result codes to the DTE during the period after it encounters a DTMF energy start marker, (<DLE>D), and before it sees either a DTMF energy release marker, (<DLE>R), or a DTMF result code, (<DLE>#VD<"number">). The DTE can optionally use this marker to help remove DTMF from the voice stream.
Effect:
This report is embedded in the voice record stream if detected DTMF energy= does not last for a valid length of time.

APPENDIX C
TEST SCRIPT
One of the best ways to test out the hardware is through the use of test scripts run through a terminal emulation program such as PROCOM. Using test scripts you can play and record with VoDaFax quite successfully.

```
 Because the scripts are interpreted through the terminal emulator, speed is
 an issue.  Fast hardisks (15 milliseconds access time) or ram drives are
 the best media to play and record from.  Using a 486DX-33 or better is also
 helpful, though a 386DX-33 should be sufficient.

SIMPLE VOICE RECORD AND PLAYBACK FROM THE LOCAL PHONE

ATZ                             ;Reset the modem
AT#VS2          ;Set the data rate to 57600 bps.
Set the terminal emulator to a data rate of 57600 bps.
AT#VF=?0         ;Turn off flow control for this simple example.
AT#VSS=?0                ;Set the sampling rate at 4800 samples per second.
AT#VSC=?0                ;Turn off compression.
AT#VSM=?0                ;Set codec mode to mu-law.
AT#VH=?2         ;Energize the local phone relay.
AT#VD1          ;Record voice
Set the terminal emulator to download a file in raw ascii to a filename.
End the message by not speaking for several seconds.  The ascii characters
 for <DLE><ETX> will be displayed followed by OK when the DCE detects silence.
AT#VD0          ;Playback voice
Set the terminal emulator to upload a file from the filename previously
specified.

Try modifying this simple example by changing the sample rate to get a
 better quality recording.  Always choose a data rate equal to or greater
 than the sample rate in bytes /s X 10 in bps.  E.G. if you choose 9600
 samples per second uncompressed, you need a data rate of 9600 X 10 bps ?=
 96000 bps, so set the data rate at #VS1 for 115200 bps.  If you use
 compression, account for the compression before you multiply by 10.  E.G.
 4800 samples per second with SPC 2:1 compression needs a data rate of
 4800/2 * 10 =? 24000 bps, so choose #VS3 for 38400 bps.  You must always
 allow for interrupt latency, so be sure to choose a data rate which is more
 than sufficient for the sampling rate you choose.


APPENDIX D
DMA HANDSHAKING



The following is a description of how to use the VoDaFax DMA interface.
Overview

The purpose of the VoDaFax DMA interface is to allow uncompressed voice data
 to be transferred between the modem and the host computer without data loss
 or degradation of system performance. The DMA interface currently only
 supports voice data. All voice commands and result codes as well as fax and
 data commands operate normally through the UART.

Initializing The Modem For DMA Transfers

This modem must be initialized properly to order to support DMA operation.
 There are two commands which support the DMA operation, AT#VCH and AT#VBS.

The AT#VCH selects the DMA channel to be used. The VoDaFax demo board
 provides for a software programmable DMA channel, eliminating the need for
 switch settings. AT#VCH=?1 selects DMA Channel 1 and AT#VCH=?3 selects
```

DMA Channel 3. These are both 8-bit DMA channels and are found on all PC systems.

The AT#VBS command sets the DMA block size and enables/disables DMA operation. AT#VBS=?0 disables DMA operation and sets up the modem to transfer voice data through the UART. AT#VBS=?1, AT#VBS=?2 and AT#VBS=?4 select DMA block sizes of 1K, 2K and 4K bytes respectively. On the VoDaFax demo board the AT#VBS=?0 command will tri-state the DRQ signal on the PC bus, enabling another board to use either DMA Channel 1 or DMA Channel 3.

Initialization of the modem for voice mode is completed by sending the appropriate VoDaFax voice commands to select the required voice operation (i.e. sample rate, compression, etc.)

DMA Handshaking

Each block of voice data is transferred to and from the host system under control of the host system. The CTS and RTS signals in the UART are used to supervise the transfer. The host must initiate the transfer of each block of data by setting the RTS signal to 1. The modem indicates a DMA transfer is underway by setting its CTS signal to 1 during the transfer of the data, and clearing the CTS signal when the selected number of bytes have been transferred. The host signals the end of a multiblock DMA transfer by setting the DTR signal to 0. The following example shows how the DMA transfer works

1.21 19

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COMMAND SYNTAX AND GUIDELINES

7.1.1 DTE COMMANDS

The ISO 646 character set (T.50 International Alphabet 5, American Standard Code for Information Interchange) is used for the issuance of commands and responses. Only the low-order 7 bits of each character are used for commands or parameters; the high order bit is ignored. Upper case characters are equivalent to lower case characters.

For Phase C data transmission or reception, all 8 bits are needed.

DTE COMMAND LINES

A command line is a string of characters sent from a DTE to the DCE while the DCE is in a command state. Command lines have a prefix, a body, and a terminator. The prefix consists of the ASCII characters 'AT' (065, 084) or 'at' (097, 116). The body is a string of commands restricted to printable ASCII characters, (032-126). Space characters (ASCII 032) and control characters other than CR (013) and BS (010) in the command string are ignored. The default terminator is the ASCII <CR> character. Characters that precede the AT prefix are ignored.

BASIC COMMAND SYNTAX

Characters within the command line are parsed as commands with associated parameter values. The basic commands consist of single ASCII characters, or single characters preceded by a prefix character (e.g.,'&'), followed by a decimal parameter.

Missing decimal parameters are evaluated as 0.

EXTENDED COMMAND SYNTAX

The facsimile commands use extended syntax. They are preceded by the '+F' characters, and they are terminated by the semicolon ';' character (059) or by the <CR> that terminated the command line.

```
AT+FAA=0         ;+FCR 1 <CR>
```

This command instructs the DCE to answer automatically a data or fax call and also enables reception.

```
AT+FCLASS=0 <CR>      for data mode
AT+FCLASS=1 <CR>      for Service Class 1 Fax
AT+FCLASS=2 <CR>      for Service Class 2 Fax
```

In Class 2, the DCE makes and terminates calls, manages the communication session and negotiates (T.30 protocol) and transports the image date to DTE. The T.4 protocol management of image data, etc. is done by DTE.

The response to

```
AT+FCLASS=0<CR>       in Data Mode
```

or

```
AT+FCLASS=2<CR>       in Service Class 2 Fax
```

is

```
OK
```

The service class may be set by the DTE from the choices available using the '+FCLASS=<VALUE>' command.

GENERAL RULES

1. +Fnnn commands must be entered completely otherwise an ERROR response is sent.

2. All response messages are preceded and followed by <CR><LF>. Multiple response commands, e.g., +FDIS:+FCSI: and +FDCS, will

therefore appear to a have a blank line between them.

3. Fax Class 2 commands can be separated by the ";" character. The ";" can be omitted if desired. Note that non-data commands cannot be separated by ";" which is allowed as a dial modifier.

4. All class 2 commands are assumed to be the final command on a command line. Additional characters will be ignored.

5. An ERROR message will be generated if any of the following conditions:

   a. A class 1 command is received while in Class 2.

   b. A Class 2 command is received while in Class 1.

   c. A Class 1 or Class 2 action command is received while in data modem ↩ mode

   d. A Class 2 read-only parameter is given the "=" form of a +F command (e.g., AT+FAXERR=5).

   e. A class 2 action command is given the inappropriate "=" or "=?" (e.g., AT+FDR=?).

7.1.2 SERIAL PORT SPEED AND FLOW CONTROL

During fax mode, the DTE-DCE port speed is 19200 bps.

The DCE provides a speed buffer of 1024 bytes and provides DC1/DC3 (XON/XOFF) or RTS/CTS method of controlling the data into the buffer. This flow control is controlled by AT&K3 or AT&K4 command.

This method of data flow control is available only for DTE to DCE direction of data. There is no provision for data flow control from DCE to DTE.

DATA STREAM TERMINATION

The DCE exchanges streams of data with the DTE while executing data transfer commands. These use data stream termination described in Section 3.2/ISO 2111.

The ASCII <DLE> character (016) is used as a special character to shield special characters. The <DLE><ETX> character pair (<106><003>) is used to mark the end of a stream. The following patterns are used:

```
any data....<DLE><ETX>       end of stream
any data....<DLE><DLE>       single <DLE> in data
any data....<DLE><any byte>  delete <DLE><any byte>
```

DTE to DCE STREAMS

The DCE filters the data stream from the DTE, and removes all character pairs beginning with <DLE>. The DCE recognizes <DLE><ETX> as the stream terminator. The DCE recognizes <DLE><DLE> and reinserts a single <DLE> in its place.

The DTE must filter stream data to the DCE, and insert extra <DLE>

```
characters ahead of data.

DCE TO DTE STREAMS

The DTE must filter the data stream from the DCE, and remove all character pairs
beginning with <DLE>.  The DTE must recognize <DLE><ETX> as the stream
terminator.  The DTE must recognize <DLE><DLE> and reinsert a single <DLE> in its
place.

The DCE filters stream data to the DTE, and inserts extra <DLE>
characters ahead of data.

7.1.3  AUTO ANSWER

The DCE can answer as a data DCE or as a fax DCE.  It can answer the call
adaptively, i.e. it can determine whether call is 'data' or 'fax'.  The +FAA
parameter controls this feature.

     AT+FAA=1            ; Auto answer as a facsimile or a
                         ; data modem depending on call

     CONNECT xxx         ; DCE status response if data call

     +FCON               ; DCE status response if fax call

7.1.4  IDENTIFICATION OF T.30 OPTIONS

Group 3 devices negotiate session parameters in DIS, DCS and DTC frames.
 These parameters are defined in table 8.2.

7.1.5  SESSION STATUS REPORTING

The DCE provides reports to the DTE on the status of a session.  The DCE provides
following status reports:

1.  Connection and hang up status:

        +FCON

        +FHNG:<0-255>

2.  Requested DIS session parameters +FDIS:<string> reports remote
    facsimile capabilities.

        Syntax:+FDIS:VR, BR, WD, LN, DF, EC, BF, ST

3.  +FDCS:<string> reports the negotiated parameters

4.  Phase C prompts:

        XON, XOFF, DC2

5.  Phase C base status reports: depending upon copy quality and related end-of
page status:

        +FPTS:<1-5>
```

7.1.6 PROCEDURE INTERRUPT NEGOTIATION

CCITT allows a station to request a procedure interruption at the end of a page. This request is passed between stations by the PIP, PIN, and PRI-Q messages.

TABLE 7-1. FAX CLASS 2 COMMANDS

Command	Function
SERVICE CLASS ID	
+FCLASS=	Service Class
CLASS 2 ACTION COMMANDS	
D	Originate a call
A	Answer a call
+FDT=	Data Transmission
+FET=N	Transmit Page Punctuation
+FDR	Begin or Continue Phase C Receive Data
+FK	Session Termination
CLASS 2 DCE RESPONSES	
+FCON	Facsimile Connection Response
+FDCS:	Report Current Session
+FDIS:	Report Remote Identification
+FCFR	Indicate Confirmation to Receive
+FTSI:	Report the Transmit Station ID
+FCSI:	Report the Called Station ID
+FPTS:	Page Transfer Status
+FET:	Post Page Message Response
+FHNG	Call Termination with Status
CLASS 2 SESSION PARAMETERS	
+FMFR?	Identify Manufacturer
+FMDL?	Identify Model
+FREV?	Identify Revision
+FDCC=	DCE Capabilities Parameters
+FDIS=	Current Sessions Parameters
+FDCS=	Current Session Results
+FLID=	Local ID String
+FCR	Capability to Receive
+FPTS=	Page Transfer Status
+FAA	Adaptive Answer
+FBUF?	Buffer Size (Read Only)
+FPHCTO	Phase C Time Out
+FAXERR	Fax Error Value
+FBOR	Phase C Data Bit Order

7.2 SERVICE CLASS 2 IDENTIFICATION AND SELECTION

The fax class 2 commands are summarized in Table 7-1.

Three commands report identification and selection information. Each of these three commands cause the DCE to send a message to the DTE. Each message is 20 bytes (ASCII encoded) followed by the terminating character (binary 0).

7.2.1 +FMFR?, REQUEST MANUFACTURER IDENTIFICATION

The +FMFR? command caused the DCE to send a message identifying the DCE product manufacturer. The default message is:

```
ROCKWELL
OK
```

7.2.2 +FMDL?, IDENTIFY PRODUCT MODEL

The +FMDL? command causes the DCE to send a message identifying the DCE product model. The default message is:

```
V.32AC
OK
```

7.2.3 +FREV?, IDENTIFY PRODUCT REVISION

The +FREV? command causes the DCE to send a message identifying the DCE product model revision number. The typical default message is:

```
V0.200 TR14-JXXX-001
OK
```

7.3 SERVICE CLASS 2 ACTION COMMANDS

These commands transfer data, and punctuate sessions. They also release specific T.30 messages. All action commands must be the last command on a command line. This is indicated by the terminating <CR>.

All action commands initiate processes. The modem will not accept other commands from the DTE until the modem issues a final result code (e.g. OK, CONNECT). The modem will abort the process if it receives any character before the final result code is issued.

7.3.1 ATD, ORIGINATE A CALL

Syntax: ATD...<CR>

The DCE can support a DTE command to originate a call using the ATD command (See Table 4-2).

If this command is unsuccessful, the DCE reports an appropriate failure or error type result code such as NO CARRIER, NO DIALTONE or BUSY (see Table 4-7).

If this call is successful, the typical DCE response is:

```
ATDnn.nn         (go off-hook, dial, get CED)
+FCON            (DCE detects flags)
[+FCSI:<remote ID string>]
+FDCS:<T.30 subparameter string>
OK
```

The DCE dials, detects call progress and generates the CNG tone. Then it waits for a DIS frame. On detection of the first Phase B preamble (V.21 ch. 2 modulated by 300 bit/s HDLC flags) it reports the "+FCON" message to the DTE. The DCE then switches to 19.2K bps.

The DCE generates a DCS frame based on the received DIS frame and on the previously set +FDIS parameter. A +FDT command from the DTE releases the DCE to transmit that DCS frame.

The DCE reports the initial received T.30 negotiation messages, including the DIS frame and the optional CSI ID string. The +FDIS: report is followed by the OK final result code.

7.3.2 ATA, ANSWER A CALL

The DCE can support a DTE command to answer an incoming call using the ATA command (see Table 4-2).

The DTE may issue an Answer command in response to an incoming ring.

If the Answer command is unsuccessful, the DCE will report an appropriate failure or error type result code, such as NO CARRIER (see 4-7)

MANUAL CALL ANSWER

If this call is successful, the typical DCE response (answer and receive) is:

```
  +FCON
  [+FTSI:<remote ID string>]
  +FDCS: <T.30 subparameter string>
  OK
  (DTE should issue +FDR command here)
```

On receipt of an Answer command from the DTE, the DCE answer and generates the CED tone. The DCE then generates a DIS frame (derived from the +FDIS parameter) and hunts for the first T.30 negotiation frames. On detection of the first Phase B preamble (V.21 ch 2 modulated by 300 bit/s HDLC flags), it reports the "+FCON" message to the DTE.

The DTE should report the initial received T.30 negotiation messages, including the DCS frame. The +FCS: report will be followed by the OK final result code.

AUTOMATIC ANSWER

The modem provides for automatic answering of incoming calls. If configured for automatic answer, the modem answers and incoming call in compliance with T.30 and reports the same messages as described for manual answer.

CONNECTIONS AS A DATA MODEM

If configured to do so by the +FAA parameter, the DCE will adaptively answer as a facsimile DCE or as a data DCE. If the DCE answers as a facsimile DCE or as a data DCE. If the DCE answers as a data DCE, it resets the +FCLASS parameter to 0 and issues the appropriate final result code (e.g. CONNECT or NO CARRIER) to the DTE.

```
7.3.3  +FDT, DATA TRANSMISSION

Syntax: +FDT<CR>

The +FDT command prefixes Phase C data transmission.  When the DCE is
ready to accept Phase C data, it issues the negotiation responses and
the CONNECT result code to the DTE.

In Phase B, the +FDT command releases the DCE to proceed with negotiation, and
releases the DCS message to the remote station.  In Phase C, the +FDT command
resumes transmission after the end of a prior transmit data stream.

INITIATE PAGE TRANSMISSION

Phase B DCE polled response:

  [+FCSI:<remote ID string>]                   ; If new CSI received
  [+FDIS:<subparameters from remote station>]  ; If new DIS received
  +FDCS:<T.30 subparameter string>
  CONNECT
  <XON>                                        ; When ready for data

After placing a call, or after finishing a document exchange, the DTE
may command the DCE to re-enter T.30 Phase B to attempt to negotiate a
document transmission.

CONTINUE A PAGE

   CONNECT
   <XON>

The DTE may issue more than one +FDT command for a given page, so that
different files may be concatenated together.  These files must have the same ↩
   format.

PHASE C DATA FRAMING

Phase C data must be presented to the DCE in stream mode.  The DCE
expects Phase C data to follow until it detects <DLE><ETX> termination
characters.  The DCE will filter the stream as described in Section
7.1.2

The DCE will acknowledge the end of the data by returning the OK result code to ↩
   the DTE.

If there is data underrun before the next +FDT or +FET= command, the DCE will
zero-fill pad as per T.4 until the  Phase C timeout  (+FPHCTO) is reached, or
until more data is received.  The DCE appends an RTC pattern to the transmit data
after an +FET= command is received from the DTE.

PHASE C DATA FORMAT

The Phase C data will be of the format specified by the negotiated T.30 DCS
frame.  The +FDCS <string> response is defined in section 7.4.2. The subparameter
values are described in table 7.2.
```

The DCE will use the negotiated minimum Scan Time parameter from the DCS frame , and insert sufficient fill bits to pad each line to the minimum scan time. This is reported in the +FDCS:ST subparameter.

If the DCE finds more than one consecutive EOL in Phase C data (e.g. RTC), it will send only one EOL.

Note 1: Phase C data must conform to T.4 specifications

Note 2: The DTE need not include a final RTC, since the DCE will append an RTC in response to an FET= command

Note 3: Some facsimile machines may treat two EOLs as an RTC

<CAN>, ESCAPE FROM TRANSMISSION

The DCE may request the DTE to halt Phase C transmission, by sending a cancel <CAN> character (024) to the DTE. In this case, the DTE should terminate Phase C transmission, issue <CAN>, and wait for the OK response code from the DCE.

Table 7-2 T.30 Session Subparameter Codes

Label	Function	Value	Description
VR	Vertical	0	Normal, 98 lpi
	resolution	1	Fine, 196 lpi
BR	Bit Rate	0	2400 bit/s V.27 ter
		1	4800 bit/s V.27 ter
	(See note 1)	2	7200 bit/s V.29 or v.17
		3	9600 bit/s V.29 or v.17
		**4	12000 bit/s V.33 or v.17
		**5	14400 bit/s V.33 or v.17
WD	Page Width	0	1728 pixels in 215 mm
		1	2048 pixels in 255 mm
		2	2432 pixels in 303 mm
		*3	1216 pixels in 151 mm
		*4	864 pixels in 107 mm
LN	Page Length	0	A4, 297 mm
		*1	B4, 364 mm
		*2	unlimited length
DF	Data	0	1-D modified Huffman
	Compression	1	2-D modified Read
	Format	*2	2-D uncompressed mode
		*3	2-D modified Read
EC	Error	0	Disable ECM
	Correction	*1	Enable ECM,64 bytes/frame
	(Annex	*2	Enable ECM,256 bytes/frame
	A/T.30)		
	(See Note 2)		
BF	Binary File	0	Disable BFT

```
|        |  Transfer      |  *1     |  Enable BFT                     |
|        |  (See Note 3)  |         |                                 |
|--------|---------------|---------|----------------------- ------|
|  ST    |  Scan Time/    |         |  VR=normal   VR=fine            |
|        |  Line          |   0     |    0 ms        0 ms             |
|        |                |   1     |    5 ms        5 ms             |
|        |                |   2     |    10 ms       5 ms             |
|        |                |   3     |    10 ms       10 ms            |
|        |                |   4     |    20 ms       10 ms            |
|        |                |   5     |    20 ms       20 ms            |
|        |                |   6     |    40 ms       20 ms            |
|        |                |   7     |    40 ms       40 ms            |
|--------|---------------|---------|----------------------- ------|
|  NOTES: 1: CCITT T.30 does not provide for the answering         |
|            station to specify all speeds exactly using the DIS  |
|            frame.  Implementation of some BR codes (e.g.code 2) |
|            by an answering DCE is manufacturer specific.        |
|                                                                 |
|                                                                 |
|          * =Not supported                                       |
|         ** =RC144AC only                                        |
|                                                                 |
|          2: ECM has been implemented in version 1.200C.  |
|             ECM transmit works correctly, and ECM receive works, |
|             but does not tell the transmitting machine that the  |
|             fax was received correctly.                          |
|                                                                 |
|         3:  BFT has been implemented in version 1.200C.  |
|             BFT transmit works correctly, and BFT receive works, |
|             but does not tell the transmitting machine that the  |
|             file was received correctly.                         |
|                                                                 |
|------------------------------------------------------- ------|
```

7.3.4 +FET=, TRANSMIT PAGE PUNCTUATION

Syntax: +FET=<ppm>[,<pc>,<bc>,<fc>]

DCE response:
+FPTS:<ppr> ; when receive from remote OK

This command is used to punctuate page and document transmission after one or more +FDT commands. This command generates T.30 Post Page Messages selected by the <ppm> code (Table 7-3)

The +FET=<ppm> command indicates that the current page is complete; no more data will be appended to it. The value indicates if there are any additional pages are to be sent and, if so, whether there is a change in any of the document parameters.

The DTE can command the DCE to generate PRI-Q messages with the +FET=<ppm> command using ppm codes 4-6 (see Table 7-3)

This command must be sent within the time out specified by +FPHCTO after sending Phase C data, or else the DCE will end the page and document transmission. If the Phase C timeout is reached, the DCE sends an EOP post page message and terminates the session

The remote facsimile station should respond to the post page message with a post page response. The DCE will report this using the +FPTS:<ppr> response (Table 7-4)

END A PAGE

The +FET= command causes the DCE to append an ETC (6 EOL) pattern as needed and enter Phase D by sending the selected T.30 Post Page message.

The +FET=1 (EOM) command signals the remote station that the next document will have a new DCS negotiated; this causes the session to re-enter Phase B.

7.3.5 +FDR, BEGIN OR CONTINUE PHASE C RECEIVE DATA

Syntax: +FDR<CR>

Default value: 3 seconds in some places

The +FDR command initiates transition to Phase C data reception. This can occur after answering, dialing, a document is received, or a page is received.

The DCE reports the negotiated T.30 parameters, with the remote ID information if available. When the DCE is ready to commence data transfer, it issues a CONNECT response code. If the DCE cannot resume data transfer because there is no more data, it responds OK. When the DTE is ready to accept data, it issues an <DC2> character (018) to the DCE.

If the DTE issues an <XOFF> character to the DCE for flow control, the DCE signals the DTE when its buffers are empty by sending a <DLE><DC2> (<016><018>) character pair.

When the DCE delivers that last byte of a page, the DCE reports the Page Transfer Status via the +FPTS:<ppr> response (Table 7-4).

After a Page Transfer Status Report, the DCE reports the post page message from the remote facsimile station via the +FET:<ppm> response (Table 7-3) which signals the intentions of the remote station.

Table 7-3. T.30 Post Page Message Codes

ppm Code	Mnemonic	Description
1	[PPS]-MPS	Another page next, same document
2	[PPS]-EOM	Another page next
3	[PPS]-EOP	no more pages or documents
4	[PPS-]PRI-MPS	Another page, procedure interrupt
5	[PPS-]PRI-EOM	Another doc, procedure interrupt
6	[PPS-]PRI-EOP	All done, procedure interrupt
7	CTC	Continue to correct
8-15	EOR-	End of Retransmission (8)+

=8+ppm		Post Page Message (ppm code)

Table 7-4. T.30 Post Page Response Message Codes

ppr Code	Mnemonic	Description
0	PPR	Partial page errors
1	MCF	Page Good
2	RTN	Page bad, retrain requested
3	RTP	Page good, retrain requested
4	PIN	Page bad, interrupt requested
5	PIP	Page good, interrupt requested

The DCE holds the post page response message to the remote facsimile station (MCF, etc.), represented in the +FPTS parameter until the next +FDR command. The DTE may modify the +FPTS parameter before issuing the +FDR command which releases that message. The DTE must issue a +FDR command to release Post Page Messages.

INITIATE DOCUMENT RECEPTION

The +FDR command may be issued in Phase B after an answer command, or in Phase B after a pervious document.

The DCE response in stream mode is:

```
+FCR              ; when CFR sent
[+FTSI:<remote ID string>]  ; if new TSI received
+FDCS:<T.30 subparameter string>]  ; if new DCS
CONNECT
(<DC2> needed from DTE here)
<Phase C data stream>
<DLE><ETX>
+FPTS:<ppr>,<lc>[,<blc>,<cblc>]
+FET:<ppm>
OK
(DTE must issue +FDR command to release post page response)
```

CONTINUE DOCUMENT RECEPTION

The DTE may issue a +FDR command in Phase D, which releases the post page message, and indicates readiness to receive another page after receipt of a Multipage (+FET:0) or PPS-NULL (+FET:3) message. The DCE response will be:

```
CONNECT
(<DC2> needed from DTE here)
<Phase C data stream>
<DLE><ETX>
+FPTS:<ppr>,<lc>[,<blc>,<cblc>]
+FET:<ppm>
OK
(DTE must issue +FDR command to release post page response.
```

If done receiving:

+FHNG:<hangup cause code>
OK

Continue page reception

PHASE C DATA FRAMING

Phase C data may be presented to the DTE in stream mode. The DCE will transfer a stream of data to the DTE, followed by the <DLE><ETX> stream termination characters. The DCE will filter the stream as described in 7.1.2.

PHASE C DATA FORMAT

The received data format is negotiated under T.30 reported by the +FDCS:VR,BR,WD,LN,DF,EC,BF,ST response.

The DCE will delete the terminating RTC (6 EOLs) patterns. The DCE may strip zero fill bits from the data, to minimize storage needs.

<CAN>, ESCAPE FROM RECEPTION

>From the +FDR command until the end of Phase D Date, the DCE is in a data transfer state, and will not respond to DTE command characters. The DCE will respond to three ASCII control characters, <DC1 (017) and <DC3> (019) flow control characters, and cancel <CAN> (024).

Upon receipt of the <CAN> character, the DCE will terminate the reporting of received data by sending trailing <DLE><ETX> characters to the DTE, and will then execute an implied +FK command in order to conduct an orderly disconnection.

7.3.6 +FK, SESSION TERMINATION

Syntax: +FK

The +FK command causes the DCE to terminate the session in an orderly manner. In particular, the DCE will send a DCN message at the next opportunity and hang up. At the end of the termination process, the DCE will report the +FHNG response with result code (Table 7-5).

This operation can be invoked by using the cancel <CAN> character during Phase C data reception (see prior section).

The DCE will wait until the current page completes, unless the reception is of unlimited length; in that case, the DCE may halt reception and terminate the session at any time.

7.4 SERVICE CLASS 2 DCE RESPONSES

The DCE sends information responses to the DTE as a facsimile session proceeds. They indicate the state of the facsimile session and convey need information. These messages are solicited messages generated in execution of DTE action commands described in section 7.3.

The DCE precedes and follows the following information responses with <CR><LF>.

The DCE provides the on-line status of several session parameters when they are available during T.30 handshaking. These include the remote ID string and the DIS/DCS parameters. These responses report the T.30 session parameter frames. The subparameters are described in Table 7-2.

7.4.1 +FCON, FACSIMILE CONNECTION RESPONSE

+FCON indicates connection with a fax machine. It is released by detection of HDLC flags in the first received frame +FCON is generated in response to an Originate or Answer command.

7.4.2 +FDCS:, REPORT CURRENT SESSION CAPABILITIES

Syntax: +FDCS:VR,BR,WD,LN,DF,EC,BF,ST

+FDCS:<string> reports the negotiated parameters. Phase C data will be formatted as described by the subparameters. This message may be generated in execution of +FDT or +FDR commands before the CONNECT result code if new DCS frames are generated of received. (See Table 7-2.)

7.4.3 +FDIS:, REPORT REMOTE STATION CAPABILITIES

Syntax: +FDIS:VR,BR,WD,LN,DF,EC,BF,ST

+FDIS:<string> reports remote facsimile station capabilities and intentions. The parameters are provided in ASCII notation. (See Table 7-2.)

This message is generated in execution of Originate, Answer, +FDT, or +FDR commands.

7.4.4 +FCFR, INDICATE CONFIRMATION TO RECEIVE

Syntax: +FCFR

The DCE sends a +FCFR response to the DTE upon reception of an acceptable TCF training burst and a valid DCS signal from the remote machine. This indicates that the DCE will receive Phase C data after the remote station receives the local DCE’s CFR message. The +FCFR message is generated in execution of a +FDR command.

7.4.5 +FTSI:, REPORT THE TRANSMIT STATION ID

Syntax: +FTSI:"<TSI ID string>" Transmit Station ID

This response reports the received transmit station ID string, if any. This message is generated in execution of Originate, Answer, +FDT, or +FDR commands.

7.4.6 +FCSI:, REPORT THE CALLED STATION ID

Syntax: +FCSI:"<CSI ID string>" Called Station ID

This response reports the received called station ID string, if any. This message is generated in execution of Originate, Answer, +FDT, or +FDA commands.

7.4.7 +FPTS:, RECEIVE PAGE TRANSFER STATUS

Syntax: +FPTS:<ppr>,<lc>[,<blc>,<cblc>]

The +FPTS:<ppr> is generated by the DCE at the end of Phase C data
reception in execution of a +FDR command.

The <ppr> is generated by the DCE; it depends on the DCE capabilities at T.4 error checking. See Table 7-4 for <ppr> values.

The receiving DCE will count the lines and may optionally generate bad
line counts. These values are:

<lc> = line count
<blc> = bad line count
<cblc> = <consecutive bad line count

A receiving DTE may inspect <ppr> and write a modified value into the +FPTS parameter. The DCE will hold the corresponding Post Page Response message until released by a +FDR command from the DTE.

7.4.8 +FET:, POST PAGE MESSAGE RESPONSE

Syntax: +FET:<ppm>

The +FET:<post page message> response is generated by a receiving DCE
after DCE after the end of Phase C reception on receipt of the post-page message from the transmitting station. The +GET:<ppm> response is generated in execution of a +FDR command. The <ppm> codes respond to the T.30 pst page messages (Table 7-3)

7.4.9 +FPTS:, TRANSMIT PAGE TRANSFER STATUS

Syntax: +FPTS:<ppr>

The +FPTS: response reports a <ppr> number representing the copy
quality and related post page message responses received from the remote DCE.

The set of valid <ppr> values are defined in Table 7-4.

The +FPTS:<ppr> response is generated in execution of a +FET=<ppm>
command.

7.4.10 +FHNG:, CALL TERMINATION WITH STATUS

Syntax: +FHNG:<hangup status code>

+FHNG indicates that the call has been terminated. The hangup cause is reported and stored in the +FAXERR parameter for later inspection. The <hangup status code> values are described in Table 7-5.

+FHNG:<hsc> is a possible intermediate result code to any DTE action
command described in Section 7.3. It is always followed by the OK final result code.

Upon termination of a call, the DCE determines the cause of termination and reports it as part of the FHNG:<hsc> response. It also stores this <hsc> code in the +FAXERR parameter for later inspection.

The hangup values are organized according to the phases of the facsimile transaction as defined by T.30. A COMREC error or RSPREC error indicates that one of two events occurred. 1) a DCN (disconnect) signal was received, or 2) an FCS error was detected and the incoming signal was still present after 3 seconds.

The table values are in decimal notation. Leading zero characters are optional.

Table 7-5 Hangup Status Codes

Code	Cause Description
0-9	CALL PLACEMENT AND TERMINATION
0	Normal and proper end of connection
1	Ring Detect without successful handshake
2	Call aborted, from +FK or AN
3	No Loop Current
10-19	TRANSMIT PHASE A & MISCELLANEOUS ERRORS
10	Unspecified Phase A error
11	No Answer (T.30 T1 timeout)
20-39	TRANSMIT PHASE B HANGUP CODES
20	Unspecified Transmit Phase B error
21	Remote cannot receive or send
22	COMREC error in transmit Phase B
23	COMREC invalid command received
24	RSPEC error
25	DCS sent three times without response
26	DIS/DTC received 3 times; DCS not recognized
27	Failure to train at 2400 bps or +FMINSP value
28	RSPREC invalid response received
40-49	TRANSMIT PHASE C HANGUP CODES
40	Unspecified Transmit Phase C error
43	DTE to DCE data underflow
50-69	TRANSMIT PHASE D HANGUP CODES
50	Unspecified Transmit Phase D error
51	RSPREC error
52	No response to MPS repeated 3 times
53	Invalid response to MPS
54	No response to EOP repeated 3 times
55	Invalid response to EOM
56	No response to EOM repeated 3 times
57	Invalid response to EOM
58	Unable to continue after PIN or PIP

70-89	RECEIVE PHASE B HANGUP CODES
70	Unspecified Receive Phase B error
71	RSPREC error
72	COMREC error
73	T.30 T2 timeout, expected page not received
74	T.30 T1 timeout after EOM received
90-99	RECEIVE PHASE C HANGUP CODES
90	Unspecified Receive Phase C error
91	Missing EOL after 5 seconds
92	Unused code
93	DCE to DTE buffer overflow
94	Bad CRC or frame (ECM or BFT modes)
100-119	RECEIVE PHASE D HANGUP CODES
100	Unspecified Receive Phase D errors
101	RSPREC invalid response received
102	COMREC invalid response received
103	Unable to continue after PIN or PIP
120-255	RESERVED CODES

7.5 SERVICE CLASS 2 PARAMETERS

All Service Class 2 parameters can be read, written, and tested for range of legal values by the DCE. The general syntax is described in Section 7.1.

Group 3 FAX devices negotiate session parameters in DIS, DCS, and DTC frames. The following parameters are provided to condition the facsimile DCE for the capabilities it will offer and to report the session settings negotiated.

The three primary T.30 session parameters are +FDCC, +FDIS and +FDCS. They are compound parameters, using values listed in Table 7-2. Figure 70-1 illustrates their relationships.

7.5.1 +FDCC, DCE CAPABILITIES PARAMETERS

```
Write Syntax:   +FDCC:VR,BR,WD,LN,DF,EC,BF,ST

Valid values    See Table 7-2

Default values  0,3,0,2,0,0,0,0  (RC96AC)
                0,5,0,2,0,0,0,0  (RC144AC)
```

+FDCC allows the DTE to sense and constrain the capabilities of the facsimile DCE from the choices defined in CCITT t.30 Table 2. When +FDCC is modified by the DTE, the DCE copies +FDCC into +FDIS.

7.5.2 +FDIS, CURRENT SESSIONS CAPABILITIES PARAMETERS

```
Write Syntax:   +FDIS:VR,BR,WD,LN,DF,EC,BF,ST

Valid values    See Table 7-2

Default values  0,3,0,2,0,0,0,0  (RC96AC)
                0,5,0,2,0,0,0,0  (RC144AC)
```

The +FDIS parameter allows the DTE to sense and constrain the capabilities used for the current session. The DCE uses +FDIS to generate DIS or DTC messages directly, and uses +FDIS and received DIS messages to generate DCS messages.

The DCE initializes the +FDIS parameter from the +FDCC parameter on initialization, when +FDCC is written, and at the end of a session.

7.5.4 +FLID=, LOCAL ID STRING

```
Write Syntax   +FLID="<local ID string>"

Valid values:   20 character ASCII string

Default value:  Empty
```

If FLID is not a null string, it generates a TSI or CSI frame. Table 3/T.30 includes digits 0-9, "+" and space.

If the DCE supports use of Table 3/t.30 only, the response to a +FLID=? command is "<20)(32, 43, 48-57)". If the DCE supports printable ASCII <, the response is "(20)(32-127)<CRLF>" The first "(20)" represents string length: the second (character values) field reports supported string values.

Notes: 1. The string is saved in RAM.
2. Non-numeric characters are not filtered out.

7.5.5 +FCR, CAPABILITY TO RECEIVE

```
Write Syntax:  +FCR=<value>

Valid values:  1,0

Default values 0
```

+FCR=0 indicates that the DCE will not receive message data. This can be sued when the DTE has insufficient storage. The DCE can send and can be polled for a file.

+FCR is sampled in CCITT T.30 Phase A and Phase D

7.5.6 +FPTS=, PAGE TRANSFER STATUS

```
Write syntax:   +FPTS=<ppr>

Valid Values:   1,2,3,4,5

Default value:  0
```

7.5.7 +FCQ, COPY QUALITY CHECKING

Write Syntax: +FCQ=<value>

Valid Values: 0

Default Value: 0

This parameter controls Copy Quality checking by a receiving facsimile DCE.

The DCE returns +FCQ=0 which indicates the DCE does no quality checking. The DCE will generate Copy Quality OK (MCF) responses to complete pages, and set +FPTS =1.

7.5.8 +FPHCTO, DTE PHASE C RESPONSE TIME-OUT

Write Syntax: +FPHCTO=<value>

Valid Values: 0-255, 100 millisecond units

Default Value: 30

The +FPHCTO command determines how long the DCE will wait for a command after reaching the end of data when transmitting in Phase C. When this time-out is reached, the DCE assumes there are no more pages and no documents to send. It then sends the T.30 EOP response to the remote device.

7.5.9 +FAXERR, T.30 SESSION ERROR REPORT

Read Syntax: +FAXERR=<table value>, read only

Valid values: 0-255, see table 7-5 for meaning

This read-only parameter indicates the cause of the hangup. Table 7-5 shows the valid values for this parameter as well as the meaning of the each value . +FAXERR is set by the DCE at the conclusion of a fax session. The DCE resets +FAXERR to 0 at the beginning of Phase A off-hook time.

7.5.10 +FBOR, DATA BIT ORDER

Write Syntax: +FBOR=<value>

Valid Values: 0,1

Default value: 0

This parameter controls the mapping between PSTN facsimile data and the DTE-DCE link. There are two choices:

DIRECT: The first bit transferred to each byte on the DTE-DCE link is the first bit transferred on the PSTN data carrier.

REVERSED: The last bit transferred of each byte on the DTE-DCE link is the first bit transferred on the PSTN data carrier.

There are two data types to control:

This command controls Phase C data (T.4 encoded data) transferred during execution of +FDT or +FDR commands.

The following two codes are supported.

+FBOR=0 selects direct bit order for Phase C data

+FBOR=1 selects reversed bit order for Phase C data

Note that this parameter does not affect the bit order of control characters generated by the DCE.

7.5.11 +FAA, ANSWER PARAMETER

Write syntax: +FAA=<value>

Valid values: 0,1

Default value   0

+FAA=0   constrains the DCE to answer as set by +FCLASS

+FAA=1   indicates that the DCE can answer and automatically determine whether to answer as a Class 2 facsimile DCE or as a data modem. If the DCE automatically switches, if modifies FCLASS appropriately.

Class 2 adaptive answer is implemented as follows:

First, a data mode handshake is attempted. If the DCE has been configured for automode detection (using the A command), the DCE may try several protocols be terminating attempts to make a data mode connection. This can take as long as 6-8 seconds.

If the data mode connection attempt fails, a facsimile Class 2 connection is assumed. When a connection is made, a result of the adaptive answer, the DCE issues the D or FAX result code before the CONNECT or +FCC message to inform the DTE of the connection type. A making a class 2 connection, the DCE stays on-line rather than going into the command mode as with a Class 2 connection.

7.5.12 +FBUF?, BUFFER SIZE

Read syntax: +FBUF?

DCE response syntax <bs>,<xoft>,<xont>,<bc> where:

<bs> = total buffer size
<xoft> = XOFF threshold
<xcont> = XON threshold
<bc> = current buffer byte count

The +FBUF parameter allows the DTE to determine the characteristics of the DCE's data buffer. Data buffers are used for flow control. Use of the reported values allow the DTE to transfer data without provoking XOFF.

7.6 EXAMPLE SESSIONS

Table 7-6 and 7-7 show the typical command and responses for sending and receiving two pages respectively.

```
               Table 7-6 Send two pages, 1-D data, no errors
|----------------------------------------------------------- ---------|
| DTE COMMAND | DCE RESPONSE | LOCAL DTE ACTION |REMOTE STATION ACTION |
|-------------|--------------|------------------|----------- ---------|
| AT+FCLASS=2 | OK           | Set Class 2      |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FLID=    |              |                  |                      |
| <local id>  | OK           | Set local ID     |                      |
|-------------|--------------|------------------|----------- ---------|
| AT<dial str>|              | off hook, dial   | answer               |
|             |              | send CNG         | send [CED],          |
|             | +FCON        | detect flags     | v.21 flags           |
|             | +FDIS:<csi>  | get CSI          | CSI                  |
|             | +FDIS:<codes>| get DIS          | DIS                  |
|             | OK           |                  |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FDT      |              | send TSI         | get TSI              |
|             |              | send DCS         | get DCS              |
|             |              | send TCF         | get TCF              |
|             | +FDCS:<codes>| get CFR          | send CFR             |
|             | CONNECT      | send carrier     | receive carrier      |
|             | <XON>        |                  |                      |
| <1st page>  |              | send page data   | receive page data    |
| <DLE><ETX>  | OK           |                  |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FET=0    |              | send RTC         | get RTC              |
|             |              | get MPS          | send MPS             |
|             | +FPTS:1      | get MCF          | send MCF             |
|             | OK           |                  |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FDT      | CONNECT      | send carrier     | receive carrier      |
|             | <XON>        |                  |                      |
| <2nd page>  |              | send page data   | receive page data    |
| <DLE><ETX>  | OK           |                  |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FET=2    |              | send RTC         | get RTC              |
|             |              | send EOP         | get EOP              |
|             | +FPTS:1      | get MCF          | send MCF             |
|             | +FHNG:0      | send DCN         | get DCN              |
|             | OK           | hangup           | hangup               |
|-------------|--------------|------------------|----------- ---------|
```

```
               Table 7-7 Receive two pages, 1-D data, no errors
|----------------------------------------------------------- ---------|
| DTE COMMAND | DCE RESPONSE | LOCAL DTE ACTION |REMOTE STATION ACTION |
|-------------|--------------|------------------|----------- ---------|
| AT+FCR=1    | OK           | Enable reception |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FLID=    |              |                  |                      |
```

```
| <local id>  | OK           | Set local ID     |                      |
|-------------|--------------|------------------|----------- ---------|
|             | RING    <-   | detect ring  <-  | Dials[, send CNG]    |
|-------------|--------------|------------------|----------- ---------|
| ATA         |              | off hook         |                      |
|             |              | send CED         | get CED              |
|             |              | send CSI         | get CSI              |
|             |              | send DIS         | get DIS              |
|             | +FCON        | detect flags     | send v.21 flags      |
|             |[+FTSI:"<tsi>"] [get TSI]        | [send TSI]           |
|             | +FDCS:<codes>| get DCS          | send DCS             |
|             | OK           | begin TCF receive| start TCF            |
|-------------|--------------|------------------|----------- ---------|
| AT+FDR      |              | accept TCF       | finish TCF           |
|             | +FCFR        | send CFR         | get CFR              |
|             |[+FDCS:<codes>]                  |                      |
|             | CONNECT      | get page carrier | send page carrier    |
| <DC2>       |              | get page data    | send page data       |
|             |<page data stream>               |                      |
|             | <DLE><ETX> <-| detect RTC   <-  | send RTC             |
|             | +FPTS:1,<lc> |                  | drop  carrier         |
|             | +FET:0    <- | get MPS       <- | send MPS             |
|             | OK           |                  |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FDR      |              | send MCF         | get MCF              |
|             | CONNECT      | get page carrier | send page carrier    |
| <DC2>       |              | get page data    | send page data       |
|             |<page data stream>               |                      |
|             | <DLE><ETX> <-| detect RTC   <-  | send RTC             |
|             | +FPTS:1,<lc> |                  | drop carrier         |
|             | +FET:2    <- | get EOP       <- | send EOP             |
|             | OK           |                  |                      |
|-------------|--------------|------------------|----------- ---------|
| AT+FDR      |              | send MCF         | get MCF              |
|             | +FHNG:0   <- | get DCN       <- | send DCN             |
|             | OK           | hangup           | hangup               |
|-------------|--------------|------------------|----------- ---------|
```

1.22 FAQs for modems

```
Q: How to connect 2 modems with a presented line?
A: Just type on your modem "ATX1DT1", and type on another modem "ATA"...
   The connect is ready.

Q: How to maximising my modem for the Net?
A:
```

1.23 Modem based informations in the NET

```
 Modem related informations on teh NET

  http://www.rosenet.net/~costmo
```

```
  http://uts.cc.utexas.edu/~loudon/

Online groups
-------------
  In general ask questions on AOL, Compuserve, the LineLink mailing
  list. I believe there is a forum/area for Prometheus on AOL.

The following internet Usenet newsgroups would be helpful also
  comp.dcom.modems
  comp.dcom.fax

For Mac users also look at
  comp.sys.mac.comm
  comp.sys.mac.hardware

For Amiga owners also look at
  comp.sys.amiga.comm
```

1.24 USR SportSter 14.4 FAX

```
(ATI4)

USRobotics Sportster 14400 Fax Settings...

   B0  E1  F1  L2  M1  Q0  V1  X4  Y0
   BAUD=57600   PARITY=N  WORDLEN=8
   DIAL=TONE   ON HOOK

   &A3  &B1  &C1  &D2  &H1  &I0  &K1
   &M4  &N0  &P0  &R2  &S0  &T5  &Y1

   S00=000  S01=000  S02=043  S03=013  S04=010  S05=008  S06=003
   S07=060  S08=002  S09=006  S10=014  S11=085  S12=050  S13=000
   S15=000  S16=000  S18=000  S19=000  S21=010  S22=017  S23=019
   S25=005  S27=001  S28=008  S29=020  S30=000  S31=128  S36=014
   S38=000  S39=012  S40=000

   LAST DIALED #:

OK
at$

HELP,  Command Quick Reference (CTRL-S to Stop, CTRL-C to Cancel)

&$    HELP, Ampersand Commands       On    n=0  Return Online
A/    Repeat Last Command                  n=1  Return Online & Retrain
AT    Command Mode Prefix            P     Pulse Dial
A     Answer Call                    Qn    n=0  Result Codes Sent
Bn    n=0  CCITT Answer Seq                n=1  Quiet (No Result Codes)
      n=1  Reserved                        n=2  Verbose/Quiet On Answer
Dn    Dial a Telephone Number              n=3  Ring Message (Voice mode)
      n=0..9#*TPR,;W@!()-            Sr=n  Sets Register "r" to "n"
DL    Dial Last Phone Number         Sr?   Query Register "r"
DSn   Dial Stored Phone Number       S$    HELP, S Registers
```

```
D$     HELP, Dial Commands          T      Tone Dial
En     n=0  No Command Echo         Vn     n=0  Numeric Responses
       n=1  Echo Command Chars             n=1  Verbal Responses
Fn     n=0  Online Echo             Xn     n=0  Basic Result Codes
       n=1  No Online Echo                 n=1  Extended Result Codes
Hn     n=0  On Hook (Hang Up)              n=2-4  Advanced Result Codes
       n=1  Off Hook                Yn     n=0  Next reset to &W0 settings
In     n=0  Product Code                   n=1  Next reset to &W1 settings
       n=1  Checksum                Zn     n=0  Y value determines reset
Strike a key when ready . . .
       n=2  RAM Test                       n=1  Reset to &W0 settings
       n=4  Current Settings               n=2  Reset to &W1 settings
       n=5  NVRAM Settings                 n=3  Reset to &F0 settings
       n=6  Link Diagnostics               n=4  Reset to &F1 settings
       n=7  Product Configuration          n=5  Reset to &F2 settings
Mn     n=0  Speaker Off             +++    Escape Code
       n=1  Speaker On Until CD     $      HELP,  Command Summary
       n=2  Speaker Always On
       n=3  Speaker Off During Dial

OK
at&$

HELP, Ampersand Commands (CTRL-S to Stop, CTRL-C to Cancel)

&An    n=0  Disable /ARQ Result Codes   &Nn    n=0  Highest Link Speed
       n=1  Enable /ARQ Result Codes           n=1  300 bps
       n=2  Enable /Modulation Codes           n=2  1200 bps
       n=3  Enable /Extra Result Codes         n=3  2400 bps
&Bn    n=0  Floating DTE Speed                 n=4  4800 bps
       n=1  Fixed DTE Speed                    n=5  7200 bps
       n=2  DTE Speed Fixed When ARQ           n=6  9600 bps
&Cn    n=0  CD Always On                       n=7  12000 bps
       n=1  Modem Controls CD                  n=8  14400 bps
&Dn    n=0  Ignore DTR                  &Pn    n=0  N.American Pulse Dial
       n=1  On-Line Command Mode               n=1  UK Pulse Dial
       n=2  DTE Controls DTR            &Rn    n=1  Ignore RTS
&Fn    n=0  Load Factory 0, no FC              n=2  RX to DTE/RTS high
       n=1  Load Factory 1, HW FC       &Sn    n=0  DSR Always On
       n=2  Load Factory 2, SW FC              n=1  Modem Controls DSR
&Hn    n=0  Disable TX Flow Control     &Tn    n=0  End Test
       n=1  CTS                                n=1  Analog Loopback (ALB)
       n=2  Xon/Xoff                           n=3  Digital Loopback (DLB)
       n=3  CTS and Xon/Xoff                   n=4  Grant Remote DLB
Strike a key when ready . . .
&In    n=0  Disable RX Flow Control            n=5  Deny Remote DLB
       n=1  Xon/Xoff                           n=6  Remote Digital Loopback
       n=2  Xon/Xoff Chars Filtered            n=7  Remote DLB With Self Test
       n=3  HP Enq/Ack Host Mode               n=8  ALB With Self Test
       n=4  HP Enq/Ack Terminal Mode    &Wn    n=0  Store Configuration 0
       n=5  Xon/Xoff for non-ARQ Mode          n=1  Store Configuration 1
&Kn    n=0  Disable Data Compression    &Yn    n=0  Destructive
       n=1  Auto Data Compression              n=1  Destructive/Expedited
       n=2  Enable Data Compression            n=2  Nondest./Expedited
       n=3  Selective Data Compression         n=3  Nondest./Unexpedited
&Mn    n=0  Normal Mode                 &Zn=s Store Phone Number
       n=4  ARQ/Normal Mode             &Zn?  Query Phone Number
```

```
      n=5  ARQ Mode

OK
```

1.25 Serial Cables for modems

```
       Macintosh Serial (MODEM) Cable


  Serial modem Cable


                           pc       AMIGA
RS-232 Definition        Computer/Terminal        Modem
     Signal                     DTE                DCE
                         9-pin      25-pin        25-pin
-------------------------------------------------------------------
GND  Signal GND            5          1             1
TXD  Transmit Data         3          2             2
RXD  Receive Data          2          3             3
RTS  Req. to Send          7          4             4
CTS  Clear to Send         8          5             5
DSR  Data Set Ready        6          6             6
GND  Chassis GND           -          7             7
CD   Carrier Detect        1          8             8
DTR  Data Term. Ready      4          20            20



  CONNECTORS


DB-9 Connector

    Pin   Signal                   Pin  Signal
-------------------------------------------------------------------
     1    CD   Carrier Detect       6   DSR  Data Set Ready
     2    RXD  Receive Data         7   RTS  Request to Send
     3    TXD  Transmit Data        8   CTS  Clear to Send
     4    DTR  Data Term. Ready     9   RI   Ring Indicator
     5    GND  Signal GND


DB-25 Connector

    Pin   Signal                   Pin  Signal
-------------------------------------------------------------------
     1    GND  Ground / Shield     14        {2nd TXD}
     2    TXD  Transmit Data       15        Transmit Clock
     3    RXD  Received Data       16        {2nd Rec. Clock}
     4    RTS  Request to Send     17        {Receive Clock}
     5    CTS  Clear to Send       18        {Unassigned}
     6    DSR  Data Set Ready      19        {2nd RTS}
     7    GND  Ground              20   DTR  Data Term Ready
     8    DCD  Carrier Detect      21        {Sig. Quality}
```

```
     9         {Reserved}          22   RI   Ring Indicator
    10         {Reserved}          23        {Data Rate Sel.}
    11         {Unassigned}        24        {Transmit Clock}
    12         {2nd CD}            25        {Unassigned}
    13         {2nd CTS}


  NULL MODEM CABLE

RS-232 Definition        Computer/Terminal        Modem
     Signal                     DTE                DCE
                         9-pin      25-pin        25-pin
-------------------------------------------------------------------
GND  Signal GND            5          1             1
TXD  Transmit Data         3          2             3
RXD  Receive Data          2          3             2
RTS  Req. to Send          7          4             5
CTS  Clear to Send         8          5             4
DSR  Data Set Ready        6          6             20
GND  Chassis GND           -          7             7
CD   Carrier Detect        1          8             8
DTR  Data Term. Ready      4          20            6


         DTE                       DCE

          1 ....................... 1

          2 ............     ...... 2
                 .............
          3 ......     ............ 3

          4 ............     ...... 4
                 .............
          5 ......     ............ 5

          6 ............     ...... 6
                       .     .
          7 ....................... 7
                 .............
          8 ....................... 8
                 .     .
         20 ......     ............ 20


  Null modem cables (Several variations)
```

The first variation is explained in an excert from the ZIP162 DOC file. The ZIP program will allow computer <> computer file transfers through a null modem cable. It can even clone itself over the cable (in case the disk drives are not compatible/working).

I have tried this cable with Central Point Software’s DriveMap 1.0 program and Lap Link V 5.0. It works perfectly. Also note if you build a 25 <> 25 pin cable and you need to connect to a 9 pin COM

```
port that a STANDARD 9F > 25M adapter and/or adapter cable will
connect the correct pins.

I have not tried a 9 <> 9 pin cable using a 25F > 9M adapter.  It
may or may not work.  I don’t have an cable of this type to check.


     SERIAL NULL MODEM CABLES, in various combinations of 9- and 25-pin
connectors, are available from a wide variety of sources, and a simple cable
in the configuration you need (for example, DB9 to DB25 female) should cost
less than $10 at Radio Shack or many computer stores.  Double-headed null
modem cables (both 9 and 25 pin on each end) are also made, and would be ideal
for use with ZIP; I am told that a good source for these is:
     DALCO, 233 Pioneer Blvd, Springboro OH 45066; (800)445-5342

     If you’re building or shopping for a cable, you need a "null modem"
cable, meaning the transmit and receive data lines should be crossed, and the
signal ground connected straight through.  (The pin numbers depend on whether
you have a small DB9 or large DB25 connector, see figure.)  No other
connections should be needed; ZIP uses no hardware handshaking lines.  (NOTE:
ZIPDUP does require the DTR connections between pins 20/4 and 6.)

        |--COMPUTER 1--|         |--COMPUTER 2--|
         DB9F or   DB25F          DB25F or   DB9F
      pin 2 - - - - 3 - - - - - - - - 2 - - - - - 3   \ transmit &
          3 - - - - 2 - - - - - - - - 3 - - - - - 2   / receive data
          5 - - - - 7 - - - - - - - - 7 - - - - - 5   - signal ground

      pin 4 - - - - 20  - - - - - - - 6 - - - - - 6 * \
          6 - - - - 6 - - - - - - - - 20  - - - - 4 *  \handshaking (optional)
          7 - - - - 4 - - - - - - - - 5 - - - - - 8    /(* required for ZIPDUP)
          8 - - - - 5 - - - - - - - - 4 - - - - - 7   /

Actually, any serial cable that doesn’t work by itself, should work with a
"null modem adapter" attached.  If available, use a well shielded cable; high
speed transmissions can be especially susceptible to RF interference."


In talking around and asking several Tech. support persons I received
some variations on the null modem cable.  Below are the most to least
common types ’believed’ to work.  (Using the chart layout from above)

        |--COMPUTER 1--|         |--COMPUTER 2--|
         DB9F or   DB25F          DB25F or   DB9F
      pin   - - - - 1 - - - - - - - - 1 - - - -
          3 - - - - 2 - - - - - - - - 3 - - - - - 2
          2 - - - - 3 - - - - - - - - 2 - - - - - 3
          7 - - - - 4 - - - - - - - - 5 - - - - - 8
          8 - - - - 5 - - - - - - - - 4 - - - - - 7
          6 - - - - 6 - - - - - - - - 20- - - - - 4 (As you can see here, pins
          1 - - - - 8 - - - - - - - - 20- - - - - 4 6 & 8 are jumped together
          4 - - - - 20- - - - - - - - 6 - - - - - 6 and join the 20 on the
          4 - - - - 20- - - - - - - - 8 - - - - - 1 other end (both ways)).


        |--COMPUTER 1--|         |--COMPUTER 2--|
         DB9F or   DB25F          DB25F or   DB9F
```

```
    pin   - - - - 1 - - - - - - - - 1 - - - - -
          3 - - - - 2 - - - - - - - - 3 - - - - - 2
          2 - - - - 3 - - - - - - - - 2 - - - - - 3
          8 - - - - 5 - - - - - - - - 20- - - - 4 (As you can see here, pins
          6 - - - - 6 - - - - - - - - 20- - - - 4 5, 6 & 8 are jumped together
          1 - - - - 8 - - - - - - - - 20- - - - 4 and join the 20 on the
          4 - - - - 20- - - - - - - - 5 - - - - - 8 other end (both ways)).
          4 - - - - 20- - - - - - - - 6 - - - - - 6
          4 - - - - 20- - - - - - - - 8 - - - - - 1


      |--COMPUTER 1--|           |--COMPUTER 2--|
       DB9F or   DB25F            DB25F or   DB9F
    pin   - - - - 1 - - - - - - - - 1 - - - - -
          3 - - - - 2 - - - - - - - - 3 - - - - - 2
          2 - - - - 3 - - - - - - - - 2 - - - - - 3
          7 - - - - 4 - - - - - - - -   - - - - -   (4 & 5 jumpered on one end
          8 - - - - 5 - - - - - - - -   - - - - -   but don't connect thru.)
            - - - -   - - - - - - - - 4 - - - - - 7 (4 & 5 jumpered on one end
            - - - -   - - - - - - - - 5 - - - - - 8 but don't connect thru.)
          6 - - - - 6 - - - - - - - - 20- - - - 4
          4 - - - - 20- - - - - - - - 6 - - - - - 6



The above 9 pin connections were 'figured out' using the 9<>25 pin
adapters with the following pinouts.

This is the pin outs for adapters from<>to 9<>25 pin cables.

      |-- 9F <> 25M --|                        |-- 25F <> 9M --|
       DB9F or   DB25M                          DB25F or   DB9M
    pin 1 - - - - 8 - - -                          - - - - 1 - - - -
        2 - - - - 3 - - -                        3 - - - - 2 - - - -
        3 - - - - 2 - - -                        2 - - - - 3 - - - -
        4 - - - - 20- - -                        20- - - - 4 - - - -
        5 - - - - 7 - - -                        7 - - - - 5 - - - -
        6 - - - - 6 - - -                          - - - - 6 - - - -
        7 - - - - 4 - - -                        4 - - - - 7 - - - -
        8 - - - - 5 - - -                          - - - - 8 - - - -
        9 - - - - 22- - -                          - - - - 9 - - - -



  LAPLINK 3 - SERIAL CABLE WIRING


All connectors are female

   DB9  DB25   -   DB25  DB9

    3     2    -     3    2
    2     3    -     2    3
          4    -     5
          5    -     4
    6     6    -    20
    5     7    -     7    5
```

```
        20    -      6    6
 shroud shroud   shroud  shroud



  DESKLINK 2 - SERIAL CABLE WIRING

All connectors are female

   DB9  DB25  TEL             ___         Tel cable is reversed
                             |   |
    3     2    4           __|   |__      1 blue   -  yellow 4
    2     3    1          |         |     2 red    -  green  3
          4               |         |     3 green  -  red    2
          5               |         |     4 yellow -  blue   1
    6     6               | 1 2 3 4 |
    5     7    2+3        |_________|
         20                               Tel socket viewed from plug entry
  scr.   scr



  Serial cable DB25 to DB9

25 pin         9 pin
connector      serial adapter
               on computer
               (cable connector is female)

                                   Signal Direction
                                     DCE-ADAPTER
                                   Cable-Computer

   DB25                       DB9
     8     Carrier Detect      1       >
     3     Received Data       2       >
     2     Transmitted Data    3       <
    20     Data Terminal Ready 4       <
     7     Signal Ground       5       -
     6     Data Set Ready      6       >
     4     Request to send     7       <
     5     Clear To Send       8       >
    22     Ring Indicator      9       >



  RS-232C INTERFACE STANDARD

Data terminal equipment (DTE) is typically a computer.
Data Communications equipment (DCE) is typically a modem.



DTE                                          |  DTE  Modem
```

```
Data Terminal Equipment                     |  Data Communications Equipment
                                            |

Signal     EIA / CCITT                     Pin  Telephone Co.  Signal
Direct     Line Number                     No.  Lead Number    Direction

-          Protective Ground                 1  AA/101     -
-          Signal Ground                     7  AB/102     -
-          Transmitted Data                  2  BA/103     >
<          Received Data                     3  BB/104     -
-          Request to Send                   4  CA/105     >

<          Clear to Send                     5  CB/106     -
<          Data Set Ready                    6  CC/107     -
-          Data Terminal Ready              20  CD/108.2   >
-          Connect Data Set to line         20  * /108.1   >
<          Received Line Signal Detector     8  CF/109     -

-          Speed Select                     23  CH/111     >
<          Transmit Signal Element Timing   15  DB/114     -
<          Receive Signal Element Timing    17  DD/115     -
-          Select Standby                   11  * /116     >
<          Ring Indicator                   22  DE/125     -

-          Test                             18  * /*       >


* means non-defined/standardised by EIA / CCITT




Switched Timing Sequence  (dial-up line communication)
                          ____________________________________________
Data Terminal Ready    ___|
                             _________________________________________
Data Set Ready         ______|
                                ______________________
Request To Send        _________|                      |______________
                                   ________________________
Clear To Send          ____________|                       |__________
                                      _________________
Transmitted Data       _______________|                |______________



Nonswitched Timing Sequence (direct line connection)
                          ____________________________________________
Data Terminal Ready    ___|
                             _________________________________________
Data Terminal Ready    ______|
                                ________________________
Request To Send        _________|                      |______________
                                   _________________________
Clear To Send          ____________|                       |__________
```

```
                                 ______________
Transmitted Data        _______________|            |__________________
```

1.26 Class 2 Fax/Modem Command Scorecard

```
              Class 2 Fax/Modem Command Scorecard


Could anyone with a Fax/Modem combination card which is ~Class2~ run a
favorite communications program with screen logging on to save the output
and then execute each of the following commands.

I will be adding this to the scorecard so that people know what is
implemented in each type of fax/modem.

NOTE: PLEASE DO THESE COMMANDS RIGHT AFTER POWERING UP THE FAX/MODEM TO
      ENSURE WE ARE READING THE CORRECT DEFAULTS

Note2: Please also included a mailing address and phone number for the
       manufacturer.  THANX!

MaS

****************************************

I0                                      For Identification
I1                                      For Identification
I2                                      For Identification
I3                                      For Identification
I4                                      For Identification
I5                                      For Identification
I6                                      For Identification

+FJUNK=?                                FOR TESTING COMMAND PARSING
+FJUNK?                                 FOR TESTING COMMAND PARSING

+FAA=?                                  SP 2388 Answer Mode Capabilities
+FAA?                                   SP 2388 Answer Mode Default
+FAXERR=?                               SP 2388 Hangup Status Codes
+FAXERR?                                SP 2388 Hangup Status Code
+FBADLIN=?                              SP 2388 Bad Line Thresh. Capabalities
+FBADLIN?                               SP 2388 Bad Line Thresh. Default
+FBADMUL=?                              SP 2388 Error Thresh. Mult. Capab.
+FBADMUL?                               SP 2388 Error Thresh. Mult. Defau.
+FBOR=?                                 SP 2388 Data Bit Order Capabilities
+FBOR?                                  SP 2388 Data Bit Order Default
+FBUF?                                          Buffer Sizes
+FBUG=?                                 SP 2388 Session Message Report Capab.
+FBUG?                                  SP 2388 Session Message Report Defau.
+FCIG=?                                 SP 2388 Local Polling ID String Capab.
+FCIG?                                  SP 2388 Local Polling ID String Defau.
+FCLASS=?                               SP 2388 Service Class Capabilities
+FCLASS?                                SP 2388 Service Class Default
+FCQ=?                                  SP 2388 Copy Quality Capabilities
```

```
+FCQ?                                   SP 2388 Copy Quality Default
+FCR=?                                  SP 2388 Capability to Receive Capab.
+FCR?                                   SP 2388 Capability to Receive Defau.
+FCTCRTY=?                              SP 2388 ECM Retry Count Capabilites
+FCTCRTY?                               SP 2388 ECM Retry Count Default
+FDCC=?                                 SP 2388 DCE Capabilities
+FDCC?                                  SP 2388 DCE Defaults
+FDCS=?                                 SP 2388 Current Session Results
+FDCS?                                  SP 2388 Current Session Defaults
+FDFFC=?                                SP 2388 Data Comp. Conv. Capabilities
+FDFFC?                                 SP 2388 Data Comp. Conv. Default
+FDIS=?                                 SP 2388 Current Session Capabilities
+FDIS?                                  SP 2388 Current Session Defaults
+FDT=?                                  SP 2388 Transmit Data Capabilities
+FDT?                                   SP 2388 Transmit Data Default
+FECM=?                                 SP 2388 Error Correction Capabilities
+FECM?                                  SP 2388 Error Correction Default
+FET=?                                  SP 2388 End page Capabilities
+FET?                                   SP 2388 End page Default
+FLID=?                                 SP 2388 Local ID String Capabilites
+FLID?                                  SP 2388 Local ID String Default
+FLNFC=?                                SP 2388 Length Conversion Capabilities
+FLNFC?                                 SP 2388 Length Conversion Default
+FLPL=?                                 SP 2388 Indicate Doc. to Poll Capab.
+FLPL?                                  SP 2388 Indicate Doc. to Poll Default
+FMDL?                                          Detect Fax/Modem Model
+FMFR?                                          Detect Fax/Modem Manufacturer
+FMINSP=?                               SP 2388 Minimum Speed Capabilities
+FMINSP?                                SP 2388 Minimum Speed Default
+FPHCTO=?                               SP 2388 Phase C Timeout Capabilities
+FPHCTO?                                SP 2388 Phase C Timeout Default
+FPTS=?                                 SP 2388 Page Transfer Status Capab.
+FPTS?                                  SP 2388 Page Transfer Status Default
+FRBC=?                                 SP 2388 Receive Block Size Capabilities
+FRBC?                                  SP 2388 Receive Block Size Default
+FREL=?                                 SP 2388 EOL Alignment Capabilities
+FREL?                                  SP 2388 EOL Alignment Default
+FREV?                                          Detect Fax/Modem Revision
+FSPL=?                                 SP 2388 Request to Poll Capabilities
+FSPL?                                  SP 2388 Request to Poll Default
+FTBC=?                                 SP 2388 Transmit Block Size Capabilities
+FTBC?                                  SP 2388 Transmit Block Size Default
+FVRFC=?                                SP 2388 Vertical Res. Conv. Capabilities
+FVRFC?                                 SP 2388 Vertical Res. Conv. Default
+FWDFC=?                                SP 2388 Width Conversion Capabilities
+FWDFC?                                 SP 2388 Width Conversion Default

******************************************************************************

Some commands are multiline and lines will be broken by '..'

Most commands are followed by \r\nOK or \r\n\r\nOK and these will be excluded
from the table but denoted by '...'

******************************************************************************

Manufacturer                 | ATI0                                             |
```

Aceex	
DM-2496H exar based	249 ...
DM-2496H rockwell based	249 ...
DM-1496V rockwell based	249 ...
Adtech	
Externally Yours	240 ...
AMT	
Star 2496i	248 ...
Computer Peripherals, Inc.	
Viva 2496ef	249 ...
Gateway	
Telepath	14400 ...
GVC	
FM 9696	240 ...
Multi-Tech	
MT224BAF	244 ...
MT1432BA	247 ...
NetComm	
SmartModem v.32bis	960 ...
Prometheus	
Ultima Home Office	ProModem Ultima Home Office ...
Supra	
V.32bis External 1.200C	14400 ...
Twincom	
144/DF	14400 ...
Zoom	
FX 9624 1.15	242 ...
VFXV.32bis	14400 ...

Manufacturer	ATI1
Aceex	
DM-2496H exar based	216 ...
DM-2496H rockwell based	251 ... (THIS IS THE ROM VERSION)
DM-1496V rockwell based	026 ...
Adtech	
Externally Yours	231 ...
AMT	
Star 2496i	000 ...
Computer Peripherals, Inc.	
Viva 2496ef	172 ...
Gateway	
Telepath	000 ...
GVC	
FM 9696	213 .. Version 3.2 ...
Multi-Tech	
MT224BAF	0302 ...
MT1432BA	00102A ...
NetComm	
SmartModem v.32bis	008 3ACE ...
Prometheus	
Ultima Home Office	000 ...
Supra	
V.32bis External 1.200C	032 ...
Twincom	

```
    144/DF                   | 164 ...                                          |
Zoom                         |                                                  |
    FX 9624 1.15             | 128 ...                                          |
    VFXV.32bis               | 049 ...                                          |


Manufacturer                 | ATI2                                             |
_____________________________|__________________________________________________|
Aceex                        |                                                  |
    DM-2496H exar based      | ...                                              |
    DM-2496H rockwell based  | ...                                              |
    DM-1496V rockwell based  | ...                                              |
Adtech                       |                                                  |
    Externally Yours         | ...                                              |
AMT                          |                                                  |
    Star 2496i               | ...                                              |
Computer Peripherals, Inc.   |                                                  |
    Viva 2496ef              | ... ...                                          |
Gateway                      |                                                  |
    Telepath                 | ... ...                                          |
GVC                          |                                                  |
    FM 9696H                 | ...                                              |
Multi-Tech                   |                                                  |
    MT224BAF                 | MT224BAF    /V25BIS/V42/REMOTE/DIALBACK/FAX/     |
                             |   07/13/92 ...                                   |
    MT1432BA                 | MT1432BA ...                                     |
NetComm                      |                                                  |
    SmartModem v.32bis       | ... ...                                          |
Prometheus                   |                                                  |
    Ultima Home Office       | ...                                              |
Supra                        |                                                  |
    V.32bis External 1.200C  | ...                                              |
Twincom                      |                                                  |
    144/DF                   | ???                                              |
Zoom                         |                                                  |
    FX 9624 1.15             | ...                                              |
    VFXV.32bis               | ...                                              |


Manufacturer                 | ATI3                                             |
_____________________________|__________________________________________________|
Aceex                        |                                                  |
    DM-2496H exar based      | ...                                              |
    DM-2496H rockwell based  | ...                                              |
    DM-1496V rockwell based  | 008 ...                                          |
Adtech                       |                                                  |
    Externally Yours         |  10/25/91       3.10 E       REVISION 2.2 ...    |
AMT                          |                                                  |
    Star 2496i               | AMT STAR 2496I FAX V1.23 060491 ...              |
Cardinal                     |                                                  |
    MB2296SR                 | SIERA SRFAX  REV. 1.24  061291 ...               |
Computer Peripherals, Inc.   |                                                  |
    Viva 2496ef              | 029-502508-000 ...                               |
Everex                       |                                                  |
    Everfax 2496D            |                                                  |
Frecom                       |                                                  |
    Fax96 with Modem         | FRECOM 111991 ...                                |
```

```
Gateway                      |                                                  |
    Telepath                 | Gateway TelePath 1.5 000 ...                     |
GVC                          |                                                  |
    FM 9696                  | FM - 9696   12/31/91 ...                         |
    FM 9696H                 | FM - 9696H  12/31/91 ...                         |
Husky                        |                                                  |
    FAXMODEM 96              | RC9624 V1.14P ...                                |
Incomm Data Products         |                                                  |
    Vision PC 2400           | SIERRA SRFAX REV. 1.1  032891 ...                |
Infotel                      |                                                  |
    144I                     | V1.200 TR14-Jxxx-001 210 ...                     |
Maxlite                      |                                                  |
    Maxfax                   | MAXFAX 2S V0.7 ...                               |
Multi-Tech                   |                                                  |
    MT224BAF                 | 119 162 176 001 000 000 239 010 ...              |
    MT1432BA                 | 103 162 240 001 000 000 239 010 ...              |
NetComm                      |                                                  |
    SmartModem v.32bis       | ERROR                                            |
OA                           |                                                  |
    Fax Modem FM9648         | 3/8/91 - 7.10 E       REVISION 1.0 ...           |
Prometheus Products          |                                                  |
    24/96 BSR Plus           |                                                  |
    Ultima Home Office       | 600-0082-C00 125 ...                             |
Quiktel                      |                                                  |
    Logicode S/R 14,400      | V1.000 TR14-Jxxx-001 164 ...                     |
Supra                        |                                                  |
    V.32bis External 1.000E  | V1.000-E TR14-Jxxx-001 003 ...                   |
    V.32bis External 1.200C  |                                                  |
Twincom                      |                                                  |
    144/DF                   | V1.000 TR14-Jxxx-001 164 ...                     |
Zoltrix                      |                                                  |
    ZoFax Standard 96/24     | SSC V4.10 - Copyright 1991 ...                   |
Zoom                         |                                                  |
    FX 9624 1.13             | RC9624 1.13DA ...                                |
    FX 9624 1.15             | RC9624AT V1.15 ...                               |
    VFXV.32bis               | V1.200 TR14-Jxxx-001 049 ...                     |
ZyXel                        |                                                  |
    U-1496B                  | ERROR                                            |
    U-1496E 4.12c            | OK                                               |
    U-1496E 5.02M            | OK                                               |
?                            |                                                  |
    Generic RC9624AC 1.53    |                                                  |


Manufacturer                 | ATI4                                             |
_____________________________|__________________________________________________|
Aceex                        |                                                  |
    DM-2496H exar based      | ...                                              |
    DM-2496H rockwell based  | ...                                              |
    DM-1496V rockwell based  | RC144DP ...                                      |
Adtech                       |                                                  |
    Externally Yours         |  10/25/91       3.10 E       REVISION 2.2 ...    |
AMT                          |                                                  |
    Star 2496i               | PAR-INT HYB-MAP SC11006   * NO MNP * NO SENDFAX |
                             |   * ...                                          |
Cardinal                     |                                                  |
    MB2296SR                 | PAR-INT HYB-MAP SC11006   * NO MNP * NO SENDFAX |
```

```
                             |   * ...                                           |
Computer Peripherals, Inc.   |                                                   |
    Viva 2496ef              | 508-100430-192 ...                                |
Everex                       |                                                   |
    Everfax 2496D            |                                                   |
Frecom                       |                                                   |
    Fax96 with Modem         | PAR-INT HYB-MAP SC11006   * NO MNP * FAX * ...  |
Gateway                      |                                                   |
    Telepath                 | a007090C08484402F .. bC60000000                   |
                             |   r16E5111151012004 .. r3000111170000000 ...      |
GVC                          |                                                   |
    FM 9696                  | FM - 9696   12/31/91 ...                          |
    FM 9696H                 | FM - 9696H  12/31/91 ...                          |
Husky                        |                                                   |
    FAXMODEM 96              | ERROR ...                                         |
Incomm Data Products         |                                                   |
    Vision PC 2400           | PAR-INT HYB-MAP SC11006   * NO MNP * NO SENDFAX |
                             |   * ...                                           |
Infotel                      |                                                   |
    144I                     | a007050C08484402F .. bC60000000                   |
                             |   r16E5111151012000 .. r3000111170000000 ...      |
Maxlite                      |                                                   |
    Maxfax                   | CONFIGURATION:  SERIAL MODE, EXTERNAL HYBRID ...|
Multi-Tech                   |                                                   |
    MT224BAF                 | 244 ...                                           |
    MT1432BA                 | 247 .. ERROR                                      |
NetComm                      |                                                   |
    SmartModem v.32bis       | ERROR                                             |
OA                           |                                                   |
    Fax Modem FM9648         | 3/8/91 - 7.10 E       REVISION 1.0 ...            |
Prometheus Products          |                                                   |
    24/96 BSR Plus           |                                                   |
    Ultima Home Office       | V.32bis/V.32bis/Fax/Voice ...                     |
Quiktel                      |                                                   |
    Logicode S/R 14,400      | a007050C08484402F .. bC60000000 ..                |
                             |   r16E5111151012000 .. r3000111170000000 ...      |
Supra                        |                                                   |
    V.32bis External 1.000E  | a007050C08484402F .. bC60000000 ..                |
                             |   r16E5111151012000 .. r3000111170000000 ...      |
    V.32bis External 1.200C  | a007050C08484402F .. bC60000000 ..                |
                             |   r16E5111151012000 .. r3000111170000000 ...      |
Twincom                      |                                                   |
    144/DF                   | a007050C08484402F .. bC60000000                   |
                             |   r16E5111151012000 .. r3000111170000000 ...      |
Zoltrix                      |                                                   |
    ZoFax Standard 96/24     | PAR-INT HYB-MAP SC11006   * NO NMP * SRFAX * ...|
Zoom                         |                                                   |
    FX 9624 1.13             | ERROR                                             |
    FX 9624 1.15             | ERROR                                             |
    VFXV.32bis               | a007050C08484402F .. bC60000000                   |
                             |   r16E5111151012000 .. r3000111170000000 ...      |
ZyXel                        |                                                   |
    U-1496B                  | ERROR                                             |
    U-1496E 4.12c            | OK                                                |
    U-1496E 5.02M            | OK                                                |
?                            |                                                   |
    Generic RC9624AC 1.53    |                                                   |
```

Manufacturer	ATI5
Aceex	
DM-2496H exar based	...
DM-2496H rockwell based	...
DM-1496V rockwell based	001 ...
Adtech	
Externally Yours	10/25/91 3.10 E REVISION 2.2 ...
AMT	
Star 2496i	0611 ...
Cardinal	
MB2296SR	
Computer Peripherals, Inc.	
Viva 2496ef	ERROR
Everex	
Everfax 2496D	
Frecom	
Fax96 with Modem	
Gateway	
Telepath	ERROR
GVC	
FM 9696	FM - 9696 12/31/91 ...
FM 9696H	FM - 9696H 12/31/91 ...
Husky	
FAXMODEM 96	ERROR
Incomm Data Products	
Vision PC 2400	0611 ...
Infotel	
144I	ERROR
Maxlite	
Maxfax	...
Multi-Tech	
MT224BAF	244 ...
MT1432BA	247 .. ERROR
NetComm	
SmartModem v.32bis	ERROR
OA	
Fax Modem FM9648	3/8/91 - 7.10 E REVISION 1.0 ...
Prometheus Products	
24/96 BSR Plus	0996 ...
Ultima Home Office	ERROR
Quiktel	
Logicode S/R 14,400	ERROR
Supra	
V.32bis External 1.000E	(c)1992 Supra Corporation ...
V.32bis External 1.200C	(c)1992 Supra Corporation ...
Twincom	
144/DF	ERROR
Zoltrix	
ZoFax Standard 96/24	06111 ...
Zoom	
FX 9624 1.13	ERROR
FX 9624 1.15	ERROR
VFXV.32bis	ERROR
ZyXel	

```
    U-1496B                  | ERROR                                              |
    U-1496E 4.12c            | ...                                                |
    U-1496E 5.02M            | ...                                                |
?                            |                                                    |
    Generic RC9624AC 1.53    |                                                    |


Manufacturer                 | ATI6                                               |
_____________________________|__________________________________________________|
Aceex                        |                                                    |
    DM-2496H exar based      | ...                                                |
    DM-2496H rockwell based  | ...                                                |
    DM-1496V rockwell based  | V.103 Sep-15-1992 ...                              |
Adtech                       |                                                    |
    Externally Yours         | EXAR 2900 .. NO SPEEDCONVERSION ..                 |
                             |   FAX CLASS 2 .. VERSION ID : 016_002 ...          |
AMT                          |                                                    |
    Star 2496i               | ...                                                |
Cardinal                     |                                                    |
    MB2296SR                 |                                                    |
Computer Peripherals, Inc.   |                                                    |
    Viva 2496ef              | ERROR                                              |
Everex                       |                                                    |
    Everfax 2496D            |                                                    |
Frecom                       |                                                    |
    Fax96 with Modem         |                                                    |
Gateway                      |                                                    |
    Telepath                 | ERROR                                              |
GVC                          |                                                    |
    FM 9696                  | FM - 9696   12/31/91 ...                           |
    FM 9696H                 | FM - 9696H  12/31/91 ...                           |
Husky                        |                                                    |
    FAXMODEM 96              |                                                    |
Incomm Data Products         |                                                    |
    Vision PC 2400           |                                                    |
Infotel                      |                                                    |
    144I                     | ERROR                                              |
Maxlite                      |                                                    |
    Maxfax                   |                                                    |
Multi-Tech                   |                                                    |
    MT224BAF                 |                                                    |
    MT1432BA                 |                                                    |
NetComm                      |                                                    |
    SmartModem v.32bis       | ERROR                                              |
OA                           |                                                    |
    Fax Modem FM9648         |                                                    |
Prometheus Products          |                                                    |
    24/96 BSR Plus           |                                                    |
    Ultima Home Office       | ERROR                                              |
Quiktel                      |                                                    |
    Logicode S/R 14,400      |                                                    |
Supra                        |                                                    |
    V.32bis External 1.000E  | ERROR                                              |
    V.32bis External 1.200C  | ERROR                                              |
Twincom                      |                                                    |
    144/DF                   | ERROR                                              |
Zoltrix                      |                                                    |
```

```
    ZoFax Standard 96/24    |                                                  |
Zoom                        |                                                  |
    FX 9624 1.13            |                                                  |
    FX 9624 1.15            |                                                  |
    VFXV.32bis              | ERROR                                            |
ZyXel                       |                                                  |
    U-1496B                 |                                                  |
    U-1496E 4.12c           |                                                  |
?                           |                                                  |
    Generic RC9624AC 1.53   |                                                  |

From: mshiels@TMSoftware.Ca (Michael A. Shiels)
Subject: Ersatz Class 2 Fax/Modem Command Scorecard part 2/7

ATI9

NetComm                     |                                                  |
    SmartModem v.32bis      | Series 4  V.32bis Modem Y7 v1.58 (C) NetComm     |
                            |   1992 ...                                       |

Manufacturer                | AT+FJUNK=?              | AT+FJUNK?              |
____________________________|_________________________|________________________|
Aceex                       |                         |                        |
    DM-2496H exar based     | ERROR                   | ERROR                  |
    DM-2496H rockwell based | ERROR                   | ERROR                  |
    DM-1496V rockwell based | ERROR                   | ERROR                  |
Adtech                      |                         |                        |
    Externally Yours        | ERROR                   | ERROR                  |
AMT                         |                         |                        |
    Star 2496i              | 000 ...                 | 000 ...                |
Cardinal                    |                         |                        |
    MB2296SR                | binary junk ...         | binary junk ...        |
Computer Peripherals, Inc.  |                         |                        |
    Viva 2496ef             | ERROR                   | ERROR                  |
Everex                      |                         |                        |
    Everfax 2496D           |                         |                        |
Frecom                      |                         |                        |
    Fax96 with Modem        | ERROR                   | ERROR                  |
Gateway                     |                         |                        |
    Telepath                | ERROR                   | ERROR                  |
GVC                         |                         |                        |
    FM 9696                 | ERROR                   | ERROR                  |
    FM 9696H                | ERROR                   | ERROR                  |
Husky                       |                         |                        |
    FAXMODEM 96             | ERROR                   | ERROR                  |
Incomm Data Products        |                         |                        |
    Vision PC 2400          | binary junk ...         | binary junk ...        |
Infotel                     |                         |                        |
    144I                    | ERROR                   | ERROR                  |
Maxlite                     |                         |                        |
    Maxfax                  | 000 ...                 | 000 ...                |
Multi-Tech                  |                         |                        |
    MT224BAF                | ERROR                   | ERROR                  |
    MT1432BA                | ERROR                   | ERROR                  |
NetComm                     |                         |                        |
    SmartModem v.32bis      | ERROR                   | ERROR                  |
OA                          |                         |                        |
```

Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	000 ...	000 ...
Ultima Home Office	ProModem Ultima Home Office .. ERROR	ERROR
Quiktel		
Logicode S/R 14,400	ERROR	ERROR
Supra		
V.32bis External 1.000E	ERROR	ERROR
V.32bis External 1.200C	ERROR	ERROR
Twincom		
144/DF	ERROR	ERROR
Zoltrix		
ZoFax Standard 96/24	000 ...	000 ...
Zoom		
FX 9624 1.13	?lots of junk?	?lots of junk?
FX 9624 1.15	ERROR	ERROR
VFXV.32bis	ERROR	ERROR
ZyXel		
U-1496B	ERROR	ERROR
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53		

Manufacturer	AT+FAA=?	AT+FAA?
Aceex		
DM-2496H exar based	001 ...	ERROR
DM-2496H rockwell based	001 ...	ERROR
DM-1496V rockwell based	001 ...	ERROR
Adtech		
Externally Yours	000 ...	ERROR
AMT		
Star 2496i	+FAA = 0,1 ...	+FAA = 0 ...
Cardinal		
MB2296SR	+FAA = 0,1 ...	+FAA = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0,1 ...	0 ...
Everex		
Everfax 2496D	(0) ...	0 ...
Frecom		
Fax96 with Modem	0,1 ...	0 ...
Gateway		
Telepath	0,1 ...	0 ...
GVC		
FM 9696	001 ...	ERROR
FM 9696H	001 ...	ERROR
Husky		
FAXMODEM 96	0,1 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FAA = 0,1 ...	+FAA = 0 ...
Infotel		
144I	0,1 ...	0 ...
Maxlite		
Maxfax	+FAA = 0,1 ...	+FAA = 0 ...

Multi-Tech		
MT224BAF	+FAA=0-1 ...	+FAA=0 ...
MT1432BA	+FAA=0-1 ...	+FAA=0 ...
NetComm		
SmartModem v.32bis	0,1 ...	0 ...
OA		
Fax Modem FM9648	001 ...	ERROR
Prometheus Products		
24/96 BSR Plus	+FAA = 0,1 ...	+FAA = 0 ...
Ultima Home Office	+FAA = 0,1 ...	+FAA = 0 ...
Quiktel		
Logicode S/R 14,400	0,1 ...	0 ...
Supra		
V.32bis External 1.000E	0,1 ...	0 ...
V.32bis External 1.200C	0,1 ...	0 ...
Twincom		
144/DF	0,1 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FAA = 0,1 ...	+FAA = 0 ...
Zoom		
FX 9624 1.13	+FAA = 0,1 ...	+FAA = 0 ...
FX 9624 1.15	0,1 ...	0 ...
VFXV.32bis	0,1 ...	0 ...
ZyXel		
U-1496B	OK	OK
U-1496E 4.12c	OK	0 ...
U-1496E 5.02M	OK	0 ...
?		
Generic RC9624AC 1.53	0,1 ...	

Manufacturer	AT+FAXERR=?	AT+FAXERR?
Aceex		
DM-2496H exar based	ERROR	...
DM-2496H rockwell based	ERROR	...
DM-1496V rockwell based	1,1,0,2,0,0,0,5 .. 001 ...	...
Adtech		
Externally Yours	ERROR	...
AMT		
Star 2496i	+FAXERR = 0-255 ...	+FAXERR = 0 ...
Cardinal		
MB2296SR	+FAXERR = 0-255 ...	+FAXERR = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0-255 ...	40 ...
Everex		
Everfax 2496D	???	0 ...
Frecom		
Fax96 with Modem	0-255 ...	0 ...
Gateway		
Telepath	0-255 ...	0 ...
GVC		
FM 9696	ERROR	OK
FM 9696H	ERROR	OK
Husky		
FAXMODEM 96	0-255 ...	0 ...

Incomm Data Products		
Vision PC 2400	+FAXERR = 0-255 ...	+FAXERR = 0 ...
Infotel		
144I	0-255 ...	0 ...
Maxlite		
Maxfax	+FAXERR = 0-255 ...	+FAXERR = 0 ...
Multi-Tech		
MT224BAF	+FAXERR=0-255 ...	+FAXERR=0 ...
MT1432BA	+FAXERR=0-255 ...	+FAXERR=0 ...
NetComm		
SmartModem v.32bis	0,10,20,30,40,50,60,70 ...	00 ...
OA		
Fax Modem FM9648	ERROR	OK
Prometheus Products		
24/96 BSR Plus	+FAXERR = 0-255 ...	+FAXERR = 0 ...
Ultima Home Office	+FAXERR = 0-255 ...	+FAXERR = 000 ...
Quiktel		
Logicode S/R 14,400	0-255 ...	0 ...
Supra		
V.32bis External 1.000E	0-255 ...	0 ...
V.32bis External 1.200C	0-255 ...	1 ...
Twincom		
144/DF	0-255 ...	1 ...
Zoltrix		
ZoFax Standard 96/24	+FAXERR = 0-255 ...	+FAXERR = 0 ...
Zoom		
FX 9624 1.13	+FAXERR = 0-255 ...	+FAXERR = 0 ...
FX 9624 1.15	0-255 ...	255 ...
VFXV.32bis	0-255 ...	0 ...
ZyXel		
U-1496B	ERROR	ERROR
U-1496E 4.12c	ERROR	ERROR
U-1496E 5.02M	ERROR	ERROR
?		
Generic RC9624AC 1.53		0 ...

Manufacturer	AT+FBADLIN=?	AT+FBADLIN?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FBADLIN = 0 ...	+FBADLIN = 0 ...
Cardinal		
MB2296SR	+FBADLIN = 0 ...	+FBADLIN = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0-255) ...	3 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		

```
    Telepath              | 0 ...                   | 0 ...                   |
GVC                       |                         |                         |
    FM 9696               | ERROR                   | ERROR                   |
    FM 9696H              | ERROR                   | ERROR                   |
Husky                     |                         |                         |
    FAXMODEM 96           | 0 ...                   | 0 ...                   |
Incomm Data Products      |                         |                         |
    Vision PC 2400        | +FBADLIN = 0 ...        | +FBADLIN = 0 ...        |
Infotel                   |                         |                         |
    144I                  | 0 ...                   | 0 ...                   |
Maxlite                   |                         |                         |
    Maxfax                | +FBADLIN = 0 ...        | +FBADLIN = 0 ...        |
Multi-Tech                |                         |                         |
    MT224BAF              | +FBADLIN=0-255 ...      | +FBADLIN=10 ...         |
    MT1432BA              | +FBADLIN=0-255 ...      | +FBADLIN=10 ...         |
NetComm                   |                         |                         |
    SmartModem v.32bis    | ERROR                   | ERROR                   |
OA                        |                         |                         |
    Fax Modem FM9648      | ERROR                   | ERROR                   |
Prometheus Products       |                         |                         |
    24/96 BSR Plus        | +FBADLIN = 0 ...        | +FBADLIN = 0 ...        |
    Ultima Home Office    | +FBADLIN = 0-255 ...    | +FBADLIN = 000 ...      |
Quiktel                   |                         |                         |
    Logicode S/R 14,400   | 0 ...                   | 0 ...                   |
Supra                     |                         |                         |
    V.32bis External 1.000E | 0 ...                 | 0 ...                   |
    V.32bis External 1.200C | 0 ...                 | 0 ...                   |
Twincom                   |                         |                         |
    144/DF                | 0 ...                   | 0 ...                   |
Zoltrix                   |                         |                         |
    ZoFax Standard 96/24  | +FBADLIN = 0 ...        | +FBADLIN = 0 ...        |
Zoom                      |                         |                         |
    FX 9624 1.13          | +FBADLIN = 0 ...        | +FBADLIN = 0 ...        |
    FX 9624 1.15          | 0 ...                   | 0 ...                   |
    VFXV.32bis            | 0 ...                   | 0 ...                   |
ZyXel                     |                         |                         |
    U-1496B               | ERROR                   | ERROR                   |
    U-1496E 4.12c         | ERROR                   | ERROR                   |
    U-1496E 5.02M         | ERROR                   | ERROR                   |
?                         |                         |                         |
    Generic RC9624AC 1.53 | 0 ...                   | 0 ...                   |


Manufacturer              | AT+FBADMUL=?            | AT+FBADMUL?             |
__________________________|_________________________|_________________________|
Aceex                     |                         |                         |
    DM-2496H exar based   | ERROR                   | ...                     |
    DM-2496H rockwell based | ERROR                 | ERROR                   |
    DM-1496V rockwell based | ERROR                 | OK                      |
Adtech                    |                         |                         |
    Externally Yours      | ERROR                   | ...                     |
AMT                       |                         |                         |
    Star 2496i            | +FBADMUL = 0 ...        | +FBADMUL = 0 ...        |
Cardinal                  |                         |                         |
    MB2296SR              | +FBADMUL = 0 ...        | +FBADMUL = 0 ...        |
Computer Peripherals, Inc. |                        |                         |
    Viva 2496ef           | 0 ...                   | 0 ...                   |
```

Everex		
Everfax 2496D	(0-255) ...	20 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	OK
FM 9696H	ERROR	OK
Husky		
FAXMODEM 96	0 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FBADMUL = 0 ...	+FBADMUL = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FBADMUL = 0 ...	+FBADMUL = 0 ...
Multi-Tech		
MT224BAF	+FBADMUL=0-255 ...	+FBADMUL=20 ...
MT1432BA	+FBADMUL=0-255 ...	+FBADMUL=20 ...
NetComm		
SmartModem v.32bis	ERROR	ERROR
OA		
Fax Modem FM9648	ERROR	OK
Prometheus Products		
24/96 BSR Plus	+FBADMUL = 0 ...	+FBADMUL = 0 ...
Ultima Home Office	+FBADMUL = 0-255 ...	+FBADMUL = 000 ...
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FBADMUL = 0 ...	+FBADMUL = 0 ...
Zoom		
FX 9624 1.13	+FBADMUL = 0 ...	+FBADMUL = 0 ...
FX 9624 1.15	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B	ERROR	ERROR
U-1496E 4.12c	ERROR	ERROR
U-1496E 5.02M	ERROR	ERROR
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FBOR=?	AT+FBOR?
Aceex		
DM-2496H exar based	001 ...	ERROR
DM-2496H rockwell based	001 ...	ERROR
DM-1496V rockwell based	001 ...	ERROR
Adtech		
Externally Yours	000 ...	ERROR
AMT		

```
    Star 2496i                | +FBOR = 0,1,2,3 ...     | +FBOR = 0 ...            |
Cardinal                      |                         |                          |
    MB2296SR                  | +FBOR = 0,1,2,3 ...     | +FBOR = 0 ...            |
Computer Peripherals, Inc.    |                         |                          |
    Viva 2496ef               | 0-3 ...                 | 0 ...                    |
Everex                        |                         |                          |
    Everfax 2496D             | (0-3) ...               | 0 ...                    |
Frecom                        |                         |                          |
    Fax96 with Modem          | 0-3 ...                 | 0 ...                    |
Gateway                       |                         |                          |
    Telepath                  | 0-3 ...                 | 0 ...                    |
GVC                           |                         |                          |
    FM 9696                   | 001 ...                 | ERROR                    |
    FM 9696H                  | 001 ...                 | ERROR                    |
Husky                         |                         |                          |
    FAXMODEM 96               | 0,1,2,3 ...             | 0 ...                    |
Incomm Data Products          |                         |                          |
    Vision PC 2400            | +FBOR = 0,1,2,3 ...     | +FBOR = 0 ...            |
Infotel                       |                         |                          |
    144I                      | 0-3 ...                 | 0 ...                    |
Maxlite                       |                         |                          |
    Maxfax                    | +FBOR = 0,1 ...         | +FBOR = 0 ...            |
Multi-Tech                    |                         |                          |
    MT224BAF                  | +FBOR=0-1 ...           | +FBOR=0 ...              |
    MT1432BA                  | +FBOR=0-1 ...           | +FBOR=0 ...              |
NetComm                       |                         |                          |
    SmartModem v.32bis        | 0,3 ...                 | 0 ...                    |
OA                            |                         |                          |
    Fax Modem FM9648          | 001 ...                 | ERROR                    |
Prometheus Products           |                         |                          |
    24/96 BSR Plus            | +FBOR = 0,1,2,3 ...     | +FBOR = 0 ...            |
    Ultima Home Office        | +FBOR = 0-3 ...         | +FBOR = 0 ...            |
Quiktel                       |                         |                          |
    Logicode S/R 14,400       | 0-3 ...                 | 0 ...                    |
Supra                         |                         |                          |
    V.32bis External 1.000E   | 0-3 ...                 | 0 ...                    |
    V.32bis External 1.200C   | 0-3 ...                 | 0 ...                    |
Twincom                       |                         |                          |
    144/DF                    | 0-3 ...                 | 0 ...                    |
Zoltrix                       |                         |                          |
    ZoFax Standard 96/24      | +FBOR = 0,1,2,3 ...     | +FBOR = 0 ...            |
Zoom                          |                         |                          |
    FX 9624 1.13              | +FBOR = 0,1,2,3 ...     | +FBOR = 0 ...            |
    FX 9624 1.15              | 0,1,2,3 ...             | 0 ...                    |
    VFXV.32bis                | 0-3 ...                 | 0 ...                    |
ZyXel                         |                         |                          |
    U-1496B                   |                         |                          |
    U-1496E 4.12c             | ERROR                   | ERROR                    |
    U-1496E 5.02M             | ERROR                   | ERROR                    |
?                             |                         |                          |
    Generic RC9624AC 1.53     | 0-3 ...                 | 0 ...                    |


                                AT+FBUF=?
Multi-Tech
    MT224BAF                    +FBUF=(0-65535),(0-65535),(0-65535),(0-65535)...|
    MT1432BA                  |                                                  |
```

Manufacturer	AT+FBUF?
Aceex	
DM-2496H exar based	ERROR
DM-2496H rockwell based	ERROR
DM-1496V rockwell based	ERROR
Adtech	
Externally Yours	ERROR
AMT	
Star 2496i	+FBUF = 104,88,16,0 ...
Cardinal	
MB2296SR	+FBUF = 104,88,16,0 ...
Computer Peripherals, Inc.	
Viva 2496ef	1250,700,100,0 ...
Everex	
Everfax 2496D	104,88,16,0
Frecom	
Fax96 with Modem	104,88,48,0
Gateway	
Telepath	1024,700,100,0 ...
GVC	
FM 9696	ERROR
FM 9696H	ERROR
Husky	
FAXMODEM 96	
Incomm Data Products	
Vision PC 2400	+FBUF = 104,88,16,0 ...
Infotel	
144I	1024,700,100,0 ...
Maxlite	
Maxfax	+FBUF = 120 ...
Multi-Tech	
MT224BAF	+FBUF=2500,1875,1250,0 ...
MT1432BA	+FBUF=2500,1875,1250,0 ...
NetComm	
SmartModem v.32bis	"11904" ...
OA	
Fax Modem FM9648	ERROR
Prometheus Products	
24/96 BSR Plus	+FBUF = 104,88,16,0 ...
Ultima Home Office	000 ...
Quiktel	
Logicode S/R 14,400	1024,700,100,0 ...
Supra	
V.32bis External 1.000E	1024,700,100,0 ...
V.32bis External 1.200C	1024,700,100,0 ...
Twincom	
144/DF	1024,700,100,0 ...
Zoltrix	
ZoFax Standard 96/24	+FBUF = 104,88,16,0 ...
Zoom	
FX 9624 1.13	+FBUF = 104,88,16,0 ...
FX 9624 1.15	104,88,16,0 ...
VFXV.32bis	1024,700,100,0 ...
ZyXel	

U-1496B	ERROR
U-1496E 4.12c	ERROR
U-1496E 5.02M	ERROR
?	
Generic RC9624AC 1.53	

Manufacturer	AT+FBUG=?	AT+FBUG?
Aceex		
DM-2496H exar based	001 ...	0 ...
DM-2496H rockwell based	001 ...	0 ...
DM-1496V rockwell based	001 ...	0 ...
Adtech		
Externally Yours	000 ...	0 ...
AMT		
Star 2496i	+FBUG = 0,1 ...	+FBUG = 0 ...
Cardinal		
MB2296SR	+FBUG = 0,1 ...	+FBUG = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	0 ...
Frecom		
Fax96 with Modem	0,1 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	001 ...	0 ...
FM 9696H	001 ...	0 ...
Husky		
FAXMODEM 96	0 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FBUG = 0,1 ...	+FBUG = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FBUG = 0,1 ...	+FBUG = 0 ...
Multi-Tech		
MT224BAF	+FBUG=0-1 ...	+FBUG=0 ...
MT1432BA	+FBUG=0-1 ...	+FBUG=0 ...
NetComm		
SmartModem v.32bis	0,1 ...	0 ...
OA		
Fax Modem FM9648	001 ...	0 ...
Prometheus Products		
24/96 BSR Plus	+FBUG = 0,1 ...	+FBUG = 0 ...
Ultima Home Office	ERROR	+FBUG = 0 ...
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FBUG = 0,1 ...	+FBUG = 0 ...

```
Zoom                         |                         |                         |
    FX 9624 1.13             | +FBUG = 0,1 ...         | +FBUG = 0 ...           |
    FX 9624 1.15             | 0,1 ...                 | 0 ...                   |
    VFXV.32bis               | 0 ...                   | 0 ...                   |
ZyXel                        |                         |                         |
    U-1496B                  |                         |                         |
    U-1496E 4.12c            | ERROR                   | ERROR                   |
    U-1496E 5.02M            | ERROR                   | ERROR                   |
?                            |                         |                         |
    Generic RC9624AC 1.53    | 0 ...                   | 0 ...                   |

From: mshiels@TMSoftware.Ca (Michael A. Shiels)
Subject: Ersatz Class 2 Fax/Modem Command Scorecard part 3/7

Manufacturer                 | AT+FCIG=?                                         |
_____________________________|___________________________________________________|
Aceex                        |                                                   |
    DM-2496H exar based      | ERROR                                             |
    DM-2496H rockwell based  | ERROR                                             |
    DM-1496V rockwell based  | ERROR                                             |
Adtech                       |                                                   |
    Externally Yours         | ERROR                                             |
AMT                          |                                                   |
    Star 2496i               | +FCIG = (20)(32-127) ...                          |
Cardinal                     |                                                   |
    MB2296SR                 | +FCIG = (20)(32-127) ...                          |
Computer Peripherals, Inc.   |                                                   |
    Viva 2496ef              | (20)(32-127) ...                                  |
Everex                       |                                                   |
    Everfax 2496D            | (20)(32,33,35-126) ...                            |
Frecom                       |                                                   |
    Fax96 with Modem         | (20)(32-127) ...                                  |
Gateway                      |                                                   |
    Telepath                 | (20)(32-127) ...                                  |
GVC                          |                                                   |
    FM 9696                  | ERROR                                             |
    FM 9696H                 | ERROR                                             |
Husky                        |                                                   |
    FAXMODEM 96              | (20)(32-127) ...                                  |
Incomm Data Products         |                                                   |
    Vision PC 2400           | +FCIG = (20)(32-127) ...                          |
Infotel                      |                                                   |
    144I                     | (20)(32-127) ...                                  |
Maxlite                      |                                                   |
    Maxfax                   | +FCIG = (20)(32-127) ...                          |
Multi-Tech                   |                                                   |
    MT224BAF                 | +FCIG=(20)(32-127) ...                            |
    MT1432BA                 | +FCIG=(20)(32-127) ...                            |
NetComm                      |                                                   |
    SmartModem v.32bis       | "(20)(32,43,48-57)" ...                           |
OA                           |                                                   |
    Fax Modem FM9648         | ERROR                                             |
Prometheus Products          |                                                   |
    24/96 BSR Plus           | +FCIG = (20)(32-127) ...                          |
    Ultima Home Office       | ERROR                                             |
Quiktel                      |                                                   |
    Logicode S/R 14,400      | (20)(32-127) ...                                  |
```

```
Supra                            |                                                  |
    V.32bis External 1.000E | (20)(32-127) ...                                      |
    V.32bis External 1.200C | (20)(32-127) ...                                      |
Twincom                          |                                                  |
    144/DF                       | (20)(32-127) ...                                 |
Zoltrix                          |                                                  |
    ZoFax Standard 96/24         | +FCIG = (20)(32-127) ...                         |
Zoom                             |                                                  |
    FX 9624 1.13                 | +FCIG = (20)(32-127) ...                         |
    FX 9624 1.15                 | (20)(32-127) ...                                 |
    VFXV.32bis                   | (20)(32-127) ...                                 |
ZyXel                            |                                                  |
    U-1496B                      | ERROR                                            |
    U-1496E 4.12c                | OK                                               |
    U-1496E 5.02M                | OK                                               |
?                                |                                                  |
    Generic RC9624AC 1.53        | (20)(32,33,35-96,123-126) ...                    |


Manufacturer                     | AT+FCIG?                                         |
_________________________________|__________________________________________________|
Aceex                            |                                                  |
    DM-2496H exar based          | ERROR                                            |
    DM-2496H rockwell based      | ERROR                                            |
    DM-1496V rockwell based      | ERROR                                            |
Adtech                           |                                                  |
    Externally Yours             | ERROR                                            |
AMT                              |                                                  |
    Star 2496i                   | +FCIG = SOFTWARE\x7FPLUS\x7FSA ... (what was     |
                                 |   saved into it!)                                |
Cardinal                         |                                                  |
    MB2296SR                     | +FCIG = ...                                      |
Computer Peripherals, Inc.       |                                                  |
    Viva 2496ef                  | ...                                              |
Everex                           |                                                  |
    Everfax 2496D                | "" ...                                           |
Frecom                           |                                                  |
    Fax96 with Modem             | TEST 1 416 581 0111 ... (what I wrote into it!)  |
Gateway                          |                                                  |
    Telepath                     | ERROR                                            |
GVC                              |                                                  |
    FM 9696                      | ERROR                                            |
    FM 9696H                     | ERROR                                            |
Husky                            |                                                  |
    FAXMODEM 96                  | ERROR                                            |
Incomm Data Products             |                                                  |
    Vision PC 2400               | +FCIG = ...                                      |
Infotel                          |                                                  |
    144I                         | ERROR                                            |
Maxlite                          |                                                  |
    Maxfax                       | ?lots of junk and modem goes out to lunch?       |
Multi-Tech                       |                                                  |
    MT224BAF                     | +FCIG="" ...                                     |
    MT1432BA                     | +FCIG="" ...                                     |
NetComm                          |                                                  |
    SmartModem v.32bis           | "                    " ...                       |
OA                               |                                                  |
```

```
    Fax Modem FM9648         | ERROR                                               |
Prometheus Products          |                                                     |
    24/96 BSR Plus           | +FCIG = (805)685-4347                               |
    Ultima Home Office       | ERROR                                               |
Quiktel                      |                                                     |
    Logicode S/R 14,400      | ERROR                                               |
Supra                        |                                                     |
    V.32bis External 1.000E  | ERROR                                               |
    V.32bis External 1.200C  | ERROR                                               |
Twincom                      |                                                     |
    144/DF                   | ERROR                                               |
Zoltrix                      |                                                     |
    ZoFax Standard 96/24     | +FCIG = ...                                         |
Zoom                         |                                                     |
    FX 9624 1.13             | +FCIG = spazy ... (assumed to be written in!)       |
    FX 9624 1.15             | ...                                                 |
    VFXV.32bis               | ERROR                                               |
ZyXel                        |                                                     |
    U-1496B                  | ERROR                                               |
    U-1496E 4.12c            | OK                                                  |
    U-1496E 5.02M            | OK                                                  |
?                            |                                                     |
    Generic RC9624AC 1.53    | ERROR                                               |


Manufacturer                 | AT+FCLASS=?              | AT+FCLASS?               |
_____________________________|__________________________|__________________________|
Aceex                        |                          |                          |
    DM-2496H exar based      | 0,2 ...                  | 0 ...                    |
    DM-2496H rockwell based  | 0,2 ...                  | 0 ...                    |
    DM-1496V rockwell based  | 0,2 ...                  | 0 ...                    |
Adtech                       |                          |                          |
    Externally Yours         | (0,1,2) ...              | 0 ...                    |
AMT                          |                          |                          |
    Star 2496i               | +FCLASS = 0,2 ...        | +FCLASS = 0 ...          |
Cardinal                     |                          |                          |
    MB2296SR                 | +FCLASS = 0,2 ...        | +FCLASS = 2 ...          |
Computer Peripherals, Inc.   |                          |                          |
    Viva 2496ef              | 0,1,2 ...                | 0 ...                    |
Everex                       |                          |                          |
    Everfax 2496D            | (0,2) ...                | 0 ...                    |
Frecom                       |                          |                          |
    Fax96 with Modem         | 0,2 ...                  | 2 ...                    |
Gateway                      |                          |                          |
    Telepath                 | 0,1,2 ...                | 0 ...                    |
GVC                          |                          |                          |
    FM 9696                  | (0,1,2) ...              | 0 ...                    |
    FM 9696H                 | (0,1,2) ...              | 0 ...                    |
Husky                        |                          |                          |
    FAXMODEM 96              | 0,2 ..                   | 2 ...                    |
Incomm Data Products         |                          |                          |
    Vision PC 2400           | +FCLASS = 0,2 ...        | +FCLASS = 2 ...          |
Infotel                      |                          |                          |
    144I                     | 0,1,2 ...                | 0 ...                    |
Maxlite                      |                          |                          |
    Maxfax                   | +FCLASS = 0,2 ...        | +FCLASS = 0 ...          |
Multi-Tech                   |                          |                          |
```

MT224BAF	+FCLASS=0,2 ...	+FCLASS=0 ...
MT1432BA	+FCLASS=0,2 ...	+FCLASS=0 ...
NetComm		
SmartModem v.32bis	0,2 ...	0 ...
OA		
Fax Modem FM9648	0,2 ...	0 ...
Prometheus Products		
24/96 BSR Plus	+FCLASS = 0,2 ...	+FCLASS = 0 ...
Ultima Home Office	+FCLASS = 0, 2 ...	+FCLASS = 0 ...
Quiktel		
Logicode S/R 14,400	0,1,2 ...	0 ...
Supra		
V.32bis External 1.000E	0,1,2 ...	0 ...
V.32bis External 1.200C	0,1,2 ...	0 ...
Twincom		
144/DF	0,1,2 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FCLASS = 0,2 ...	+FCLASS = 0 ...
Zoom		
FX 9624 1.13	+FCLASS = 0,2 ...	+FCLASS = 0 ...
FX 9624 1.15	0,2 ...	0 ...
VFXV.32bis	0,1,2 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	0,2 ...	0 ...
U-1496E 5.02M	0,2,8 ...	0 ...
?		
Generic RC9624AC 1.53	0,1,2 ...	

Manufacturer	AT+FCQ=?	AT+FCQ?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FCQ = 0 ...	+FCQ = 0 ...
Cardinal		
MB2296SR	+FCQ = 0 ...	+FCQ = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	1 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	0 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FCQ = 0 ...	+FCQ = 0 ...

Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FCQ = 0 ...	+FCQ = 0 ...
Multi-Tech		
MT224BAF	+FCQ=0-1 ...	+FCQ=1 ...
MT1432BA	+FCQ=0-1 ...	+FCQ=1 ...
NetComm		
SmartModem v.32bis	ERROR	ERROR
OA		
Fax Modem FM9648	???	???
Prometheus Products		
24/96 BSR Plus	+FCQ = 0 ...	+FCQ = 0 ...
Ultima Home Office	+FCQ = 0-2 ...	+FCQ = 0 ...
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FCQ = 0 ...	+FCQ = 0 ...
Zoom		
FX 9624 1.13	+FCQ = 0 ...	+FCQ = 0 ...
FX 9624 1.15	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	ERROR	ERROR
U-1496E 5.02M	ERROR	ERROR
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FCR=?	AT+FCR?
Aceex		
DM-2496H exar based	001 ...	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	001 ...	ERROR
Adtech		
Externally Yours	000 ...	ERROR
AMT		
Star 2496i	+FCR = 0,1 ...	+FCR = 0 ...
Cardinal		
MB2296SR	+FCR = 0,1 ...	+FCR = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0,1 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	1 ...
Frecom		
Fax96 with Modem	0,1 ...	0 ...
Gateway		
Telepath	0,1 ...	0 ...
GVC		
FM 9696	001 ...	ERROR

```
    FM 9696H                 | 001 ...                  | ERROR                    |
Husky                        |                          |                          |
    FAXMODEM 96              | 0,1 ...                  | 1 ...                    |
Incomm Data Products         |                          |                          |
    Vision PC 2400           | +FCR = 0,1 ...           | +FCR = 0 ...             |
Infotel                      |                          |                          |
    144I                     | 0,1 ...                  | 0 ...                    |
Maxlite                      |                          |                          |
    Maxfax                   | +FCR = 0,1 ...           | +FCR = 0 ...             |
Multi-Tech                   |                          |                          |
    MT224BAF                 | +FCR=0-1 ...             | +FCR=0 ...               |
    MT1432BA                 | +FCR=0-1 ...             | +FCR=0 ...               |
NetComm                      |                          |                          |
    SmartModem v.32bis       | 0,1 ...                  | 1 ...                    |
OA                           |                          |                          |
    Fax Modem FM9648         | 001 ...                  | ERROR                    |
Prometheus Products          |                          |                          |
    24/96 BSR Plus           | +FCR = 0,1 ...           | +FCR = 0 ...             |
    Ultima Home Office       | +FCR = 0,1 ...           | +FCR = 0 ...             |
Quiktel                      |                          |                          |
    Logicode S/R 14,400      | 0,1 ...                  | 0 ...                    |
Supra                        |                          |                          |
    V.32bis External 1.000E  | 0,1 ...                  | 0 ...                    |
    V.32bis External 1.200C  | 0,1 ...                  | 1 ...                    |
Twincom                      |                          |                          |
    144/DF                   | 0,1 ...                  | 1 ...                    |
Zoltrix                      |                          |                          |
    ZoFax Standard 96/24     | +FCR = 0,1 ...           | +FCR = 0 ...             |
Zoom                         |                          |                          |
    FX 9624 1.13             | +FCR = 0,1 ...           | +FCR = 0 ...             |
    FX 9624 1.15             | 0,1 ...                  | 0 ...                    |
    VFXV.32bis               | 0,1 ...                  | 0 ...                    |
ZyXel                        |                          |                          |
    U-1496B                  |                          |                          |
    U-1496E 4.12c            | ERROR                    | ERROR                    |
    U-1496E 5.02M            | ERROR                    | ERROR                    |
?                            |                          |                          |
    Generic RC9624AC 1.53    | 0,1 ...                  | 0 ...                    |


Manufacturer                 | AT+FCTCRTY=?             | AT+FCTCRTY?              |
_____________________________|__________________________|__________________________|
Aceex                        |                          |                          |
    DM-2496H exar based      | ERROR                    | ERROR                    |
    DM-2496H rockwell based  | ERROR                    | ERROR                    |
    DM-1496V rockwell based  | ERROR                    | ERROR                    |
Adtech                       |                          |                          |
    Externally Yours         | ERROR                    | ERROR                    |
AMT                          |                          |                          |
    Star 2496i               | +FTBC = 0-65535 ...      | +FTBC = 0 ...            |
Cardinal                     |                          |                          |
    MB2296SR                 | +FTBC = 0-65535 ...      | +FTBC = 0 ...            |
Computer Peripherals, Inc.   |                          |                          |
    Viva 2496ef              | 0 ...                    | 0 ...                    |
Everex                       |                          |                          |
    Everfax 2496D            | ERROR                    | ERROR                    |
Frecom                       |                          |                          |
```

Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	0 ...	OK
Incomm Data Products		
Vision PC 2400	+FTBC = 0-65535 ...	+FTBC = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FTBC = 0-65535 ...	+FTBC = 0 ...
Multi-Tech		
MT224BAF	ERROR	ERROR
MT1432BA	ERROR	ERROR
NetComm		
SmartModem v.32bis	ERROR	ERROR
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FTBC = 0-65535 ...	+FTBC = 0 ...
Ultima Home Office	ERROR	ERROR
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FRBC = 0-65535 ...	+FRBC = 0 ...
Zoom		
FX 9624 1.13	+FCTCTRY = 0 ...	+FCTCTRY = 0 ...
FX 9624 1.15	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FDCC=?
Aceex	
DM-2496H exar based	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
DM-2496H rockwell based	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
DM-1496V rockwell based	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
Adtech	
Externally Yours	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
AMT	
Star 2496i	+FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Cardinal	

```
    MB2296SR                 | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) |
                             |   ...                                           |
Computer Peripherals, Inc.   |                                                 |
    Viva 2496ef              | (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
Everex                       |                                                 |
    Everfax 2496D            | (0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ... |
Frecom                       |                                                 |
    Fax96 with Modem         | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),(0),(0),(0|
                             |   -7) ...                                       |
Gateway                      |                                                 |
    Telepath                 | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
GVC                          |                                                 |
    FM 9696                  | (0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ... |
    FM 9696H                 | (0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ... |
Husky                        |                                                 |
    FAXMODEM 96              | (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
Incomm Data Products         |                                                 |
    Vision PC 2400           | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) |
                             |   ...                                           |
Infotel                      |                                                 |
    144I                     | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
Maxlite                      |                                                 |
    Maxfax                   | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) |
                             |   ...                                           |
Multi-Tech                   |                                                 |
    MT224BAF                 | +FDCC=(0-1),(0-3),(0-4),(0-2),(0),(0),(0),(0-7) |
                             |   ...                                           |
    MT1432BA                 | +FDCC=(0-1),(0-3),(0-4),(0-2),(0),(0),(0),(0-7) |
                             |   ...                                           |
NetComm                      |                                                 |
    SmartModem v.32bis       | (0,1),(0-3),(0),(0-2),(0,1),(0),(0),(0-7) ...   |
OA                           |                                                 |
    Fax Modem FM9648         | (0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ... |
Prometheus Products          |                                                 |
    24/96 BSR Plus           | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) |
                             |   ...                                           |
    Ultima Home Office       | +FDCC = (0,1),(0-3),0,(0,2),0,0,0,(0-7) ...     |
Quiktel                      |                                                 |
    Logicode S/R 14,400      | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
Supra                        |                                                 |
    V.32bis External 1.000E  | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
    V.32bis External 1.200C  | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
Twincom                      |                                                 |
    144/DF                   | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
Zoltrix                      |                                                 |
    ZoFax Standard 96/24     | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,2),0,0,(0-7) |
                             |   ...                                           |
Zoom                         |                                                 |
    FX 9624 1.13             | +FDCC = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) |
                             |   ...                                           |
    FX 9624 1.15             | (0,1),(0-3),(0),(0-2),(0,1),0,0,(0-7) ...       |
    VFXV.32bis               | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...     |
ZyXel                        |                                                 |
    U-1496B                  | (0,1),(0-5),(0-2),(0-2),(0,1),(0),(0),(0-7) ... |
    U-1496E 4.12c            | (0,1),(0-5),(0-2),(0-2),(0,1),(0),(0),(0-7) ... |
    U-1496E 5.02M            | (0,1),(0-5),(0-2),(0-2),(0,1),(0),(0),(0-7) ... |
?                            |                                                 |
```

Generic RC9624AC 1.53	(0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...

Manufacturer	AT+FDCC?
Aceex	
DM-2496H exar based	ERROR
DM-2496H rockwell based	ERROR
DM-1496V rockwell based	ERROR
Adtech	
Externally Yours	,3,0,2,0,0,0,5 ...
AMT	
Star 2496i	+FDCC = 0,3,0,2,0,0,0,0 ...
Cardinal	
MB2296SR	+FDCC = 0,3,0,2,0,0,0,0 ...
Computer Peripherals, Inc.	
Viva 2496ef	0,3,0,2,0,0,0,0 ...
Everex	
Everfax 2496D	1,3,2,2,0,0,0,0 ...
Frecom	
Fax96 with Modem	0,3,0,2,0,0,0,0 ...
Gateway	
Telepath	0,5,0,2,0,0,0,0 ...
GVC	
FM 9696	,3,0,2,0,0,0,5 ...
FM 9696H	,3,0,2,0,0,0,5 ...
Husky	
FAXMODEM 96	1,3,0,2,0,0,0,0 ...
Incomm Data Products	
Vision PC 2400	+FDCC = 0,3,0,2,0,0,0,0 ...
Infotel	
144I	0,5,0,2,0,0,0,0 ...
Maxlite	
Maxfax	+FDCC = 0,3,0,2,0,0,0,0 ...
Multi-Tech	
MT224BAF	+FDCC=1,3,0,2,0,0,0,0 ...
MT1432BA	+FDCC=1,3,0,2,0,0,0,0 ...
NetComm	
SmartModem v.32bis	0,3,0,2,1,0,0,0 ...
OA	
Fax Modem FM9648	,3,0,2,0,0,0,5 ...
Prometheus Products	
24/96 BSR Plus	+FDCC = 0,3,0,2,0,0,0,0 ...
Ultima Home Office	+FDCC = 1,3,0,2,0,0,0,0 ...
Quiktel	
Logicode S/R 14,400	0,5,0,2,0,0,0,0 ...
Supra	
V.32bis External 1.000E	0,5,0,2,0,0,0,0 ...
V.32bis External 1.200C	1,1,0,2,0,0,0,0 ...
Twincom	
144/DF	0,5,0,2,0,0,0,0 ...
Zoltrix	
ZoFax Standard 96/24	+FDCC = 0,3,0,2,0,0,0,0 ...
Zoom	
FX 9624 1.13	+FDCC = 0,3,0,2,0,0,0,0 ...
FX 9624 1.15	???
VFXV.32bis	0,5,0,2,0,0,0,0 ...

```
ZyXel                        |                                                    |
    U-1496B                  | 0,3,0,2,0,0,0,0 ...                                |
    U-1496E 4.12c            | 0,3,0,2,0,0,0,5 ...                                |
    U-1496E 5.02M            | 0,3,0,2,0,0,0,0 ...                                |
?                            |                                                    |
    Generic RC9624AC 1.53    | 0,3,0,2,0,0,0,0 ...                                |

From: mshiels@TMSoftware.Ca (Michael A. Shiels)
Subject: Ersatz Class 2 Fax/Modem Command Scorecard part 4/7

Manufacturer                 | AT+FDCS=?                                          |
_____________________________|____________________________________________________|
Aceex                        |                                                    |
    DM-2496H exar based      | ERROR                                              |
    DM-2496H rockwell based  | ERROR                                              |
    DM-1496V rockwell based  | ERROR                                              |
Adtech                       |                                                    |
    Externally Yours         | ERROR                                              |
AMT                          |                                                    |
    Star 2496i               | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7)    |
                             |   ...                                              |
Cardinal                     |                                                    |
    MB2296SR                 | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7)    |
                             |   ...                                              |
Computer Peripherals, Inc.   |                                                    |
    Viva 2496ef              | (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...        |
Everex                       |                                                    |
    Everfax 2496D            | (0,1),(0-3),(0-2),(0-2),(0-2),(0),(0),(0-7) ...    |
Frecom                       |                                                    |
    Fax96 with Modem         | ???                                                |
Gateway                      |                                                    |
    Telepath                 | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...        |
GVC                          |                                                    |
    FM 9696                  | ERROR                                              |
    FM 9696H                 | ERROR                                              |
Husky                        |                                                    |
    FAXMODEM 96              | (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...        |
Incomm Data Products         |                                                    |
    Vision PC 2400           | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7)    |
                             |   ...                                              |
Infotel                      |                                                    |
    144I                     | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...        |
Maxlite                      |                                                    |
    Maxfax                   | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7)    |
                             |   ...                                              |
Multi-Tech                   |                                                    |
    MT224BAF                 | +FDCS=(0-1),(0-3),(0-4),(0-2),(0),(0),(0),(0-7)    |
                             |   ...                                              |
    MT1432BA                 | +FDCS=(0-1),(0-3),(0-4),(0-2),(0),(0),(0),(0-7)    |
                             |   ...                                              |
NetComm                      |                                                    |
    SmartModem v.32bis       | ERROR                                              |
OA                           |                                                    |
    Fax Modem FM9648         | ERROR                                              |
Prometheus Products          |                                                    |
    24/96 BSR Plus           | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7)    |
                             |   ...                                              |
```

```
    Ultima Home Office       | +FDCS = (0,1),(0-3),0,(0,2),0,0,0,(0-7) ...      |
Quiktel                      |                                                  |
    Logicode S/R 14,400      | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...      |
Supra                        |                                                  |
    V.32bis External 1.000E  | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...      |
    V.32bis External 1.200C  | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...      |
Twincom                      |                                                  |
    144/DF                   | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...      |
Zoltrix                      |                                                  |
    ZoFax Standard 96/24     | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,2),0,0,(0-7)  |
                             |   ...                                            |
Zoom                         |                                                  |
    FX 9624 1.13             | +FDCS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7)  |
                             |   ...                                            |
    FX 9624 1.15             | (0,1),(0-3),(0),(0-2),(0,1),0,0,(0-7) ...        |
    VFXV.32bis               | (0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...      |
ZyXel                        |                                                  |
    U-1496B                  |                                                  |
    U-1496E 4.12c            | ERROR                                            |
    U-1496E 5.02M            | ERROR                                            |
?                            |                                                  |
    Generic RC9624AC 1.53    | (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...      |


Manufacturer                 | AT+FDCS?                                         |
_____________________________|__________________________________________________|
Aceex                        |                                                  |
    DM-2496H exar based      | ERROR                                            |
    DM-2496H rockwell based  | ERROR                                            |
    DM-1496V rockwell based  | ERROR                                            |
Adtech                       |                                                  |
    Externally Yours         | ERROR                                            |
AMT                          |                                                  |
    Star 2496i               | +FDCS = 0,0,0,0,0,0,0,0 ...                      |
Cardinal                     |                                                  |
    MB2296SR                 | +FDCS = 0,0,0,0,0,0,0,0 ...                      |
Computer Peripherals, Inc.   |                                                  |
    Viva 2496ef              | 0,0,0,0,0,0,0,0 ...                              |
Everex                       |                                                  |
    Everfax 2496D            | 0,0,0,0,0,0,0,5 ...                              |
Frecom                       |                                                  |
    Fax96 with Modem         | 0,0,0,0,0,0,0,0 ...                              |
Gateway                      |                                                  |
    Telepath                 | 0,0,0,0,0,0,0,0 ...                              |
GVC                          |                                                  |
    FM 9696                  | ERROR                                            |
    FM 9696H                 | ERROR                                            |
Husky                        |                                                  |
    FAXMODEM 96              | ERROR                                            |
Incomm Data Products         |                                                  |
    Vision PC 2400           | +FDCS = 0,0,0,0,0,0,0,0 ...                      |
Infotel                      |                                                  |
    144I                     | 0,0,0,0,0,0,0,0 ...                              |
Maxlite                      |                                                  |
    Maxfax                   | +FDCS = 0,0,0,0,0,0,0,5 ...                      |
Multi-Tech                   |                                                  |
    MT224BAF                 | +FDCS=0,0,0,0,0,0,0,0 ...                        |
```

MT1432BA	+FDCS=0,0,0,0,0,0,0,0 ...
NetComm	
SmartModem v.32bis	0,0,0,0,0,0,0,0 ...
OA	
Fax Modem FM9648	ERROR
Prometheus Products	
24/96 BSR Plus	+FDCS = 0,0,0,0,0,0,0,0 ...
Ultima Home Office	+FDCS = 0,0,0,0,0,0,0,0 ...
Quiktel	
Logicode S/R 14,400	0,0,0,0,0,0,0,0 ...
Supra	
V.32bis External 1.000E	0,0,0,0,0,0,0,0 ...
V.32bis External 1.200C	0,0,0,0,0,0,0,0 ...
Twincom	
144/DF	0,0,0,0,0,0,0,0 ...
Zoltrix	
ZoFax Standard 96/24	+FDCS = 0,0,0,0,0,0,0,0 ...
Zoom	
FX 9624 1.13	+FDCS = 0,0,0,0,0,0,0,0 ...
FX 9624 1.15	???
VFXV.32bis	0,0,0,0,0,0,0,0 ...
ZyXel	
U-1496B	
U-1496E 4.12c	ERROR
U-1496E 5.02M	ERROR
?	
Generic RC9624AC 1.53	0,0,0,0,0,0,0,0 ...

Manufacturer	AT+FDFFC=?	AT+FDFFC?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FDFFC = 0 ...	+FDFFC = 0 ...
Cardinal		
MB2296SR	+FDFFC = 0 ...	+FDFFC = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	0 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	0 ...	ERROR
Incomm Data Products		
Vision PC 2400	+FDFFC = 0 ...	+FDFFC = 0 ...
Infotel		

144I	0 ...	0 ...
Maxlite		
Maxfax	+FDFFC = 0 ...	+FDFFC = 0 ...
Multi-Tech		
MT224BAF	+FDFFC=0 ...	+FDFFC=0 ...
MT1432BA	+FDFFC=0 ...	+FDFFC=0 ...
NetComm		
SmartModem v.32bis	ERROR	ERROR
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FDFFC = 0 ...	+FDFFC = 0 ...
Ultima Home Office	ERROR	ERROR
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FDFFC = 0 ...	+FDFFC = 0 ...
Zoom		
FX 9624 1.13	+FDFFC = 0 ...	+FDFFC = 0 ...
FX 9624 1.15	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FDIS=?
Aceex	
DM-2496H exar based	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
DM-2496H rockwell based	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
DM-1496V rockwell based	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
Adtech	
Externally Yours	(0-1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
AMT	
Star 2496i	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Cardinal	
MB2296SR	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Computer Peripherals, Inc.	
Viva 2496ef	(0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Everex	
Everfax 2496D	(0,1),(0-3),(0-2),(0-2),(0-2),(0),(0),(0-7) ...
Frecom	
Fax96 with Modem	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),(0),(0),(0-7) ...
Gateway	
Telepath	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...

GVC	
FM 9696	(0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
FM 9696H	(0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
Husky	
FAXMODEM 96	(0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Incomm Data Products	
Vision PC 2400	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Infotel	
144I	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...
Maxlite	
Maxfax	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Multi-Tech	
MT224BAF	+FDIS=(0-1),(0-3),(0-4),(0-2),(0),(0),(0),(0-7) ...
MT1432BA	+FDIS=(0-1),(0-3),(0-4),(0-2),(0),(0),(0),(0-7) ...
NetComm	
SmartModem v.32bis	(0,1),(0-3),(0),(0-2),(0,1),(0),(0),(0-7) ...
OA	
Fax Modem FM9648	(0,1),(0-3),(0-3),(0-2),(0-2),(0),(0),(0-7) ...
Prometheus Products	
24/96 BSR Plus	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
Ultima Home Office	+FDIS = (0,1),(0-3),0,(0,2),0,0,0,(0-7) ...
Quiktel	
Logicode S/R 14,400	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...
Supra	
V.32bis External 1.000E	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...
V.32bis External 1.200C	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...
Twincom	
144/DF	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...
Zoltrix	
ZoFax Standard 96/24	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,2),0,0,(0-7) ...
Zoom	
FX 9624 1.13	+FDIS = (0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...
FX 9624 1.15	(0,1),(0-3),(0),(0-2),(0,1),0,0,(0-7) ...
VFXV.32bis	(0,1),(0-5),(0-2),(0-2),(0,1),0,0,(0-7) ...
ZyXel	
U-1496B	
U-1496E 4.12c	(0,1),(0-5),(0-2),(0-2),(0,1),(0),(0),(0-7) ...
U-1496E 5.02M	(0,1),(0-5),(0-2),(0-2),(0,1),(0),(0),(0-7) ...
?	
Generic RC9624AC 1.53	(0,1),(0-3),(0-2),(0-2),(0,1),0,0,(0-7) ...

Manufacturer	AT+FDIS?
Aceex	
DM-2496H exar based	ERROR
DM-2496H rockwell based	ERROR
DM-1496V rockwell based	1,1,0,2,0,0,0,5 ...
Adtech	
Externally Yours	ERROR

```
AMT                            |                                                  |
    Star 2496i                 | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
Cardinal                       |                                                  |
    MB2296SR                   | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
Computer Peripherals, Inc.     |                                                  |
    Viva 2496ef                | 0,3,0,2,0,0,0,0 ...                              |
Everex                         |                                                  |
    Everfax 2496D              | 1,3,2,2,0,0,0,0 ...                              |
Frecom                         |                                                  |
    Fax96 with Modem           | 0,3,0,2,0,0,0,0 ...                              |
Gateway                        |                                                  |
    Telepath                   | 0,5,0,2,0,0,0,0 ...                              |
GVC                            |                                                  |
    FM 9696                    | ERROR                                            |
    FM 9696H                   | ERROR                                            |
Husky                          |                                                  |
    FAXMODEM 96                | 1,3,0,2,0,0,0,0 ...                              |
Incomm Data Products           |                                                  |
    Vision PC 2400             | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
Infotel                        |                                                  |
    144I                       | 0,5,0,2,0,0,0,0 ...                              |
Maxlite                        |                                                  |
    Maxfax                     | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
Multi-Tech                     |                                                  |
    MT224BAF                   | +FDIS=1,3,0,2,0,0,0,0 ...                        |
    MT1432BA                   | +FDIS=1,3,0,2,0,0,0,0 ...                        |
NetComm                        |                                                  |
    SmartModem v.32bis         | 0,3,0,2,1,0,0,0 ...                              |
OA                             |                                                  |
    Fax Modem FM9648           | ERROR                                            |
Prometheus Products            |                                                  |
    24/96 BSR Plus             | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
    Ultima Home Office         | +FDIS = 1,3,0,2,0,0,0,0 ...                      |
Quiktel                        |                                                  |
    Logicode S/R 14,400        | 0,5,0,2,0,0,0,0 ...                              |
Supra                          |                                                  |
    V.32bis External 1.000E    | 0,5,0,2,0,0,0,0 ...                              |
    V.32bis External 1.200C    | 1,1,0,2,0,0,0,0 ...                              |
Twincom                        |                                                  |
    144/DF                     | 0,5,0,2,0,0,0,0 ...                              |
Zoltrix                        |                                                  |
    ZoFax Standard 96/24       | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
Zoom                           |                                                  |
    FX 9624 1.13               | +FDIS = 0,3,0,2,0,0,0,0 ...                      |
    FX 9624 1.15               | ???                                              |
    VFXV.32bis                 | 0,5,0,2,0,0,0,0 ...                              |
ZyXel                          |                                                  |
    U-1496B                    |                                                  |
    U-1496E 4.12c              | ERROR                                            |
    U-1496E 5.02M              | ERROR                                            |
?                              |                                                  |
    Generic RC9624AC 1.53      | 0,3,0,2,0,0,0,0 ...                              |

Manufacturer                   | AT+FDT=?                 | AT+FDT?               |
_______________________________|__________________________|_______________________|
Aceex                          |                          |                       |
```

```
    DM-2496H exar based     | ERROR                  | ERROR                  |
    DM-2496H rockwell based | ERROR                  | ERROR                  |
    DM-1496V rockwell based | ERROR                  | ERROR                  |
Adtech                      |                        |                        |
    Externally Yours        | ERROR                  | ERROR                  |
AMT                         |                        |                        |
    Star 2496i              | OK                     | OK                     |
Cardinal                    |                        |                        |
    MB2296SR                | OK                     | OK                     |
Computer Peripherals, Inc.  |                        |                        |
    Viva 2496ef             | ERROR                  | ERROR                  |
Everex                      |                        |                        |
    Everfax 2496D           |                        |                        |
Frecom                      |                        |                        |
    Fax96 with Modem        | ERROR                  | ERROR                  |
Gateway                     |                        |                        |
    Telepath                | ERROR                  | ERROR                  |
GVC                         |                        |                        |
    FM 9696                 | ERROR                  | ERROR                  |
    FM 9696H                | ERROR                  | ERROR                  |
Husky                       |                        |                        |
    FAXMODEM 96             | OK                     | OK                     |
Incomm Data Products        |                        |                        |
    Vision PC 2400          | OK                     | OK                     |
Infotel                     |                        |                        |
    144I                    | ERROR                  | ERROR                  |
Maxlite                     |                        |                        |
    Maxfax                  | OK                     | OK                     |
Multi-Tech                  |                        |                        |
    MT224BAF                | +FDT=(0),(0-1),(0-4),  | +FDT=0 ...             |
                            |   (0-2) ...            |                        |
    MT1432BA                | +FDT=(0),(0-1),(0-4),  | +FDT=0 ...             |
                            |   (0-2) ...            |                        |
NetComm                     |                        |                        |
    SmartModem v.32bis      | ERROR                  | ERROR                  |
OA                          |                        |                        |
    Fax Modem FM9648        | ERROR                  | ERROR                  |
Prometheus Products         |                        |                        |
    24/96 BSR Plus          | OK                     | OK                     |
    Ultima Home Office      | 000 ...                | 000 ...                |
Quiktel                     |                        |                        |
    Logicode S/R 14,400     | ERROR                  | ERROR                  |
Supra                       |                        |                        |
    V.32bis External 1.000E | ERROR                  | ERROR                  |
    V.32bis External 1.200C | ERROR                  | ERROR                  |
Twincom                     |                        |                        |
    144/DF                  | ERROR                  | ERROR                  |
Zoltrix                     |                        |                        |
    ZoFax Standard 96/24    | OK                     | OK                     |
Zoom                        |                        |                        |
    FX 9624 1.13            | OK                     | OK                     |
    FX 9624 1.15            | ERROR                  | ERROR                  |
    VFXV.32bis              | ERROR                  | ERROR                  |
ZyXel                       |                        |                        |
    U-1496B                 |                        |                        |
    U-1496E 4.12c           | ERROR                  | ERROR                  |
    U-1496E 5.02M           | ERROR                  | ERROR                  |
```

?		
Generic RC9624AC 1.53		

Manufacturer	AT+FECM=?	AT+FECM?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	001 ...	ERROR
DM-1496V rockwell based	0 .. 001 ...	ERROR
Adtech		
Externally Yours	000 ...	...
AMT		
Star 2496i	+FECM = 0 ...	+FECM = 0 ...
Cardinal		
MB2296SR	+FECM = 0 ...	+FECM = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0) ...	0 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	001 ...	...
FM 9696H	001 ...	...
Husky		
FAXMODEM 96	0 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FECM = 0 ...	+FECM = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FECM = 0 ...	+FECM = 0 ...
Multi-Tech		
MT224BAF	ERROR	ERROR
MT1432BA	ERROR	ERROR
NetComm		
SmartModem v.32bis	ERROR	ERROR
OA		
Fax Modem FM9648	001 ...	OK
Prometheus Products		
24/96 BSR Plus	+FECM = 0 ...	+FECM = 0 ...
Ultima Home Office	ERROR	ERROR
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FECM = 0 ...	+FECM = 0 ...
Zoom		
FX 9624 1.13	+FECM = 0 ...	+FECM = 0 ...
FX 9624 1.15	0 ...	0 ...

VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	ERROR	OK
U-1496E 5.02M	ERROR	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FET=?	AT+FET?
Aceex		
DM-2496H exar based	001 ...	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	001 ...	ERROR
Adtech		
Externally Yours	000 ...	ERROR
AMT		
Star 2496i	OK	OK
Cardinal		
MB2296SR	OK	OK
Computer Peripherals, Inc.		
Viva 2496ef	ERROR	ERROR
Everex		
Everfax 2496D	???	???
Frecom		
Fax96 with Modem	ERROR	ERROR
Gateway		
Telepath	ERROR	ERROR
GVC		
FM 9696	001 ...	ERROR
FM 9696H	001 ...	ERROR
Husky		
FAXMODEM 96	OK	OK
Incomm Data Products		
Vision PC 2400	OK	OK
Infotel		
144I	ERROR	ERROR
Maxlite		
Maxfax	OK	OK
Multi-Tech		
MT224BAF	+FET=0,1,2,4,5,6 ...	+FET=2 ...
MT1432BA	+FET=0,1,2,4,5,6 ...	+FET=237 ...
NetComm		
SmartModem v.32bis	0-15 ...	255 ...
OA		
Fax Modem FM9648	001 ...	ERROR
Prometheus Products		
24/96 BSR Plus	OK	OK
Ultima Home Office	+FET = 0-7 ...	+FET = 0 ...
Quiktel		
Logicode S/R 14,400	ERROR	ERROR
Supra		
V.32bis External 1.000E	ERROR	ERROR
V.32bis External 1.200C	ERROR	ERROR
Twincom		
144/DF	ERROR	ERROR

```
Zoltrix                        |                         |                         |
    ZoFax Standard 96/24       | OK                      | OK                      |
Zoom                           |                         |                         |
    FX 9624 1.13               | OK                      | OK                      |
    FX 9624 1.15               | ERROR                   | ERROR                   |
    VFXV.32bis                 | ERROR                   | ERROR                   |
ZyXel                          |                         |                         |
    U-1496B                    |                         |                         |
    U-1496E 4.12c              | OK                      | OK                      |
    U-1496E 5.02M              | OK                      | OK                      |
?                              |                         |                         |
    Generic RC9624AC 1.53      |                         |                         |

From: mshiels@TMSoftware.Ca (Michael A. Shiels)
Subject: Ersatz Class 2 Fax/Modem Command Scorecard part 5/7

Manufacturer                   | AT+FLID=?                                         |
_______________________________|___________________________________________________|
Aceex                          |                                                   |
    DM-2496H exar based        | "(20)(32-127)" ...                                |
    DM-2496H rockwell based    | "(20)(32-127)" ...                                |
    DM-1496V rockwell based    | "(20)(32-127)" ...                                |
Adtech                         |                                                   |
    Externally Yours           | "(20)(32-127)" ...                                |
AMT                            |                                                   |
    Star 2496i                 | +FLID = (20)(32-127) ...                          |
Cardinal                       |                                                   |
    MB2296SR                   | +FLID = (20)(32-127) ...                          |
Computer Peripherals, Inc.     |                                                   |
    Viva 2496ef                | (20)(32-127) ...                                  |
Everex                         |                                                   |
    Everfax 2496D              | (20),(32,33,35-126) ...                           |
Frecom                         |                                                   |
    Fax96 with Modem           | (20)(32-127) ...                                  |
Gateway                        |                                                   |
    Telepath                   | (20)(32-127) ...                                  |
GVC                            |                                                   |
    FM 9696                    | "(20)(32-127)" ...                                |
    FM 9696H                   | "(20)(32-127)" ...                                |
Husky                          |                                                   |
    FAXMODEM 96                | (20)(32-127) ...                                  |
Incomm Data Products           |                                                   |
    Vision PC 2400             | +FLID = (20)(32-127) ...                          |
Infotel                        |                                                   |
    144I                       | (20)(32-127) ...                                  |
Maxlite                        |                                                   |
    Maxfax                     | +FLID = (20)(32-127) ...                          |
Multi-Tech                     |                                                   |
    MT224BAF                   | +FLID=(20)(32-127) ...                            |
    MT1432BA                   | +FLID=(20)(32-127) ...                            |
NetComm                        |                                                   |
    SmartModem v.32bis         | "(20)(32,43,48-57)" ...                           |
OA                             |                                                   |
    Fax Modem FM9648           | "(20)(32-127)" ...                                |
Prometheus Products            |                                                   |
    24/96 BSR Plus             | +FLID = (20)(32-127) ...                          |
    Ultima Home Office         | +FLID = (20)(32-127) ...                          |
```

```
Quiktel                       |                                                  |
    Logicode S/R 14,400       | (20)(32-127) ...                                 |
Supra                         |                                                  |
    V.32bis External 1.000E   | (20)(32-127) ...                                 |
    V.32bis External 1.200C   | (20)(32-127) ...                                 |
Twincom                       |                                                  |
    144/DF                    | (20)(32-127) ...                                 |
Zoltrix                       |                                                  |
    ZoFax Standard 96/24      | +FLID = (20)(32-127) ...                         |
Zoom                          |                                                  |
    FX 9624 1.13              | +FLID = (20)(32-127) ...                         |
    FX 9624 1.15              | (20)(32-127) ...                                 |
    VFXV.32bis                | (20)(32-127) ...                                 |
ZyXel                         |                                                  |
    U-1496B                   |                                                  |
    U-1496E 4.12c             | OK                                               |
    U-1496E 5.02M             | OK                                               |
?                             |                                                  |
    Generic RC9624AC 1.53     | (20)(32,33,35-96,123-126) ...                    |


Manufacturer                  | AT+FLID?                                         |
______________________________|__________________________________________________|
Aceex                         |                                                  |
    DM-2496H exar based       | ...                                              |
    DM-2496H rockwell based   | SEP-30-1992 ... (DEFAULTED AS ?ROM DATE?)        |
    DM-1496V rockwell based   | Sep-24-1991 ... (DEFAULTED AS ?ROM DATE?)        |
Adtech                        |                                                  |
    Externally Yours          |  10/25/91       3.10 E       REVISION 2.2 ...    |
AMT                           |                                                  |
    Star 2496i                | +FLID = SOFTWARE\x7FPLUS\x7FSA ... (what was     |
                              |   saved into it!)                                |
Cardinal                      |                                                  |
    MB2296SR                  | +FLID = ...                                      |
Computer Peripherals, Inc.    |                                                  |
    Viva 2496ef               | ...                                              |
Everex                        |                                                  |
    Everfax 2496D             | "" ...                                           |
Frecom                        |                                                  |
    Fax96 with Modem          | TEST 1 416 581 0111 ... (what I wrote into it!)  |
Gateway                       |                                                  |
    Telepath                  | ...                                              |
GVC                           |                                                  |
    FM 9696                   | FM - 9696   12/31/91                             |
    FM 9696H                  | FM - 9696H  12/31/91                             |
Husky                         |                                                  |
    FAXMODEM 96               | ...                                              |
Incomm Data Products          |                                                  |
    Vision PC 2400            | +FLID = ...                                      |
Infotel                       |                                                  |
    144I                      | ...                                              |
Maxlite                       |                                                  |
    Maxfax                    | ?junk and modem goes out to lunch again?         |
Multi-Tech                    |                                                  |
    MT224BAF                  | +FLID="" ...                                     |
    MT1432BA                  | +FLID="" ...                                     |
NetComm                       |                                                  |
```

```
    SmartModem v.32bis       | "                     " ...                     |
OA                           |                                                 |
    Fax Modem FM9648         | 3/8/91 - 7.10 E       REVISION 1.0 ...          |
Prometheus Products          |                                                 |
    24/96 BSR Plus           | +FLID = (805)685-4347 ...                       |
    Ultima Home Office       | +FLID = ...                                     |
Quiktel                      |                                                 |
    Logicode S/R 14,400      | ...                                             |
Supra                        |                                                 |
    V.32bis External 1.000E  | ...                                             |
    V.32bis External 1.000E  | MSHIELS 416 581 0111 ... (what I had set)       |
Twincom                      |                                                 |
    144/DF                   | ...                                             |
Zoltrix                      |                                                 |
    ZoFax Standard 96/24     | +FLID = ...                                     |
Zoom                         |                                                 |
    FX 9624 1.13             | +FLID = spazy ... (assumed to be written in!)   |
    FX 9624 1.15             | ...                                             |
    VFXV.32bis               | ...                                             |
ZyXel                        |                                                 |
    U-1496B                  |                                                 |
    U-1496E 4.12c            | OK                                              |
    U-1496E 5.02M            | OK                                              |
?                            |                                                 |
    Generic RC9624AC 1.53    | ...                                             |


Manufacturer                 | AT+FLNFC=?              | AT+FLNFC?               |
_____________________________|_________________________|_________________________|
Aceex                        |                         |                         |
    DM-2496H exar based      | ERROR                   | ERROR                   |
    DM-2496H rockwell based  | ERROR                   | ERROR                   |
    DM-1496V rockwell based  | ERROR                   | ERROR                   |
Adtech                       |                         |                         |
    Externally Yours         | ERROR                   | ERROR                   |
AMT                          |                         |                         |
    Star 2496i               | +FLNFC = 0 ...          | +FLNFC = 0 ...          |
Cardinal                     |                         |                         |
    MB2296SR                 | +FLNFC = 0 ...          | +FLNFC = 0 ...          |
Computer Peripherals, Inc.   |                         |                         |
    Viva 2496ef              | 0 ...                   | 0 ...                   |
Everex                       |                         |                         |
    Everfax 2496D            | (0-2) ...               | 0 ...                   |
Frecom                       |                         |                         |
    Fax96 with Modem         | 0 ...                   | 0 ...                   |
Gateway                      |                         |                         |
    Telepath                 | 0 ...                   | 0 ...                   |
GVC                          |                         |                         |
    FM 9696                  | ERROR                   | ERROR                   |
    FM 9696H                 | ERROR                   | ERROR                   |
Husky                        |                         |                         |
    FAXMODEM 96              | 0 ...                   | 0 ...                   |
Incomm Data Products         |                         |                         |
    Vision PC 2400           | +FLNFC = 0 ...          | +FLNFC = 0 ...          |
Infotel                      |                         |                         |
    144I                     | 0 ...                   | 0 ...                   |
Maxlite                      |                         |                         |
```

Maxfax	+FLNFC = 0 ...	+FLNFC = 0 ...
Multi-Tech		
MT224BAF	+FLNFC=0-2 ...	+FLNFC=0 ...
MT1432BA	+FLNFC=0-2 ...	+FLNFC=0 ...
NetComm		
SmartModem v.32bis	ERROR	ERROR
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FLNFC = 0 ...	+FLNFC = 0 ...
Ultima Home Office	+FLNFC = 0 ...	+FLNFC = 0 ...
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FLNFC = 0 ...	+FLNFC = 0 ...
Zoom		
FX 9624 1.13	+FLNFC = 0 ...	+FLNFC = 0 ...
FX 9624 1.15	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FLPL=?	AT+FLPL?
Aceex		
DM-2496H exar based	001 ...	0 ...
DM-2496H rockwell based	001 ...	0 ...
DM-1496V rockwell based	001 ...	0 ...
Adtech		
Externally Yours	000 ...	0 ...
AMT		
Star 2496i	+FLPL = 0,1 ...	+FLPL = 0 ...
Cardinal		
MB2296SR	+FLPL = 0,1 ...	+FLPL = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	0 ...
Frecom		
Fax96 with Modem	0,1 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	001 ...	0 ...
FM 9696H	001 ...	0 ...
Husky		
FAXMODEM 96	0 ...	0 ...

```
Incomm Data Products         |                        |                         |
    Vision PC 2400           | +FLPL = 0,1 ...        | +FLPL = 0 ...           |
Infotel                      |                        |                         |
    144I                     | 0 ...                  | 0 ...                   |
Maxlite                      |                        |                         |
    Maxfax                   | +FLPL = 0,1 ...        | +FLPL = 0 ...           |
Multi-Tech                   |                        |                         |
    MT224BAF                 | +FLPL=0-1 ...          | +FLPL=0 ...             |
    MT1432BA                 | +FLPL=0-1 ...          | +FLPL=0 ...             |
NetComm                      |                        |                         |
    SmartModem v.32bis       | 0,1 ...                | 0 ...                   |
OA                           |                        |                         |
    Fax Modem FM9648         | 001 ...                | 0 ...                   |
Prometheus Products          |                        |                         |
    24/96 BSR Plus           | +FLPL = 0,1 ...        | +FLPL = 0 ...           |
    Ultima Home Office       | ERROR                  | ...                     |
Quiktel                      |                        |                         |
    Logicode S/R 14,400      | 0 ...                  | 0 ...                   |
Supra                        |                        |                         |
    V.32bis External 1.000E  | 0 ...                  | 0 ...                   |
    V.32bis External 1.200C  | 0 ...                  | 0 ...                   |
Twincom                      |                        |                         |
    144/DF                   | 0 ...                  | 0 ...                   |
Zoltrix                      |                        |                         |
    ZoFax Standard 96/24     | +FLPL = 0,1 ...        | +FLPL = 0 ...           |
Zoom                         |                        |                         |
    FX 9624 1.13             | +FLPL = 0,1 ...        | +FLPL = 0 ...           |
    FX 9624 1.15             | 0,1 ...                | 0 ...                   |
    VFXV.32bis               | 0 ...                  | 0 ...                   |
ZyXel                        |                        |                         |
    U-1496B                  |                        |                         |
    U-1496E 4.12c            | OK                     | OK                      |
    U-1496E 5.02M            | OK                     | OK                      |
?                            |                        |                         |
    Generic RC9624AC 1.53    | 0 ...                  | 0 ...                   |


Manufacturer                 | AT+FMDL?                                         |
_____________________________|__________________________________________________|
Aceex                        |                                                  |
    DM-2496H exar based      | ERROR                                            |
    DM-2496H rockwell based  | 9624,RC9623DPL ...                               |
    DM-1496V rockwell based  | 9624,2,E,290E ...                                |
Adtech                       |                                                  |
    Externally Yours         | 9624,2,E,290X ...                                |
AMT                          |                                                  |
    Star 2496i               | +FMDL = SSX196 ...                               |
Cardinal                     |                                                  |
    MB2296SR                 | +FMDL = SSX196 ...                               |
Computer Peripherals, Inc.   |                                                  |
    Viva 2496ef              | RC9624AC ...                                     |
Everex                       |                                                  |
    Everfax 2496D            | Everfax 24/96D .. EV968-51 ...                   |
Frecom                       |                                                  |
    Fax96 with Modem         | FAX596E ...                                      |
Gateway                      |                                                  |
    Telepath                 | TelePath 1.5     tgg ...                         |
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GVC                           |                                                  |
    FM 9696                   | 9648,2,E,290X ...                                |
    FM 9696H                  | 9648,2,E,290X ...                                |
Husky                         |                                                  |
    FAXMODEM 96               | RC9624AT,2,I,R96MFX ...                          |
Incomm Data Products          |                                                  |
    Vision PC 2400            | +FMDL = SS2496,2,I,SC11011/06/96/98 ...          |
Infotel                       |                                                  |
    144I                      | V.32AC ...                                       |
Maxlite                       |                                                  |
    Maxfax                    | +FBUF = 120 ...                                  |
Multi-Tech                    |                                                  |
    MT224BAF                  | +FMDL=MT224BAF    /V25BIS/V42/REMOTE/DIALBACK/  |
                              |   FAX/07/13/92 ...                               |
    MT1432BA                  | +FMDL=MT1432BA ...                               |
NetComm                       |                                                  |
    SmartModem v.32bis        | ERROR                                            |
OA                            |                                                  |
    Fax Modem FM9648          | 9648,2,E,290X ...                                |
Prometheus Products           |                                                  |
    24/96 BSR Plus            | +FMDL = SSX996 ...                               |
    Ultima Home Office        | +FMDL = ProModem Ultima ...                      |
Quiktel                       |                                                  |
    Logicode S/R 14,400       | V.32AC ...                                       |
Supra                         |                                                  |
    V.32bis External 1.000E   | V.32AC ...                                       |
    V.32bis External 1.200C   | V.32AC ...                                       |
Twincom                       |                                                  |
    144/DF                    | V.32AC ...                                       |
Zoltrix                       |                                                  |
    ZoFax Standard 96/24      | +FMDL = SSX196 ...                               |
Zoom                          |                                                  |
    FX 9624 1.13              | +FMDL = RC9624AT,2,I,R96MFX ...                  |
    FX 9624 1.15              | RC9624AT,2,I,R96MFX ...                          |
    VFXV.32bis                | V.32AC ...                                       |
ZyXel                         |                                                  |
    U-1496B                   | ERROR                                            |
    U-1496E 4.12c             | U1496E  V M4.12c ...                             |
    U-1496E 5.02M             | U1496E  V 5.02 M ...                             |
?                             |                                                  |
    Generic RC9624AC 1.53     | RC9624AC ...                                     |


Manufacturer                  | AT+FMFR?                                         |
______________________________|__________________________________________________|
Aceex                         |                                                  |
    DM-2496H exar based       | EXAR ...                                         |
    DM-2496H rockwell based   | EXAR ...                                         |
    DM-1496V rockwell based   | EXAR ...                                         |
Adtech                        |                                                  |
    Externally Yours          | EXAR ...                                         |
AMT                           |                                                  |
    Star 2496i                | +FMFR = SIERRA,******** ...                      |
Cardinal                      |                                                  |
    MB2296SR                  | +FMFR = SIERRA,******** ...                      |
Computer Peripherals, Inc.    |                                                  |
    Viva 2496ef               | ROCKWELL ...
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Everex                       |                                                   |
    Everfax 2496D            | Everex Systems Inc. ...                           |
Frecom                       |                                                   |
    Fax96 with Modem         | FRECOM ...                                        |
Gateway                      |                                                   |
    Telepath                 | Gateway2000 ...                                   |
GVC                          |                                                   |
    FM 9696                  | EXAR ...                                          |
    FM 9696H                 | EXAR ...                                          |
Husky                        |                                                   |
    FAXMODEM 96              | +FMFR = ROCKWELL,******** ...                     |
Incomm Data Products         |                                                   |
    Vision PC 2400           | +FMFR = SIERRA,******** ...                       |
Infotel                      |                                                   |
    144I                     | ROCKWELL ...                                      |
Maxlite                      |                                                   |
    Maxfax                   | ?lots of junk?                                    |
Multi-Tech                   |                                                   |
    MT224BAF                 | +FMFR=Multi-Tech Systems ...                      |
    MT1432BA                 | +FMFR=Multi-Tech Systems ...                      |
NetComm                      |                                                   |
    SmartModem v.32bis       | Series 4  V.32bis Modem Y7 v1.58 (C) NetComm      |
                             |   1992 ...                                        |
OA                           |                                                   |
    Fax Modem FM9648         | EXAR ...                                          |
Prometheus Products          |                                                   |
    24/96 BSR Plus           | +FMFR = SIERRA,******** ...                       |
    Ultima Home Office       | +FMFR = Prometheus Products, Inc. ...             |
Quiktel                      |                                                   |
    Logicode S/R 14,400      | ROCKWELL ...                                      |
Supra                        |                                                   |
    V.32bis External 1.000E  | ROCKWELL ...                                      |
    V.32bis External 1.200C  | ROCKWELL ...                                      |
Twincom                      |                                                   |
    144/DF                   | ROCKWELL ...                                      |
Zoltrix                      |                                                   |
    ZoFax Standard 96/24     | +FMFR = SIERRA,******** ...                       |
Zoom                         |                                                   |
    FX 9624 1.13             | +FMFR = ROCKWELL,******** ...                     |
    FX 9624 1.15             | +FMFR = ROCKWELL,******** ...                     |
    VFXV.32bis               | ROCKWELL ...                                      |
ZyXel                        |                                                   |
    U-1496B                  | ZyXel ...                                         |
    U-1496E 4.12c            | ZyXEL ...                                         |
    U-1496E 5.02M            | ZyXEL ...                                         |
?                            |                                                   |
    Generic RC9624AC 1.53    | ROCKWELL ...                                      |


Manufacturer                 | AT+FMINSP=?              | AT+FMINSP?             |
_____________________________|__________________________|________________________|
Aceex                        |                          |                        |
    DM-2496H exar based      | ERROR                    | 0 ...                  |
    DM-2496H rockwell based  | ERROR                    | 0 ...                  |
    DM-1496V rockwell based  | ERROR                    | 0 ...                  |
Adtech                       |                          |                        |
    Externally Yours         | 000 ...                  | ...                    |
```

```
AMT                           |                         |                         |
    Star 2496i                | +FMINSP = 0,1,2,3 ...   | AT+FMINSP = 0 ...       |
Cardinal                      |                         |                         |
    MB2296SR                  | +FMINSP = 0,1,2,3 ...   | AT+FMINSP = 0 ...       |
Computer Peripherals, Inc.    |                         |                         |
    Viva 2496ef               | 0 ...                   | 0 ...                   |
Everex                        |                         |                         |
    Everfax 2496D             | (0-3) ...               | 0 ...                   |
Frecom                        |                         |                         |
    Fax96 with Modem          | 0-3 ...                 | 0 ...                   |
Gateway                       |                         |                         |
    Telepath                  | 0 ...                   | 0 ...                   |
GVC                           |                         |                         |
    FM 9696                   | 001 ...                 | ...                     |
    FM 9696H                  | 001 ...                 | ...                     |
Husky                         |                         |                         |
    FAXMODEM 96               | 0,1,2,3 ...             | 0 ...                   |
Incomm Data Products          |                         |                         |
    Vision PC 2400            | +FMINSP = 0,1,2,3 ...   | +FMINSP = 0 ...         |
Infotel                       |                         |                         |
    144I                      |                         |                         |
Maxlite                       |                         |                         |
    Maxfax                    | +FMINSP = 0,1,2,3 ...   | +FMINSP = 0 ...         |
Multi-Tech                    |                         |                         |
    MT224BAF                  | +FMINSP=0-3 ...         | +FMINSP=0 ...           |
    MT1432BA                  | +FMINSP=0-3 ...         | +FMINSP=0 ...           |
NetComm                       |                         |                         |
    SmartModem v.32bis        | 0-3 ...                 | 0 ...                   |
OA                            |                         |                         |
    Fax Modem FM9648          | 001 ...                 | OK                      |
Prometheus Products           |                         |                         |
    24/96 BSR Plus            | +FMINSP = 0,1,2,3 ...   | +FMINSP = 0 ...         |
    Ultima Home Office        | +FMINSP = 0-3 ...       | ERROR                   |
Quiktel                       |                         |                         |
    Logicode S/R 14,400       | 0 ...                   |                         |
Supra                         |                         |                         |
    V.32bis External 1.000E   | 0 ...                   | 0 ...                   |
    V.32bis External 1.200C   | 0 ...                   | 0 ...                   |
Twincom                       |                         |                         |
    144/DF                    | 0 ...                   | 0 ...                   |
Zoltrix                       |                         |                         |
    ZoFax Standard 96/24      | +FMINSP = 0,1,2,3 ...   | +FMINSP = 0 ...         |
Zoom                          |                         |                         |
    FX 9624 1.13              | +FMINSP = 0,1,2,3 ...   | +FMINSP = 0 ...         |
    FX 9624 1.15              | 0,1,2,3 ...             | 0 ...                   |
    VFXV.32bis                | 0 ...                   | 0 ...                   |
ZyXel                         |                         |                         |
    U-1496B                   |                         |                         |
    U-1496E 4.12c             | ERROR                   | ERROR                   |
    U-1496E 5.02M             | ERROR                   | ERROR                   |
?                             |                         |                         |
    Generic RC9624AC 1.53     | 0 ...                   | 0 ...                   |

Manufacturer                  | AT+FPHCTO=?             | AT+FPHCTO?              |
______________________________|_________________________|_________________________|
Aceex                         |                         |                         |
```

```
    DM-2496H exar based     | ERROR                   | ERROR                   |
    DM-2496H rockwell based | ERROR                   | ERROR                   |
    DM-1496V rockwell based | ERROR                   | ERROR                   |
Adtech                      |                         |                         |
    Externally Yours        | ERROR                   | ERROR                   |
AMT                         |                         |                         |
    Star 2496i              | +FPHCTO = 0-255 ...     | +FPHCTO = 030 ...       |
Cardinal                    |                         |                         |
    MB2296SR                | +FPHCTO = 0-255 ...     | +FPHCTO = 030 ...       |
Computer Peripherals, Inc.  |                         |                         |
    Viva 2496ef             | 0-255 ...               | 30 ...                  |
Everex                      |                         |                         |
    Everfax 2496D           | (0-60) ...              | 30 ...                  |
Frecom                      |                         |                         |
    Fax96 with Modem        | 0-30 ...                | 030 ...                 |
Gateway                     |                         |                         |
    Telepath                | 0-255 ...               | 30 ...                  |
GVC                         |                         |                         |
    FM 9696                 | ERROR                   | ERROR                   |
    FM 9696H                | ERROR                   | ERROR                   |
Husky                       |                         |                         |
    FAXMODEM 96             | 0-255 ...               | 030 ...                 |
Incomm Data Products        |                         |                         |
    Vision PC 2400          | +FPHCTO = 0-255 ...     | +FPHCTO = 030 ...       |
Infotel                     |                         |                         |
    144I                    | 0-255 ...               | 30 ...                  |
Maxlite                     |                         |                         |
    Maxfax                  | +FPHCTO = 0-255 ...     | +FPHCTO = 015 ...       |
                            |                         | (NOTE: should be ?30?)  |
Multi-Tech                  |                         |                         |
    MT224BAF                | +FPHCTO=0-255 ...       | +FPHCTO=30 ...          |
    MT1432BA                | +FPHCTO=0-255 ...       | +FPHCTO=30 ...          |
NetComm                     |                         |                         |
    SmartModem v.32bis      | 0-255 ...               | 030 ...                 |
OA                          |                         |                         |
    Fax Modem FM9648        | ERROR                   | ERROR                   |
Prometheus Products         |                         |                         |
    24/96 BSR Plus          | +FPHCTO = 0-255 ...     | +FPHCTO = 030 ...       |
    Ultima Home Office      | ERROR                   | +FPHCTO = 000 ...       |
Quiktel                     |                         |                         |
    Logicode S/R 14,400     | 0-255 ...               | 30 ...                  |
Supra                       |                         |                         |
    V.32bis External 1.000E | 0-255 ...               | 30 ...                  |
    V.32bis External 1.200C | 0-255 ...               | 30 ...                  |
Twincom                     |                         |                         |
    144/DF                  | 0-255 ...               | 30 ...                  |
Zoltrix                     |                         |                         |
    ZoFax Standard 96/24    | +FPHCTO = 0-255 ...     | +FPHCTO = 030 ...       |
Zoom                        |                         |                         |
    FX 9624 1.13            | +FPHCTO = 0-255 ...     | +FPHCTO = 030 ...       |
    FX 9624 1.15            | 0-255 ...               | 030 ...                 |
    VFXV.32bis              | 0-255 ...               | 30 ...                  |
ZyXel                       |                         |                         |
    U-1496B                 |                         |                         |
    U-1496E 4.12c           | OK                      | OK                      |
    U-1496E 5.02M           | OK                      | OK                      |
?                           |                         |                         |
```

Generic RC9624AC 1.53	0-255 ...	30 ...

From: mshiels@TMSoftware.Ca (Michael A. Shiels)
Subject: part 6/7

Manufacturer	AT+FPTS=?	AT+FPTS?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FPTS = 1,2,3,4,5 ...	+FPTS = 000 ...
Cardinal		
MB2296SR	+FPTS = 1,2,3,4,5 ...	+FPTS = 001 ...
Computer Peripherals, Inc.		
Viva 2496ef	1-5 ...	0 ...
Everex		
Everfax 2496D	(1-5) ...	1 ...
Frecom		
Fax96 with Modem	1-5 ...	0 ...
Gateway		
Telepath	1-5 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	1,2,3,4,5 ...	000 ...
Incomm Data Products		
Vision PC 2400	+FPTS = 1,2,3,4,5 ...	+FPTS = 001 ...
Infotel		
144I	1-5 ...	0 ...
Maxlite		
Maxfax	+FPTS = 1,2,3,4,5 ...	+FPTS = 000 ...
Multi-Tech		
MT224BAF	+FPTS=1-5 ...	+FPTS=1 ...
MT1432BA	+FPTS=1-5 ...	+FPTS=1 ...
NetComm		
SmartModem v.32bis	1-3 ...	0 ...
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FPTS = 1,2,3,4,5 ...	+FPTS = 000 ...
Ultima Home Office	+FPTS = 1-3 ...	+FPTS = 0 ...
Quiktel		
Logicode S/R 14,400	1-5 ...	0 ...
Supra		
V.32bis External 1.000E	1-5 ...	0 ...
V.32bis External 1.200C	1-5 ...	0 ...
Twincom		
144/DF	1-5 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FPTS + 1,2,3,4,5 ...	+FPTS = 001 ...
Zoom		
FX 9624 1.13	+FPTS + 1,2,3,4,5 ...	+FPTS = 001 ...

FX 9624 1.15	1,2,3,4,5 ...	001 ...
VFXV.32bis	1-5 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	1-5 ...	0 ...

Manufacturer	AT+FRBC=?	AT+FRBC?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FRBC = 0 ...	+FRBC = 0 ...
Cardinal		
MB2296SR	+FRBC = 0 ...	+FRBC = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0) ...	0 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	0 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FRBC = 0 ...	+FRBC = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FRBC = 0 ...	+FRBC = 0 ...
Multi-Tech		
MT224BAF	+FRBC=0 ...	+FRBC=0 ...
MT1432BA	+FRBC=0 ...	+FRBC=0 ...
NetComm		
SmartModem v.32bis	0-65535 ...	0 ...
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FRBC = 0 ...	+FRBC = 0 ...
Ultima Home Office	ERROR	ERROR
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		

144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FRBC = 0 ...	+FRBC = 0 ...
Zoom		
FX 9624 1.13	+FRBC = 0 ...	+FRBC = 0 ...
FX 9624 1.13	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FREL=?	AT+FREL?
Aceex		
DM-2496H exar based	EXAR .. 001 ...	ERROR
DM-2496H rockwell based	EXAR .. 001 ...	ERROR
DM-1496V rockwell based	EXAR .. 001 ...	ERROR
Adtech		
Externally Yours	EXAR .. 000 ...	ERROR
AMT		
Star 2496i	+FREL = 0,1 ...	+FREL = 0 ...
Cardinal		
MB2296SR	+FREL = 0,1 ...	+FREL = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	0 ...
Frecom		
Fax96 with Modem	0,1 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	EXAR\r\n\r\n001 ...	ERROR
FM 9696H	EXAR\r\n\r\n001 ...	ERROR
Husky		
FAXMODEM 96	0,1 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FREL = 0,1 ...	+FREL = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FREL = 0,1 ...	+FREL = 0 ...
Multi-Tech		
MT224BAF	+FREL=0-1 ...	+FREL=1 ...
MT1432BA	+FREL=0-1 ...	+FREL=1 ...
NetComm		
SmartModem v.32bis	0,1 ...	0 ...
OA		
Fax Modem FM9648	EXAR\r\n\r\n001 ...	ERROR
Prometheus Products		
24/96 BSR Plus	+FREL = 0,1 ...	+FREL = 0 ...
Ultima Home Office	+FREL = 0,1 ...	+FREL = 0 ...
Quiktel		

Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FREL = 0,1 ...	+FREL = 0 ...
Zoom		
FX 9624 1.13	+FREL = 0,1 ...	+FREL = 0 ...
FX 9624 1.15	0,1 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B		
U-1496E 4.12c	U1496E V M4.12c ...	U1496E V M4.12c ...
U-1496E 5.02M	U1496E V 5.02 M ...	U1496E V 5.02 M ...
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FREV?
Aceex	
DM-2496H exar based	...
DM-2496H rockwell based	SEP-30-1992 ...
DM-1496V rockwell based	Sep-24-1991 ...
Adtech	
Externally Yours	10/25/91 3.10 E REVISION 2.2 ...
AMT	
Star 2496i	+FREV = 1.23,060491,SSC ...
Cardinal	
MB2296SR	+FREV = 1.24,061291,SSC ...
Computer Peripherals, Inc.	
Viva 2496ef	TR00-J260-001 100 ...
Everex	
Everfax 2496D	901019 ...
Frecom	
Fax96 with Modem	1.25 ...
Gateway	
Telepath	Gateway TelePath 1.5 ...
GVC	
FM 9696	FM - 9696 12/31/91 ...
FM 9696H	FM - 9696H 12/31/91 ...
Husky	
FAXMODEM 96	V1.14P,071591 ...
Incomm Data Products	
Vision PC 2400	+FREV = 1.00,101090,NAVIN SYSTEMS ...
Infotel	
144I	V1.200 TR14-Jxxx-001 ...
Maxlite	
Maxfax	?lots of junk?
Multi-Tech	
MT224BAF	+FREV=0302 ...
MT1432BA	+FREV=00102A ...
NetComm	
SmartModem v.32bis	ERROR
OA	

Fax Modem FM9648	3/8/91 - 7.10 E REVISION 1.0 ...
Prometheus Products	
24/96 BSR Plus	+FREV = 1.272B, 082691,SSC ...
Ultima Home Office	Rev 0.10 ...
Quiktel	
Logicode S/R 14,400	V1.000 TR14-Jxxx-001 ...
Supra	
V.32bis External 1.000E	V1.000-E TR14-Jxxx-001 ...
V.32bis External 1.200C	V1.200-C TR14-Jxxx-001 ...
Twincom	
144/DF	V1.000 TR14-Jxxx-001 ...
Zoltrix	
ZoFax Standard 96/24	+FREV = 1.24,061191,SSC ...
Zoom	
FX 9624 1.13	+FREV = 1.13DA,051491,NAVIN SYSTEMS ...
FX 9624 1.15	V1.15,011091 ...
VFXV.32bis	V1.200 TR14-Jxxx-001 ...
ZyXel	
U-1496B	ERROR
U-1496E 4.12c	U1496E V M4.12c ...
U-1496E 5.02M	U1496E V 5.02 M ...
?	
Generic RC9624AC 1.53	TR00-J260-001 XXX

Manufacturer	AT+FSPL=?	AT+FSPL?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FSPL = 0,1 ...	+FSPL = 0 ...
Cardinal		
MB2296SR	+FSPL = 0,1 ...	+FSPL = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0,1) ...	0 ...
Frecom		
Fax96 with Modem	0,1 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	0,1 ...	0 ...
Incomm Data Products		
Vision PC 2400	+FSPL = 0,1 ...	+FSPL = 0 ...
Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FSPL = 0,1 ...	+FSPL = 0 ...
Multi-Tech		

MT224BAF	+FSPL=0-1 ...	+FSPL=0 ...
MT1432BA	+FSPL=0-1 ...	+FSPL=0 ...
NetComm		
SmartModem v.32bis	0,1 ...	0 ...
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FSPL = 0,1 ...	+FSPL = 0 ...
Ultima Home Office	ERROR	ERROR
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FSPL = 0,1 ...	+FSPL = 0 ...
Zoom		
FX 9624 1.13	+FSPL = 0,1 ...	+FSPL = 0 ...
FX 9624 1.15	0,1 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B	ERROR	ERROR
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer	AT+FTBC=?	AT+FTBC?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FTBC = 0-65535 ...	+FTBC = 0 ...
Cardinal		
MB2296SR	+FTBC = 0-65535 ...	+FTBC = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0) ...	0 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		
FM 9696	ERROR	ERROR
FM 9696H	ERROR	ERROR
Husky		
FAXMODEM 96	0-65535 ...	00000 ...
Incomm Data Products		
Vision PC 2400	+FTBC = 0-65535 ...	+FTBC = 0 ...

Infotel		
144I	0 ...	0 ...
Maxlite		
Maxfax	+FTBC = 0-65535 ...	+FTBC = 0 ...
Multi-Tech		
MT224BAF	+FTBC=0 ...	+FTBC=0 ...
MT1432BA	+FTBC=0 ...	+FTBC=0 ...
NetComm		
SmartModem v.32bis	0-65535 ...	0 ...
OA		
Fax Modem FM9648	ERROR	ERROR
Prometheus Products		
24/96 BSR Plus	+FTBC = 0-65535 ...	+FTBC = 0 ...
Ultima Home Office	ERROR	ERROR
Quiktel		
Logicode S/R 14,400	0 ...	0 ...
Supra		
V.32bis External 1.000E	0 ...	0 ...
V.32bis External 1.200C	0 ...	0 ...
Twincom		
144/DF	0 ...	0 ...
Zoltrix		
ZoFax Standard 96/24	+FTBC = 0-65535 ...	+FTBC = 0 ...
Zoom		
FX 9624 1.13	+FTBC = 0-65535 ...	+FTBC = 00000 ...
FX 9624 1.15	0 ...	0 ...
VFXV.32bis	0 ...	0 ...
ZyXel		
U-1496B	ERROR	ERROR
U-1496E 4.12c	OK	OK
U-1496E 5.02M	OK	OK
?		
Generic RC9624AC 1.53	0 ...	0 ...

Manufacturer Model	AT+FVRFC=?	AT+FVRFC?
Aceex		
DM-2496H exar based	ERROR	ERROR
DM-2496H rockwell based	ERROR	ERROR
DM-1496V rockwell based	ERROR	ERROR
Adtech		
Externally Yours	ERROR	ERROR
AMT		
Star 2496i	+FVRFC = 0 ...	+FVRFC = 0 ...
Cardinal		
MB2296SR	+FVRFC = 0 ...	+FVRFC = 0 ...
Computer Peripherals, Inc.		
Viva 2496ef	0 ...	0 ...
Everex		
Everfax 2496D	(0-2) ...	0 ...
Frecom		
Fax96 with Modem	0 ...	0 ...
Gateway		
Telepath	0 ...	0 ...
GVC		

```
    FM 9696                  | ERROR                    | ERROR                    |
    FM 9696H                 | ERROR                    | ERROR                    |
Husky                        |                          |                          |
    FAXMODEM 96              | 0 ...                    | 0 ...                    |
Incomm Data Products         |                          |                          |
    Vision PC 2400           | +FVRFC = 0 ...           | +FVRFC = 0 ...           |
Infotel                      |                          |                          |
    144I                     | 0 ...                    | 0 ...                    |
Maxlite                      |                          |                          |
    Maxfax                   | +FVRFC = 0 ...           | +FVRFC = 0 ...           |
Multi-Tech                   |                          |                          |
    MT224BAF                 | +FVRFC=0-2 ...           | +FVRFC=0 ...             |
    MT1432BA                 | +FVRFC=0-2 ...           | +FVRFC=0 ...             |
NetComm                      |                          |                          |
    SmartModem v.32bis       | ERROR                    | ERROR                    |
OA                           |                          |                          |
    Fax Modem FM9648         | ERROR                    | ERROR                    |
Prometheus Products          |                          |                          |
    24/96 BSR Plus           | +FVRFC = 0 ...           | +FVRFC = 0 ...           |
    Ultima Home Office       | +FVRFC = 0 ...           | +FVRFC = 0 ...           |
Quiktel                      |                          |                          |
    Logicode S/R 14,400      | 0 ...                    | 0 ...                    |
Supra                        |                          |                          |
    V.32bis External 1.000E  | 0 ...                    | 0 ...                    |
    V.32bis External 1.200C  | 0 ...                    | 0 ...                    |
Twincom                      |                          |                          |
    144/DF                   | 0 ...                    | 0 ...                    |
Zoltrix                      |                          |                          |
    ZoFax Standard 96/24     | +FVRFC = 0 ...           | +FVRFC = 0 ...           |
Zoom                         |                          |                          |
    FX 9624 1.13             | +FVRFC = 0 ...           | +FVRFC = 0 ...           |
    FX 9624 1.15             | 0 ...                    | 0 ...                    |
    VFXV.32bis               | 0 ...                    | 0 ...                    |
ZyXel                        |                          |                          |
    U-1496B                  | ERROR                    | ERROR                    |
    U-1496E 4.12c            | OK                       | OK                       |
    U-1496E 5.02M            | OK                       | OK                       |
?                            |                          |                          |
    Generic RC9624AC 1.53    | 0 ...                    | 0 ...                    |


Manufacturer                 | AT+FWDFC=?               | AT+FWDFC?                |
    Model                    |                          |                          |
_____________________________|__________________________|__________________________|
Aceex                        |                          |                          |
    DM-2496H exar based      | ERROR                    | ERROR                    |
    DM-2496H rockwell based  | ERROR                    | ERROR                    |
    DM-1496V rockwell based  | ERROR                    | ERROR                    |
Adtech                       |                          |                          |
    Externally Yours         | ERROR                    | ERROR                    |
AMT                          |                          |                          |
    Star 2496i               | +FWDFC = 0 ...           | +FWDFC = 0 ...           |
Cardinal                     |                          |                          |
    MB2296SR                 | +FWDFC = 0 ...           | +FWDFC = 0 ...           |
Computer Peripherals, Inc.   |                          |                          |
    Viva 2496ef              | 0 ...                    | 0 ...                    |
Everex                       |                          |                          |
```

```
    Everfax 2496D            | (0,1) ...              | 0 ...                  |
Frecom                       |                        |                        |
    Fax96 with Modem         | 0 ...                  | 0 ...                  |
Gateway                      |                        |                        |
    Telepath                 | 0 ...                  | 0 ...                  |
GVC                          |                        |                        |
    FM 9696                  | ERROR                  | ERROR                  |
    FM 9696H                 | ERROR                  | ERROR                  |
Husky                        |                        |                        |
    FAXMODEM 96              | 0 ...                  | 0 ...                  |
Incomm Data Products         |                        |                        |
    Vision PC 2400           | +FWDFC = 0 ...         | +FWDFC = 0 ...         |
Infotel                      |                        |                        |
    144I                     | 0 ...                  | 0 ...                  |
Maxlite                      |                        |                        |
    Maxfax                   | +FWDFC = 0 ...         | +FWDFC = 0 ...         |
Multi-Tech                   |                        |                        |
    MT224BAF                 | +FWDFC=0-2 ...         | +FWDFC=0 ...           |
    MT1432BA                 | +FWDFC=0-2 ...         | +FWDFC=0 ...           |
NetComm                      |                        |                        |
    SmartModem v.32bis       | ERROR                  | ERROR                  |
OA                           |                        |                        |
    Fax Modem FM9648         | ERROR                  | ERROR                  |
Prometheus Products          |                        |                        |
    24/96 BSR Plus           | +FWDFC = 0 ...         | +FWDFC = 0 ...         |
    Ultima Home Office       | NO CARRIER (DIALTONE)  | NO CARRIER (DIALTONE)  |
Quiktel                      |                        |                        |
    Logicode S/R 14,400      | 0 ...                  | 0 ...                  |
Supra                        |                        |                        |
    V.32bis External 1.000E  | 0 ...                  | 0 ...                  |
    V.32bis External 1.200C  | 0 ...                  | 0 ...                  |
Twincom                      |                        |                        |
    144/DF                   | 0 ...                  | 0 ...                  |
Zoltrix                      |                        |                        |
    ZoFax Standard 96/24     | +FWDFC = 0 ...         | +FWDFC = 0 ...         |
Zoom                         |                        |                        |
    FX 9624 1.13             | +FWDFC = 0 ...         | +FWDFC = 0 ...         |
    FX 9624 1.15             | 0 ...                  | 0 ...                  |
    VFXV.32bis               | 0 ...                  | 0 ...                  |
ZyXel                        |                        |                        |
    U-1496B                  | ERROR                  | ERROR                  |
    U-1496E 4.12c            | OK                     | OK                     |
    U-1496E 5.02M            | OK                     | OK                     |
?                            |                        |                        |
    Generic RC9624AC 1.53    | 0 ...                  | 0 ...                  |

From: mshiels@TMSoftware.Ca (Michael A. Shiels)
Subject: Ersatz Class 2 Fax/Modem Command Scorecard part 7/7

Manufacturer                 | Notes
    Model                    |
_____________________________|_________________________________________________
                             |                                                 |
General Comments             | The minimum command set should be:              |
                             | +FCLASS   to get into class2                    |
                             | +FCR      to indicate you can receive           |
                             |           Hmmm: has anyone done a class2 send   |
```

```
|                only fax?                   |
| +FLID     to set your local station ID     |
|           NOTE: some fax/modems implement this  |
|                 command but do not really  |
|                 support the CSID since they do  |
|                 not have the NVRAM chip to store|
|                 it into.  What you will see is  |
|                 when people call you then won't |
|                 see a CSID being identified     |
| +FDCC     to set the DCE capabilities      |
| +FDIS     to set the session parameters    |
| +FDT      to start sending a page's data   |
|           NOTE: most vendors do not seem to     |
|                 implement the AT+FDT=x,y,z...   |
|                 command so it is impossible to  |
|                 change the T.30 parameters      |
|                 during the fax job              |
| +FET=0    to end a page's data             |
| +FET=2    to end the fax                   |
| +FDR      to start receiving a page's data |
|
|                                            |
| The following commands are only supported by    |
| Everex and Multi-Tech:                     |
| +FBADLIN=, +FBADMUL=, +FCQ=, +FDT=,        |
| +FLNFC=, +FVRFC=, +FWDFC=                  |
| These commands can make for some very powerfull |
| software since you can support larger pages and |
| have the fax/modem shrink it if necessary.      |
|                                            |
| +FBOR seems to have vendors who implement only  |
| orders 0 and 1 and some that implement all 3    |
|                                            |
| +FDCC=?/+FDIS=? seem to have various       |
| implementations in terms of capabilities:  |
|   Everyone does normal/fine resolution.    |
|   Anyone who has 14400 fax does the bit rate but|
|     alot of vendors are not going for the 14400.|
|   Most vendors are doing page widths for 1728,  |
|     2048, and 2432.  A few do 1216 and     |
|     Multi-Tech does all 5 widths.          |
|   Everyone does the 3 page lengths.        |
|   Everyone does the 1-D modified Huffman and 2-D|
|     modified Read compression.  A few do 2-D    |
|     uncompressed mode.  NO ONE seems to do the  |
|     2-D modified modified Read compression.     |
|   NO ONE does Error correction mode        |
|   NO ONE does Binary file transfer         |
|   Everyone implements the 8 scan line times     |
| +FDCC? seems to be handle OK except by EXAR who |
|   decide not too dislay the first number and    |
|   instead start the line with a comma.     |
| +FET=? doesn't seem to be implemented by anyone |
|   except Multi-Tech.  You can't tell which codes|
|   are valid so ?all? are assumed? or ?none?     |
| +FLID is well supported by all vendors     |
|   NOTE: most eveyone supports characters 32-127 |
```

```
|        Everex supports 32,33,35-126             |
|        ROCKWELL RC9624AC supports 32,33,35-96   |
|          123-126                                |
|  NOTE: watch out for handling of "s around the |
|        +FLID string.                            |
|  NOTE: watch out for concatenating strings      |
|  NOTE: some vendors implement the +FLID in      |
|        non-volative RAM and some fax/modem      |
|        models may not have the NVRAM chip and  |
|        the +FLID will not be stored/transmitted|
|        correctly.                               |
| +FLNFC is implemented by Everex and Multi-Tech  |
|   and supports the conversion of 1D where there |
|   is a length mismatch                          |
| +FLPL is implemented by Everex, Frecom,         |
|   Multi-Tech, ROCKWELL 2496 models and all      |
|   SIERRA models.                                |
| +FMDL is well supported by all vendors          |
| +FMFR is well supported by all vendors          |
| +FMINSP seems to be implemented in Everex,      |
|   Frecom, Multi-Tech, ROCKWELL 2496 models, and |
|   all SIERRA models.                            |
| +FPHCTO seems to be supported by Everex, Frecom,|
|   Multi-Tech, all ROCKWELL models, and all      |
|   SIERRA models.                                |
| +FPTS seems to be supported by Everex, Frecom,  |
|   Multi-Tech, all ROCKWELL models, and all      |
|   SIERRA models.                                |
| +FRBC is not implemented by anyone!             |
| +FREL is advertised as supported by Everex,     |
|   Frecom, Multi-Tech, ROCKWELL 2496 models, and |
|   all SIERRA models.  But I have not been able  |
|   to verify the correct operation of the byte   |
|   alignment.                                    |
| +FREV seems to be implemented in most firmware  |
|   with various formats.  The most informative   |
|   are the "version,date,chipset" type which give|
|   all the necessary information to work detect  |
|   firmware version and chipset version to work  |
|   around any problems.                          |
| +FSPL seems to be implemented by Everex, Frecom,|
|   Multi-Tech, ROCKWELL 2496 models and all      |
|   SIERRA models.                                |
| +FTBC seems to be implemented in older ROCKWELL |
|   2496 models and all SIERRA models.            |
| +FVRFC doesn't seem to be implemented by anyone |
|   except Everex and Multi-tech who both do 1D   |
|   vertical resolution conversions.  No one does |
|   2D vertical resolution conversions.           |
| +FWDFC doesn't seem to be implemented by anyone |
|   except Everex (who only abort a connection on |
|   mismatch) and Multi-tech (who actually do     |
|   width conversions).                           |
|
|                                                 |
| Exar seems to be similar to ZyXEL in that they  |
| implement only a portion of the de facto Class 2|
```

```
                              | specification.  Exar implements Class1 in it's  |
                              | newer firmware.                                 |
                              |                                                 |
                              | Rockwell has adopted the Hayes ATI4 extensions  |
                              | documented in the Hayes Technical Reference for |
                              | listing product features and supported speeds   |
                              | Rockwell seems to be implementing Class1 in all |
                              | of it's firmware for more recent firmware.      |
                              | Rockwell is not implementing as much of the de  |
                              | facto Class 2 specification in the newer        |
                              | firmware for 144DP and 2496 models as in the    |
                              | older firmware for the 2496 models              |
                              |                                                 |
                              | Sierra has a strange error reporting technique  |
                              | for commands like AT+FJUNK since what they      |
                              | return is '000\r\nOK' which doesn't really make |
                              | much sense but seems to be consitant in any     |
                              | Sierra based products.                          |
                              |                                                 |
                              | ZyXEL has a problem with returning OK for       |
                              | commands which they don't implement.  This makes|
                              | it hard to determine if a command works or not. |
                              | ZyXEL implements the following commands only:   |
                              | +FAA=, +FCLASS=, +FCLASS=?, +FCLASS?, +FCR=,    |
                              | +FDCC=, +FDCS:, +FDIS=, +FDR, +FDT, +FET=,      |
                              | +FLID=, +FMDL?, +FMFR?, +FREV?                  |
                              | They had bugs with the handling of +FLID and the|
                              | handling of "s.  They also had bugs with the    |
                              | reporting of the +FCSI: string in that it was   |
                              | truncated to 19 characters.  These have all been|
                              | fixed in later ROM releases.                    |
                              |                                                 |
Aceex                         |                                                 |
    DM-2496H exar based       | EXAR based, custom firmware                     |
    DM-2496H rockwell based   | ROCKWELL based, custom firmware                 |
                              |   NOTE: Identifies itself as a EXAR manufacturer|
                              |         but returns a ROCKWELL model number     |
    DM-1496V rockwell based   | ROCKWELL based, custom firmware                 |
                              |   NOTE: Identifies itself as a EXAR manufacturer|
                              |         and returns a EXAR model number         |
                              |                                                 |
Adtech                        |                                                 |
    Externally Yours          | EXAR based (MDL 290X)                           |
                              |                                                 |
AMT                           |                                                 |
    Star 2496i                | SIERRA based (I4 11006) (I5 0611) (MDL SSX196)  |
                              | AT+FCTCRTY not implemented since it incorrectly |
                              |   returns +FTBC result codes                    |
                              |                                                 |
Cardinal                      |                                                 |
    MB2296SR                  | SIERRA based (I4 11006) (MDL SSX196)            |
                              | Has problems with unknown +F commands and just  |
                              |   spits out lots of junk then \r\nOK            |
                              |                                                 |
Computer Peripherals, Inc.    |                                                 |
    Viva 2496ef               | ROCKWELL based (MDL RC9624AC)                   |
                              | Class1 as well as Class2                        |
```

```
                             |                                                  |
Everex                       |                                                  |
    Everfax 2496D            |                                                  |
                             |                                                  |
Frecom                       |                                                  |
    Fax96 with Modem         | SIERRA based, FRECOM firmware (I4 11006)        |
                             | FRECOM fixed the receive bit order bug which    |
                             |   ROCKWELL and SIERRA started and have adopted  |
                             | +FPTS has valid values of 1-5 but defaults to 0?|
                             |                                                  |
Gateway                      |                                                  |
    Telepath                 | ?ROCKWELL based?                                 |
                             |                                                  |
GVC                          |                                                  |
    FM 9696H                 | EXAR based (MDL 290X)                            |
                             | ATI? where ? is >= 3 gives the same results      |
                             | They don't support many of the commands with =?  |
                             |   so it makes it hard to determine what options  |
                             |   are allowed for commands                       |
                             | +FAA=? works but +FAA? returns ERROR             |
                             | AT+FDCC? is missing the first entry              |
                             | You can't query the LID                          |
                             | AT+FREL=? seems to think it's doing AT+FMFR?     |
                             |                                                  |
Husky                        |                                                  |
    FAXMODEM 96              | ROCKWELL based (I3 RC9624) (MDL RC9624AT/R96MFX)|
                             |                                                  |
Incomm Data Products         |                                                  |
    Vision PC 2400           | SIERRA based (I4 11006) (I5 0611)                |
                             |   (MDL SS2496,SC11011/06/96/98)                  |
                             |                                                  |
Infotel                      |                                                  |
    144I                     | ROCKWELL based (MDL V.32AC)                      |
                             |                                                  |
Maxlite                      |                                                  |
    Maxfax                   |                                                  |
                             | +FMDL returns +FBUF result                       |
                             | +FMFR returns junk                               |
                             |                                                  |
                             |                                                  |
Multi-Tech                   |                                                  |
    MT224BAF                 | AT&T based, custom firmware                      |
    MT1432BA                 | AT&T based, custom firmware                      |
                             |                                                  |
NetComm                      |                                                  |
    SmartModem v.32bis       | ? based                                          |
                             | Looks like it only supports the 10,20 ... 70     |
                             |   error codes (STRANGE!)                         |
                             | It only supports a digit/space/+ CSID            |
                             |                                                  |
OA                           |                                                  |
    Fax Modem FM9648         | EXAR based (MDL 290X)                            |
                             |                                                  |
Prometheus Products          |                                                  |
    24/96 BSR Plus           | SIERRA based (I5 0696) (MDL SSX996)              |
                             | AT+FCTCRTY not implemented since it incorrectly  |
                             |   returns +FTBC result codes                     |
```

```
    Ultima Home Office       | ? based                                         |
                             |                                                 |
Quiktel                      |                                                 |
    Logicode S/R 14,400      | ROCKWELL based (MDL V.32AC)                     |
                             |                                                 |
Supra                        |                                                 |
    V.32bis External 1.000E  | ROCKWELL based (MDL V.32AC)                     |
                             |                                                 |
Twincom                      |                                                 |
    144/DF                   | ROCKWELL based (MDL V.32AC)                     |
                             |                                                 |
Zoltrix                      |                                                 |
    Zofax Standard 96/24     | SIERRA based (I4 11006) (I5 06111) (MDL SSX196) |
                             |                                                 |
Zoom                         |                                                 |
    FX 9624 1.13             | ROCKWELL based (I3 RC9624) (MDL RC9624AY/R96MFX)|
    VFXV32bis                | ROCKWELL based (MDL V.32AC)                     |
                             |                                                 |
ZyXEL                        |                                                 |
    U-1496B                  | Manufacturer based                              |
    U-1496E                  | Manufacturer based                              |
                             |                                                 |


Manufacturer                 | Address/Contact information
_____________________________|_________________________________________________
AMT                          |                                                 |
                             | ???                                             |
                             |                                                 |
Cardinal                     |                                                 |
                             | Cardinal Technologies Inc.                      |
                             | 1827 Freedom Road                               |
                             | Lancaster, PA                                   |
                             | 17601                                           |
                             |                                                 |
                             | 717-293-3000                                    |
                             | 717-293-3055 (fax)                              |
                             |                                                 |
Computer Peripherals, Inc.
667 Rancho Conejo Blvd.
Newbury Park, CA 91320
(805) 499-5751
(800) 854-7600 voice, toll free.
(805) 499-5742 fax
                             |                                                 |
Everex                       |                                                 |
                             |                                                 |
Frecom                       |                                                 |
                             |                                                 |
GVC                          |                                                 |
                             | ???                                             |
                             |                                                 |
Husky                        |                                                 |
                             | ???                                             |
                             |                                                 |
Incomm Data Products         |                                                 |
                             | Incomm Data Systems, Inc.                       |
```

```
                             | 652 S Wheeling Road                             |
                             | Wheeling, Illinois                              |
                             | 60090                                           |
                             |                                                 |
                             | 708-459-8881                                    |
                             | 708-459-0189 FAX                                |
                             | 708-459-9067 Technical Support                  |
                             |                                                 |
NetComm                      |                                                 |
                             | NetComm (Australia) Pty. Limited                |
                             | P.O. Box 379                                    |
                             | NORTH RYDE NSW 2113                             |
                             | Australia                                       |
                             |                                                 |
                             | Phone +61-2-888-5533                            |
                             |                                                 |
OA                           |                                                 |
    Fax Modem FM9648         |                                                 |
                             |                                                 |
Prometheus Products          |                                                 |
                             | Prometheus Products, Inc.                       |
                             | 9524 SW Tualatin Sherwood Rd.                   |
                             | Tualatin, OR 970062                             |
                             | Tech. Support (503)692-9601                     |
                             | Fax (503)691-1101                               |
                             |                                                 |
Supra                        | Supra                                           |
                             | 7101 Supra Dr SW                                |
                             | Albany OR 97321                                 |
                             |                                                 |
                             | 503-967-2400                                    |
                             | 800-727-8772                                    |
                             | 503-967-2401 FAX                                |
Twincom                      |                                                 |
                             | Image Communications                            |
                             | 6 Caesar Place                                  |
                             | Moonachie, NJ, USA                              |
                             | 07074                                           |
                             |                                                 |
                             | (201)935-4699                                   |
                             |                                                 |
Zoom                         |                                                 |
    FX 9624 1.13             |                                                 |
```

1.27 USRobotics Sportster Reference Manual

```
                  REFERENCE GUIDE

                         for

              Sportster High Speed Modems
                    with V.42 bis
```

Manual Revision Date: 09/30/95

TABLE OF CONTENTS

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************************************************************
SPORTSTER CONFIGURATION
************************************************************

The Sportster is preconfigured at the factory so you should
be able to connect the modem, set up your communications
software, and be ready to send and receive data.  Many users
wonôt need to change the default configurations, but if you
want to, this guide will tell you how.  Many of the
functions described below can be handled by your
communications software, but you also have the power to
place your computer in Terminal mode (via your
communications software) and control the modem directly.

NOTE:  Unless otherwise indicated, settings listed as
"default" are based on those set for the modem when it is
shipped.


============================================================
FACTORY CONFIGURATION (&Fn and Yn)
============================================================

The Sportster is preconfigured at the factory with three
permanent and two programmable templates.

============================================================
Permanent Configuration Templates (&Fn)

The following permanent templates come with your Sportster.
The default template consists of the most reliable settings,
but these settings may not work for all users.

&F0    This template does not include performance features,
       such as a fixed serial port rate or hardware flow
       control.  What it does offer is compatibility with
       nontypical computers or software that cannot handle
       flow control and other features.

&F1    Default.  This template sets the modem to
       hardware flow control, a fixed serial port rate, the
       highest level result codes, and the most complete
       result-code set.

       The &F1--Hardware Flow Control template is
       recommended for all IBM-compatible computers, as long
       as your communications software supports hardware
       flow control, a fixed serial port rate, and the
       advanced result-code subset.

       NOTE:  We also recommend that users of Macintosh
       computers invest in a Hardware Handshaking cable
       (instead of the standard cable), use this template,
       and use software that supports hardware flow control.

&F2    This is a software flow control template.  We
       recommend you do not use software flow control, and
```

```
        thus, this template.  However, if you use a
        Macintosh, see the note above.  In addition, some
        computers are limited to three-wire cables that do
        not support hardware flow control signals.  If this
        is the case, review the warning on software flow
        control later in this guide.

        To load the &F2--Software Flow Control template and
        save it as your power-on/reset default, enter the
        following command:

                  AT&F2&W <Enter>

        NOTE:  Refer to the "Programmable Templates" section
        for more information on selecting and modifying
        templates to save as your start-up configuration.

If you need a low performance template because of data-
transfer difficulties, flip DIP switch 7 ON and reset the
modem (ATZ command), or load the &F0--Low Performance
template by entering the following command:

                  AT&F <Enter>

NOTE:  When the modem receives the above command, it assumes
you want to load the &F0 template because there is no
position number indicated.  It is the same to enter AT&F as
to enter AT&F0.

This template allows you to communicate with nontypical
systems that cannot handle flow control and other features.

============================================================
Programmable Templates (Yn)

In addition to the &Fn permanent configuration templates,
two programmable templates are provided.  Your programmable
templates are located in nonvolatile, random access memory
(NVRAM).

The Sportster is shipped to load NVRAM template 0 (or Y0)
for its power-on/reset default settings.

Possible NVRAM templates:

Y0    Loads the NVRAM template 0 (stored with template
      &F1--Hardware Flow Control settings).  Default.

Y1    Loads the NVRAM template 1 (stored with template
      &F2--Software Flow Control settings).

If you want to switch the power-on/reset default NVRAM
template from Y0 to Y1, enter the Yn command, then reset the
modem with the Z command.

                  AT Y1 Z <Enter>
```

```
To customize other defaults you want to store in NVRAM as
part of your customized power-on/reset template, use the &Wn
command (below).

WARNING:  The Yn command, which selects template settings to
     use as the power-on/reset default, may select different
     power-on/reset default settings than those currently
     loaded (if you altered the settings during the current
     session).  Before changing a template, you may want to
     use option 4 of the Inquiry (I) command to display the
     current settings.

                 AT I4 <Enter>

     The Y setting on the ATI4 screen indicates if Y0 or Y1
     is the power-on/reset default.  If you want to check
     all the NVRAM settings in both Y0 and Y1 templates, use
     option 5 of the Inquiry command (I).

                 AT I5 <Enter>


============================================================
CUSTOMIZING YOUR DEFAULTS (&Wn)
============================================================

When the modem is shipped, it reads template 0 in NVRAM as
the power-on/reset default.  Template 0 (Y0) is initially
loaded with &F1 permanent configuration settings.  Although
you cannot alter the &F1 template, you can add, delete, or
modify the settings stored in your NVRAM templates.  It is
more likely, however, that you will want to keep your power-
on/reset default settings and simply change a setting for a
current session.  Refer to "Temporarily Changing a Setting"
in this guide for more information.

If  you want to modify your default configuration settings,
use the &Wn command.  Possible settings are:

&W0    Modifies the NVRAM 0 template (Y0).

&W1    Modifies the NVRAM 1 template (Y1).

Typically, users prefer the default settings stored in NVRAM
when the modem is shipped, but you may set up different
power-on/reset defaults.  For instance, if your system
supports hardware flow control, you can set your Y1 template
to the settings for hardware flow control so both templates
set the modem for hardware flow control.  (The Y0 template
is shipped with hardware flow control settings.)

                 AT &F1 &W1 <Enter>

NOTE:  Yn is unique because it writes itself to NVRAM-you do
not need to use the &Wn command.

Similarly, if your system only supports software flow
```

```
control, you can set your Y0 template to the settings for
software flow control so both templates set the modem for
software flow control.  (The Y1 template is shipped with
software flow control settings.)

                 AT &F2 &W <Enter>

You may also specify the entire configuration in a single
command string that ends with the &Wn command.  The
following example sets the modem for the current session and
stores the configuration in NVRAM 1 (or Y1).

                 AT &K3 &W1 <Enter>

After sending a configuration to NVRAM, you can change any
setting just for the current session, as in the following
example.  The NVRAM configuration remains intact.

                 AT &K3 <Enter>

But if you want the new setting to be a default, write it to
NVRAM at the same time, as in the following example, which
saves the setting to NVRAM template 0.

                 AT &K3 &W <Enter>

If you've sent the modem commands to change settings
throughout your session and want to save your current
configuration, send just the &Wn command.  The current
settings are then written to NVRAM 0 (or Y0) in the example
below.

                  AT&W <Enter>

If you cannot use hardware flow control and need to use
Xmodem-type file transfer protocols, use either Y0 or Y1 for
a no flow control configuration with no error control.

                 AT &F &M &W <Enter>
                        or
                 AT &F &M &W1 <Enter>




============================================================
USING AT COMMANDS
============================================================

To send commands directly to your modem, first put your
computer in Terminal mode.  Some communications programs do
this automatically upon loading.  Others require you to
display a communications terminal screen, press a Function
key, or perform some other operation.  If necessary, refer
to your communications software documentation for
instructions.
```

1. Type all commands in either upper case (AT) or lower case (at), but not a combination (At).

2. All commands except A/ (re-execute last command) and +++ (escape code) are preceded by the AT prefix and are executed with the Enter/Carriage Return key (<Enter>).

3. Command string length = 40 characters, maximum. The modem doesn't count the AT prefix, Carriage Return character, or spaces. In a dial string, it counts--but doesn't act on--punctuation such as hyphens and parentheses.

4. A missing numeric parameter is assumed to be zero, as in the command to hang up; ATH <Enter> is the same as ATH0 <Enter>.

==
RESETTING THE MODEM (Z)
==

If you've changed several current settings and want to reset to your power-on defaults, type the following command.

ATZ <Enter>

The modem reads its DIP switch settings and resets to its NVRAM defaults (DIP switch 7 OFF) or the &F0--Low Performance template (DIP switch 7 ON) settings.

NOTE: Use the ATZ command if you've changed the position of DIP switches 1-7 while the modem is on, so that the modem can read the new settings. The only other way to initiate a new setting for switches 1-7 is to turn the modem off and on again.

****
PLACING CALLS
****

NOTE: Unless otherwise indicated, settings listed as "default" are based on the hardware flow control template stored in NVRAM when the modem is shipped.

==
DIAL (D)
==

To dial a phone number and place a call without using your softwareôs dialing directory, first put the computer in

Terminal mode. Then type the AT and D commands, the number you wish to connect with, and press Enter. Spaces in our command examples are ignored by the modem and are only included for readability.

ATD 1234567 <Enter>

Unless you lowered your modem’s speaker volume, you will hear the modem go off hook and dial the telephone number, followed by a series of handshaking signals.

The Dial command string may include up to 40 characters. The modem counts but ignores punctuation characters such as parentheses and hyphens. It does not count spaces, the AT prefix, or the Carriage Return key (<Enter>) required to execute the command.

The modem also executes any other commands or options included in the command line. The following Dial command example instructs the modem to turn off the speaker (M0), and dial (D) the phone number (1234567) using tone dialing (T).

AT M0 DT 1234567 <Enter>

You may want to review the many options on the next several pages that are available for tailoring Dial strings. The most typically used are the Dial Type--Pulse or Tone, and the Pause options--comma, slash, and W.

==

Cancel Dialing

To cancel Dial command execution, press <any key>. If you inadvertently hit a key on the keyboard while the modem is dialing, the call is canceled. If this occurs, type the A/ command, which re-executes the last command you entered.

==

Dial Command Options

You can modify the dial string according to the needs of the connection. Listed below are options available to you when entering the Dial string.

Dial Type-Pulse or Tone

The modem defaults to pulse (rotary) dialing. To have the modem use tone dialing, which includes the asterisk (*) and pound sign (#), use the T command.

Dial type commands may be included in the Dial string (ATDT number) or, issued separately (ATT or ATP). However, if youôll always use tone dialing, write tone dialing to NVRAM as the modem’s default and/or use adaptive dialing, described below.

NOTE: You can switch from one dial type to another within a dialing sequence. The modem remains set to the last dialing type instruction until it is reset (ATZ command), or it receives a different dial-type command.

Adaptive Dialing (X2 through X4)

When any of the X2 through X4 (default) result code options is in effect and you do not issue a dial type in the Dial string, the Sportster defaults to pulse dialing. If you issue a tone dial command, the Sportster will default to Hunt dialing, beginning with tone and adapting to pulse when necessary. For instance, if the phone company's central office does not have tone-detection equipment, the modem automatically reverts to pulse dialing.

Wait for Another Dial Tone (W)

This command is useful in situations where you must wait for a second dial tone before continuing to dial. For example, if you need to dial for an outside line, as in the following example, the Sportster continues to dial as soon as it detects the next dial tone.

```
                 ATD9W1234567 <Enter>
```

NOTE: This command executes only if result code option X3 or X4 (default) has been issued. If the modem is set to X2 or lower, the modem interprets the W as a comma (two-second pause).

Pause (,)

A comma causes a two-second delay in the dial sequence. The following example contains four-second delays at several points.

```
         ATDP 9,,7654321,,55555,,1 312 1234567 <Enter>
```

The first four-second pause is to access an outside line after dialing 9, but you may wish to use the W option, just described. The second pause is to make sure the remote system is ready for the user's account number, and the third, to delay before dialing the long-distance number.

Such pauses, however, may not be necessary. Experiment and use delays only as required.

Slash (/)

A slash (/) can be used in any command string to make the modem pause for only 125 milliseconds. Some users find it helpful to have the shorter delay of a series of slashes, rather than the 2-second comma pause.

Dial and Return to Command Mode (;)

If your phone is plugged into the modem, you can use this option to have the modem Auto Dial a telephone rather than a modem. The Sportster dials, remains off hook, and returns the OK message, indicating it is in Command mode.

For example, to have the modem place a voice call, enter the Dial command with a semicolon.

```
ATDT5551234; <Enter>
```

When the modem returns the OK result, pick up your phone receiver so you can talk to the other party, and send the command that hangs up the modem.

```
ATH <Enter>
```

Similarly, if you can call a recorded weather or other service, have the modem Dial, listen to the recording over the modem's speaker and, when you are finished, instruct the modem to hang up.

Dialing Letters (")

Quotation marks are used to make the modem dial abbreviations and acronyms used as phone numbers, such as DIAL USR (the U.S. Robotics Sales Department's 800 number). This option is called Quote mode. Quotation marks are inserted at the beginning of the alphabetic string.

```
ATDT "BBS NEWS <Enter>
```

NOTE: If you are including another command after the dial string, use closing quotation marks before the additional command.

```
ATDT "BBS NEWS",,,1234<Enter>
```

Transferring Calls (!)

This command is used for modems installed where other modems share the phone line. The modem flashes the switch-hook. That is, it goes off hook 0.5 seconds, on hook for 0.5 seconds, and off hook again to dial the specified extension.

```
The following example includes instructions to return to
Command mode (;) and to hang up (H).

                 ATDT !1234;H <Enter>

----------------------
Wait for an Answer (@)
----------------------
Some online services answer the phone and return a tape-
recorded request for information before processing
transactions.  In such instances, the @ command can be used
in the Dial string to tell the modem to detect at least one
ring, wait for five seconds of silence at the other end of
the call, and then continue to execute the Dial string.

To use the @ command, set the modem result code option to X3
or X4 (default).  If the modem is set to X2 or lower, the
modem returns an ERROR message when encountering the @
character in a command string.

In the next example, the modem is set to the X3 result code
option and dials a banking service.  Each occurrence of @ in
the example indicates a five-second wait for silence.  That
is, for taped requests from the bank for a password (12345),
an account number (6789), and a transaction code (2).  The
transaction code might indicate, for example, a request for
an account balance.

           ATX3 DT5551234 @ 12345 @ 6789 @ 2 <Enter>

If the necessary conditions do not occur--no rings, or no
following five seconds of silence--the modem times out as it
normally would (after 60 seconds).  It then sends the
message NO ANSWER to the screen and aborts the call.

------------------------------------------
Reversing Originate/Answer Frequencies (R)
------------------------------------------
This command allows calls to an originate-only modem (a
modem set up to send only).  It reverses the modem's
originate/answer frequencies, forcing the Sportster to dial
out at the answer frequency.  The command follows the Dial
command, before or after the phone number.

                 AT D1234567R <Enter>
                 AT DR1234567 <Enter>

============================================================
Dialing Stored Numbers (DSn)

You can store up to four frequently used telephone numbers
in nonvolatile, random-access memory (NVRAM).  Use the &Zn=s
command to store telephone numbers, where n is the position
of the number in NVRAM (0-3) and s is the stored number.
The following command string stores the telephone number
(4441212) at position 1 in NVRAM.
```

```
                 AT&Z1=4441212 <Enter>

To dial a stored number, use the DSn command, where n is the
position of the number in NVRAM (0*3).  In the first
example, the modem dials the phone number stored at position
0.  In the second, the modem dials the phone number stored
at position 3.

                 ATDS0 <Enter>
                 ATDS3 <Enter>

You can also store a partial dial sequence.  If you often
call a set of phone numbers and only their last three or
four digits differ, it might be useful to store the other
digits.  The following example stores a partial phone number
at position 1.

                  AT&Z1 = 9W1 616 123 <Enter>

Once you have stored the partial phone number in NVRAM, use
the DSn command to dial the partial number, placing a slash
(/), then the remainder of the number after the DSn command.
The slash separates the DSn number from the remainder of the
string, yet maintains the dial command..

                  AT DS1/4567 <Enter>

NOTE:  Do not include modem settings in the &Zn=s string.
If the call requires modem settings, insert them in the
command string before the DSn command.  For example, &K3
(selective data compression) is inserted before the Dial
command to call the number stored at position 0.

                  AT&K3 DS0 <Enter>

This establishes &K3 as the current setting.  To return to
default data compression mode after the call, issue the
following command.

                  AT&K1 <Enter>


============================================================
REDIALING
============================================================

The most frequent reason for redialing is receipt of a busy
signal.  The Sportster modem provides two redialing options,
as follows.

============================================================
Dial the Last-Dialed Number (DL)

When you want to redial a number, enter the DL command.  The
modem dials the last-dialed number, which it has stored in a
special buffer.
```

```
                 ATDL <Enter>

To display the number stored in the last-dialed buffer, use
the following query.

                 ATDL? <Enter>

To write the last number dialed to NVRAM, use &Zn=L where n
is the position in NVRAM.  The following example stores the
last-dialed number at position 3.

                 &Z3=L <Enter>

If a number is already stored at position 3, that number is
overwritten with the last-dialed number.
```

```
============================================================
Re-execute the Last Command (A/)

Another option for redialing is to enter the A/ command.
This command does not require the AT prefix or a Carriage
Return.

                  A/

When the modem receives a command, it stores it in its
command buffer until it receives the next AT command.  Note
that if you've sent the modem an additional command since
the Dial command, A/ repeats that command instead of
redialing.


============================================================
ANSWERING
============================================================

Your Sportster modem is shipped with DIP switch 5 ON, Auto
Answer suppressed.  To set the modem to automatically answer
incoming calls, do one of the following.

Before powering on the modem...
*  Set DIP switch 5 OFF.  When you power on, the modem
   answers incoming calls on the first ring.

   If you want the modem to answer after several rings, set
   DIP switch 7 OFF.  Specify the ring you want the modem to
   answer on in NVRAM (default=1 ring).  The valid range is
   1-255 rings.  Power off the modem and power it on again
   with its new DIP switch and NVRAM settings..
```

```
During a current session...
*  Issue the following command to have the modem answer on
   the fourth ring:

                 ATS0=4 <Enter>

When the modem senses a call, it sends the RING result code
to your screen, goes off hook, and sends the remote modem a
high-pitched answer tone.  If there is no Carrier Detect
within 60 seconds, the modem hangs up.  If the connection is
made, the modem returns a CONNECT result code.  When the
call is disconnected by you or the remote user, the modem
hangs up and returns the NO CARRIER code.





============================================================
Suppressing Auto Answer

To disable Auto Answer, set DIP switch 5 ON before powering
on the modem, or set the modem to answer on zero (or no)
rings during the current session.

                 ATS0=0 <Enter>

NOTE:  The S-Register setting S0=0 cannot be saved to NVRAM.

============================================================
Manual Answer
If you've disabled Auto Answer but are expecting an incoming
data call, use the Manual Answer command.  Send the modem
the following command after the RING result code appears on
your screen.

                 ATA <Enter>

When the call is disconnected, the modem returns to its
original state, Auto Answer disabled.

------------------
Points to Remember
------------------
1.  You can set the modem to receive calls when you're not
    at your computer.  Load your communications software as
    you normally do, and set the modem to Auto Answer.  Also
    set your software's file-save function to save incoming
    messages and/or files.

2.  If you've attached your phone so it can be used for
    conventional calls, disable Auto Answer when you are not
    expecting incoming data calls.  Otherwise, your modem
    may answer the phone before you do, greeting a voice
```

```
    caller with a high-pitched, irritating answer tone.


============================================================
DISCONNECTING AND HANGING UP
============================================================

The commands outlined below describe how you can instruct
the modem to disconnect the call and hang up the line.

============================================================
Escape Code Operations (+++)

Once the modem is online to another system, the only command
it recognizes is an escape code of three plus symbols that
forces the modem into Online-Command mode.  Issue the
escape command in the following sequence.

*  Wait one second after sending the last item of data.
*  Type three plus symbols (+++).
*  Wait one second before typing any data.

Do not type the AT prefix or a Carriage Return.  The guard
time of one second before and after prevents the modem from
misinterpreting the presence of the +++ symbols in the
transmitted data stream.

If necessary, the character used in the escape code or the
duration of the guard time can be changed by resetting
Register S2 or S12.  See the "Quick Installation Guide" for
more information.

---------------------
Modem Response to +++
---------------------
When the modem receives +++, by default it enters Online-
Command mode and returns the OK result code.  It maintains
the connection and is ready to act on commands.  You may
then choose one of the following options.

*  Issue commands to the modem and then return it online.
*  Hang up the modem.

Alternatively, if you want the modem automatically to hang
up on receiving the +++ escape code, set Register S14 to 1
and write the command to your NVRAM templates.

                 ATS14=1 &W &W1 <Enter>

The modem disconnects and sends the NO CARRIER result code
to the screen.

============================================================
Returning Online (On)

After forcing the modem into Online-Command mode with the
escape code sequence, you can issue commands and then toggle
```

```
the modem back online with the O command, as in the
following example.

                 AT Q1 O <Enter>

O0   Return online (normal).

O1   Return online and retrain.  If errors occur during a
     non-ARQ connection, try this option.  The modem returns
     online and requests that both modems resynchronize.




============================================================
Hanging Up (Hn)

At its default setting, the escape code forces the modem
into Online-Command mode but leaves the line open.  To hang
up the modem, issue the following command once the modem
sends the OK result code.

                ATH <Enter>

H0   Hang up (go on hook).

H1   Go off hook.

============================================================
Break Handling (&Yn)

This command lets you send a Break to abort data transfer
without disconnecting from the phone line interface.

&Y0  Destructive, no Break transmitted:  the modem clears
     the data from its transmit buffer (all data is lost)
     but does not transmit the Break to the remote modem.

&Y1  Destructive, expedited:  the modem clears the buffer
     and immediately sends a Break to the remote modem.
     Default.

&Y2  Nondestructive, expedited:  the modem retains data in
     the transmit buffer, but immediately sends a Break to
     the remote modem.

&Y3  Nondestructive, unexpedited (send Break in sequence):
     the modem transmits any buffer data received before the
     Break, sends the Break, and then sends any subsequent
     input from the computer.

NOTE:  If the call is under MNP5 data compression,
destructive Breaks cause both modems to reset their data
compression tables.  When transmission resumes, the modems
build new tables, and the result is lower than normal
throughput.
```

```
==============================================================
INTERNATIONAL CALLS
==============================================================

The following commands apply to international calls.

==============================================================
ITU-T/Bell Answer Sequence (Bn)

To answer international calls, use the default B0 setting.

B0   Default.  This setting is required for V.32 or higher
     modems to answer V.32 or higher calls.  It also selects
     the ITU-T V.25 answer sequence, used outside of North
     America.

B1   This setting selects the Bell 2225 Hz answer tone used
     in the U.S. and Canada and may be used when the remote
     modem operates at only 2400 bps or lower.  However, if
     the modem is set to B1, it wonôt be recognized by V.32
     or higher modems and canôt answer calls at 9600 and
     14,400.

==============================================================
Guard Tone (&Gn)

The United Kingdom and some Commonwealth countries use phone
switching systems that require answering modems to send an
1800 Hz guard tone after they send an answer tone.  Some
other European phone networks require a 550 Hz guard tone.
Guard tones are not used in the United States or Canada.

&G0  No guard tone, U.S./Canada.  Default.

&G1  550 Hz guard tone follows answer tone.  Requires B0
     setting.

&G2  1800 Hz guard tone follows answer tone, United Kingdom
     and some Commonwealth countries.  Requires B0 setting.

==============================================================
Pulse Dial Make/Break Ratio (&Pn)

This command sets the ratio of the off-hook/on-hook
(make/break) interval for pulse dialing.  The default sets
```

```
the modem for use in North America.  The ratio must be
changed if the modem is used to dial out in the United
Kingdom and some Commonwealth countries.

&P0  Make/break ratio, U.S./Canada:  39%/61%.  Default.

&P1  Make/break ratio, United Kingdom, some Commonwealth
     countries:  33%/67%.

============================================================
ITU-T V.21-300 bps

Select this option to call or answer overseas modems at 300
bps.  In V.21 mode, the modem answers Bell 103/V.21 calls,
but only originates V.21 calls.  This option is enabled in
Register S27 with the following command.

                  ATS27=1 <Enter>

============================================================
ITU-T V.23-1200/75 bps

Some United Kingdom and European systems require a 1200-bps
speed with a 75-bps back channel.  This option is enabled in
Register S34 with the following command.

                  ATS34=8 <Enter>
```

```
**********************************************************
TEMPORARILY CHANGING A SETTING
**********************************************************

When you change a setting, the modem retains it until you do
one of the following.

*  Change the setting again.
*  Issue the ATZ command to reset the modem.
*  Turn the modem off and power it on again.

The parameters described in this section are organized in
the order of their likely use.  That is, those you are most
likely to use appear at the beginning of the section, and
those you are least likely to use appear toward the end.

============================================================
TONE DIALING
============================================================

The modem defaults to pulse (rotary) dialing.  To have the
modem use tone dialing, which includes the asterisk (*) and
pound sign (#), use the T command.

                 ATDT 4445555 <Enter>

To have the modem always use tone dialing, use the T and &W
commands:

                 AT T &W &W1 <Enter>

============================================================
AUDIO MONITOR
============================================================

The modem’s speaker enables you to monitor the dial-connect
process.  There are several ways to make use of this
feature.  After the Sportster modem dials a number, it waits
up to 60 seconds for a high-pitched answer tone from the
other modem, immediately followed by data signals, called a
"carrier."  These signals must occur before a data link is
established.

At the default X4 setting, the modem sends your screen the
NO CARRIER message after 60 seconds.  If you listen to the
speaker and realize you have received a voice answer, you
can respond immediately, instead of waiting for the modem to
time out, by pressing any key on the keyboard.  This cancels
the call.

You can also hear if dialing is proceeding too quickly for
```

```
the system.  Terminate the call (press any key) and retype
the Dial command, but insert a comma (,) or a couple of
slashes (/), to have the modem pause during the dialing
process.


============================================================
Volume Control (Ln)

The following options allow you to adjust the speaker volume
if you have an internal modem.  You can adjust an external
modemôs volume via its volume switch.

L0   Low.

L1   Low.

L2   Medium.  Default.

L3   High.


============================================================
Speaker Control (Mn)

This command disables the speaker entirely or sets the
speaker to monitor different segments of the dial-connect
sequence.

M0   Disables the speaker entirely so that you don't hear
     the modem go off hook, dial, etc.

M1   The speaker is on until Carrier Detect.  Default.  You
     can monitor call progress until the Sportster detects
     the remote modem's carrier signals, or until the 60-
     second timeout and result code display.  At Carrier
     Detect, the modem disconnects the speaker and data-
     transmission sounds are suppressed.

M2   The speaker is on continuously, including during data
     transmission.

M3   The speaker doesn't go on until after the last digit is
     dialed, then goes off at Carrier Detect.


============================================================
LOCAL ECHO
============================================================

Local echo is the display of what you type at the keyboard
and online echo display of data the Sportster transmits to
another modem.  The En command controls the display of your
typed commands, when the Sportster is in Command mode.  The
Fn command controls the display of data when your modem is
online to another system.
```

```
==============================================================
Command Mode Local Echo (En)

The power-on/reset default for command mode local echo is
set with DIP switch 4.  The Sportster modem is shipped with
DIP switch 4 OFF, enabling local echo of your typed
commands.

Use the En command to control the local echo for a current
session, independent of the switch setting.  This command
may not be stored in NVRAM.

E0   Command mode echo OFF.  The modem does not display
     keyboard commands.

E1   Command mode echo ON.

NOTE:  If double characters appear on the screen, both the
modem's and software's local echo are on.

==============================================================
Online Local Echo (Fn)

This command causes the modem to display a copy of the data
it is transmitting to another system.  Many systems,
however, return a copy of received data, which is called a
remote echo.  If the modem's online echo is ON and there is
also remote echoing, double characters appear on the screen.

In some microcomputer documentation, the term "duplex" is
applied to online local echoing, although the term is not
technically accurate.

F0   Online echo ON.  Sometimes called "half duplex."  As
     the modem transmits data to a remote system, it also
     sends a copy of the data to the screen.

F1   Online echo OFF.  Sometimes called "full duplex."
     Default.


==============================================================
S-REGISTERS
==============================================================

The S-Registers are used to set various timing parameters
and to redefine selected ASCII characters and other
configuration options.  Refer to the "Quick Installation
Guide" for a summary of S-Register functions and setting
options.

Users typically require the default values.  To change a
setting, use the ATSr=n command, where r is the register and
n is a decimal value from 0-255 (unless otherwise
indicated).
```

The example below sets the modem’s test timer (S-Register 18) to 10 seconds.

```
ATS18=10 <Enter>
```

The modem does not perform a value-range check. Some values you select may not work with some equipment, and you’ll have to readjust the settings.

Use ATSr? to display the contents of a register, as follows.

```
ATS18? <Enter>
```

```
==============================================================
RESULT CODES
==============================================================
```

Four commands control the result codes that the modem returns to the screen.

Vn   Numeric/verbal response mode

Qn   Display/suppress all result codes

Xn   Result code options

&An Display/suppress additional result code options

```
==============================================================
Response Modes (Vn)
```

Result codes are sent to the screen in words (Verbal mode) or numbers (Numeric mode).

The power-on/reset default for response modes is set with DIP switch 2. The Sportster modem is shipped with DIP switch 2 OFF, enabling Verbal mode.

Use the Vn command to select verbal or numeric result codes for a current session, independent of the DIP switch setting. This command may not be stored in NVRAM.

V0   Numeric mode. Numeric result codes are followed by a Carriage Return but no Line Feed, as in the following example, where a 3 is returned (for NO CARRIER).

```
ATD1234567 <Enter>
     becomes
3TD1234567 <Enter>
```

V1   Verbal mode. Verbal responses are preceded and followed by a Carriage Return and a Line Feed, as shown below.

```
ATD1234567 <Enter>
NO CARRIER
```

```
================================================================
Quiet Mode (Qn)

Enable/suppress the display of result codes.

The power-on/reset default for response modes is set with
DIP switch 3.  The Sportster modem is shipped with DIP
switch 2 ON, to display result codes.

Use the Qn command to control the display for a current
session, independent of the DIP switch setting.  This
command may not be stored in NVRAM.

Q0   Result codes are displayed.

Q1   Result codes are suppressed (made quiet).

Q2   Result codes are suppressed only in Answer mode.


================================================================
Result Code Options (Xn)

You have five options, X0 through X4, for selecting the
result-code set best suited to your applications, as shown
in the tables below.

X0   Basic set, returns the first five codes (0-4) in the
     following table.

X1   Extended set, codes 0-5, 10, 13 and 18, that adds rate-
     specific CONNECT messages to the Basic set.  This set
     also includes all &An result codes.

X2-4 The default is X4.  These options include the X1 set,
     call-progress codes 6 or 7, and 8, and the functions
     listed in the following table.

NOTE:  By default, the modem is also set to &A3, which
selects additional results that report the protocols used in
the connection.




                   Result Code Options

                                        Setting
Result Codes              X0      X1      X2      X3      X4
0/OK                      o       o       o       o       o
1/CONNECT                 o       o       o       o       o
2/RING                    o       o       o       o       o
3/NO CARRIER              o       o       o       o       o
4/ERROR                   o       o       o       o       o
```

5/CONNECT 1200	o	o	o	o
6/NO DIAL TONE		o		o
7/BUSY			o	o
8/NO ANSWER			o	o
10/CONNECT 2400	o	o	o	o
13/CONNECT 9600	o	o	o	o
18/CONNECT 4800	o	o	o	o
20/CONNECT 7200*	o	o	o	o
21/CONNECT 12000*	o	o	o	o
25/CONNECT 14400*	o	o	o	o
Functions				
Adaptive Dialing		o	o	o
Wait for 2nd Dial Tone (W)			o	o
Wait for Answer (@)			o	o
Fast Dial		o		o

* 14.4K only

NOTE: More CONNECT messages indicate an error control connection, the call modulation, or the error control and data compression used. See Additional Result Code Options (&An), after this section.

Result Code Definitions

Result Code	Meaning
0/OK	Command has been executed.
1/CONNECT	Connection established with another modem; if set to X0, connection may be at 300, 1200, 2400, 7200, 9600, 12K or 14.4K bps; if X1 or higher, connection is at 300 bps.
2/RING	Incoming ring detected.
3/NO CARRIER	Carrier detect has failed or carrier

```
                     has been dropped due to disconnect.

4/ERROR              Command is invalid.

5/CONNECT 1200       Connection established with another
                     modem at 1200 bps.

6/NO DIAL TONE       Dial tone not detected during the
                     normal 2 seconds, set in Register S6.

7/BUSY               Busy signal detect; modem hangs up.

8/NO ANSWER          After waiting 5 seconds for an answer,
                     modem hangs up; returned instead of
                     NO CARRIER when the @ option is used.

10/CONNECT 2400      Connection established with another
                     modem at 2400 bps.

13/CONNECT 9600      Connection established with another
                     modem at 9600 bps.

18/CONNECT 4800      Connection established with another
                     modem at 4800 bps

20*/CONNECT 7200     Connection established with another
                     modem at 7200 bps.

21*/CONNECT 12K      Connection established with another
                     modem at 12,000 bps.

25*/CONNECT 14.4K    Connection established with another
                     modem at 14,400 bps.

Adaptive (Hunt)      The modem attempts to use tone
Dailing              dialing and, if that doesn't work,
                     reverts to rotary (pulse) dialing.


Wait for Another     The modem continues dialing as soon as
Dail Tone (W)        it detects another dial tone.

Wait for an          The modem continues dialing when it
Answer (@)           detects 5 seconds of silence on the
                     line.

Fast Dial            The modem dials immediately on dial-
                     tone detect, instead of waiting the
                     normal 2 seconds set in Register S6.

*14.4K only


============================================================
Additional Result Code Options (&An)
```

```
Use this command to enable/disable one of the following sets
of error control, modulation, or protocol result codes.
If you encounter software problems, it may be because your
software expects to find different result codes from those
the modem is sending.  (The modem defaults to &A3.)  Review
your software documentation or try &A2, &A1, or &A0.  You
may need to call your softwareôs technical support to find
out which &An setting they support.

&A0  ARQ (error control) codes are disabled.  This setting
     does not affect an error control connection; the modem
     returns standard CONNECT messages if result codes are
     enabled.

&A1  ARQ codes are enabled.  Default.  One of the results
     below is shown when a successful error control
     connection is established.  CONNECT/ARQ is displayed if
     the modem is set to X0 and the connection is between
     1200 to 14.4K bps.  The remaining results indicate
     connection rate and require X1 or above.  If your
     software cannot handle the ARQ codes, select &A0.


        14/CONNECT/ARQ              19/CONNECT 4800/ARQ
        15/CONNECT 1200/ARQ         24/CONNECT 7200/ARQ
        16/CONNECT 2400/ARQ         22/CONNECT 12000/ARQ
        17/CONNECT 9600/ARQ         26/CONNECT 14400/ARQ

&A2  V.32 modulation codes are enabled.  These results
     require a setting of X1 or higher.  If your software
     cannot handle the added modulation information, select
     &A1 or &A0.

        33/CONNECT 9600/V32         41/CONNECT 12000/V32
        37/CONNECT 9600/ARQ/V32     42/CONNECT 12000/ARQ/V32
        38/CONNECT 4800/V32         44/CONNECT 7200/ARQ/V32
        39/CONNECT 4800/ARQ/V32     45/CONNECT 14400/V32
        40/CONNECT 7200/V32         46/CONNECT 14400/ARQ/V32

&A3  Protocol codes are enabled.  Default.  Error control
     protocols reported are LAPM or MNP.  When the call is
     not under one of those protocols (and ARQ is not
     included in the result code), the modem reports NONE,
     for no protocol.

     If the modems are using data compression, the type of
     compression-V42BIS or MNP5-is added to the result code.
     In the first of the following examples, the modems
     negotiated error control for the call (ARQ), used
     V.32 bis modulation, are using the LAPM error control
     protocol, and are using V.42 bis compression.

     CONNECT 14400/ARQ/V32/LAPM/V42BIS        [or MNP/MNP5]
     CONNECT 2400/ARQ/MNP/MNP5             [or LAPM/V42BIS]
     CONNECT 2400/NONE

     If your software cannot handle the added protocol
```

```
     information, select &A2, &A1, or &A0.

     Although these codes will return numeric identifiers if
     DIP switch 2 is ON or you've set the modem to V0, they
     are the same numeric identifiers used for &A2 result
     codes.  If you want &A3 protocol indicators, use Verbal
     mode (V1), and not Numeric mode (V0).


============================================================
ERROR CONTROL (&Mn)
============================================================

By default, the Sportster first attempts a connection using
V.42 (LAPM) error control and, if that doesn't succeed, it
attempts an MNP connection.  If that doesn't succeed, the
modem tries to connect without error control.

Error control is possible at rates of 1200 bps and above.

The following options are available.

NOTE:  ARQ is U.S. Roboticsô term for error control
protocols that feature error detection and automatic
retransmission of corrupted blocks of data.

&M0  Normal mode, no error control.  Because of the nature
     of phone-line channels, this is never recommended for
     calls above 2400 bps unless you're using an error-
     correcting file-transfer protocol.

&M1  Reserved.

&M2  Reserved.

&M3  Reserved.

&M4  Normal/ARQ mode.  Default.  If the remote modem doesn't
     recognize the Sportster's error control signals--V.42
     or MNP--the modem operates in Normal mode, as though it
     were set to &M0.

&M5  ARQ mode.  If the remote modem doesn't recognize the
     error control request--V.42 or MNP--the Sportster hangs
     up.

Always set the Sportster for error control, &M4 (default) or
&M5, for calls at speeds over 2400 bps.  Most users
communicating with V.42- or MNP-compatible modems will want
error control at 2400 and 1200 bps, as well.

If you're dialing out and have trouble connecting, it may be
because the remote modem doesn't have either MNP capability,
and it misinterprets your modem's MNP error control request.
If you know the remote modem doesn't support MNP, disable
MNP handshaking by setting Register S27 to 16 (ATS27=16).
The Sportster still connects, but without MNP error control.
```

```
To reset the modem for normal operations after the
call, issue the ATZ (reset) command, or set Register
S27 to zero.

============================================================
Auto Answer with Error Control

When set to &M4 or &M5 and a call comes in, the modem goes
off hook and responds to received error control signals.  If
the Sportster doesn't receive those signals and is set to
Normal/ARQ mode (&M4), it answers the call in Normal mode
(&M0).  If it doesn't receive the signals and is set to ARQ
mode (&M5), it hangs up.


============================================================
DATA COMPRESSION (&Kn)
============================================================

When data compression is enabled, the transmitting modem
detects redundant units of data and recodes them into
shorter units of fewer bits.  The receiving modem
decompresses the redundant data units before passing them to
the receiving computer.

Compression does not occur unless the modems can establish
an error control connection.

If the Sportster makes a V.42 connection, it negotiates V.42
bis compression.  If V.42 bis is not feasible, the
connection remains under error control, but without data
compression.

If the Sportster makes an MNP connection, it negotiates for
MNP Level 5 (MNP5) data compression.  If the remote modem
does not have MNP5 capability, the connection remains
under MNP error control, but without compression.

&K0  Data compression disabled.

&K1  Auto enable/disable.  Default.  The modem enables
     compression if the serial port rate is fixed (&B1) and
     disables compression if the serial port rate follows
     the connection rate (&B0).  (Compression offers no
     throughput advantage when serial port and connection
     rates are equal, and may even degrade throughput.)

&K2  Data compression enabled.  Use this setting to keep the
     modem from disabling compression.

&K3  Selective data compression.  The modem negotiates only
     for V.42 bis compression, and disables MNP Level 5
     (MNP5) compression.  See the following note.

NOTE:  MNP5 compression is not useful when transferring
already compressed files, such as the .ZIP files downloaded
```

from Bulletin Boards and 8-bit binary files that appear
already compressed to the modem. MNP5 tends to add data to
these files, and throughput over the phone link degrades.

V.42 bis compression detects when data is already compressed
and turns off until it detects that compression will be
advantageous. The special &K3 setting allows the best
throughput for already compressed and 8-bit binary files.

==
DATA RATE COMMANDS
==

The &Bn and &Nn commands control data rates at the serial
port and phone line interfaces.

The Sportster defaults to a fixed rate at the serial port
interface (&B1) to keep the serial port rate higher than the
connection rate. You'll get greater throughput regardless
of the connection rate. Your software, however, must
support this feature and you must set your software to use a
fixed rate.

For the phone line, however, we recommend variable
connection rates (&N0). This lets the modem switch its
connection rate to match the rate of a remote modem, no
matter what that rate is. If the connection rate is fixed,
for example, at 9600 bps (&N6), the modem only connects with
modems operating at that rate. Of course, if your
application requires connections with modems at only one
rate, you may wish to set the modem to a fixed connection
rate.

Software Requirements

Both variable and fixed serial port rates require
communications software support. Most communications
programs support variable or fixed rates. Check your
software manual. Set your software BEFORE making calls.

==
Serial Port Rate (&Bn)

Initially, the modem's serial port rate depends on your
software setting. The modem uses the rate at which it
receives the AT command to determine the serial port rate;
after that it depends on its &B setting.

&B0 Variable serial port rates. The modem switches its
     serial port rate to follow the connection rate
     established with a remote modem. If your software has
     Auto Baud Detect, turn it on. The software will switch
     its serial port rate to match the connection rate.

&B1 Fixed serial port rate. Default. The modem detects

```
     its serial port rate from your last AT command and
     maintains it, whatever the connection rate.

     Set your software to 57.6K, 38.4K, or 19.2K bps, then
     set the modem to &B1 for the best throughput.  Some
     programs require that you turn off Auto Baud Detect to
     fix the serial port rate.  Others use the term Serial
     Port Lock (yes or no).

     The serial port rate MUST EQUAL OR EXCEED the
     connection rate.  Also, this setting requires
     flow control, preferably hardware (&H1), to avoid
     buffer overflow.

&B2  Fixed for ARQ calls/Variable for non-ARQ calls, Answer
     mode only.  When the modem goes off hook and answers in
     ARQ mode, it shifts its serial port rate to the one
     written to NVRAM, for example, 38.4K bps.  In non-ARQ
     mode, it acts as if set to &B0 when answering, and
     switches its serial port rate to match the call’s
     connection rate.

     This option is designed for installations such as
     Bulletin Boards that receive calls from a wide variety
     of modems, ranging from the very slow to those with the
     Sportster ’s advanced design.

============================================================
Connection Rate (&Nn)

Use the &Nn command to select variable or fixed rates at the
phone-line interface.  Variable rates let the modem connect
with a variety of remote modems, while fixed rates limit
calls to one connection rate.

&N0  Variable rates.  Default.  The Sportster negotiates
     with the remote modem for the highest possible
     connection rate, depending on the capabilities of the
     remote modem.  This is the recommended setting.

&N   Fixed rate.  The Sportster only connects if the remote
1-8  modem is operating at the same rate.  If not, the
     Sportster hangs up.

     The fixed rate options are as follows.

       &N1  300 bps       &N5  7200 bps (14,400 only)
       &N2  1200 bps      &N6  9600 bps
       &N3  2400 bps      &N7  12K bps (14,400 only)
       &N4  4800 bps      &N8  14.4K bps (14,400 only)

By fixing the connection rate, you can filter out calls at
other than a specific rate, for security or other reasons.

============================================================
FLOW CONTROL
============================================================
```

The modem uses either hardware or software flow control to manage the amount of data stored in the buffers, thus preventing buffer overflow.

The Sportster defaults to hardware flow control. This type of flow control is performed between the modem and computer with serial signaling.

Software flow control uses the standard ASCII Transmit OFF (XOFF) character, Ctrl-S, and the Transmit ON (XON) character, Ctrl-Q.

ASCII definitions are as follows.

```
XON    Ctrl-Q      ASCII 17 Decimal, 11 Hex
XOFF   Ctrl-S      ASCII 19 Decimal, 13 Hex
```

NOTE: Both your software and computer must support the flow control you select. All 100% IBM PC-compatible computers support hardware flow control, as do Apple computers equipped with a Hardware Handshaking cable. However, hardware flow control requires software support. Refer to your software documentation to see what your software supports.

When you have determined the type of flow control your system supports, be sure to set your software appropriately BEFORE transferring files.

==

Warning on Software Flow Control

In ordinary operations, the only characters the modem recognizes during a call are the three plus symbols (+++) of the escape code that return it to Command mode. But when software flow control is enabled, the modem or computer also looks for Ctrl-S or Ctrl-Q characters. IF THESE CHARACTERS OCCUR IN A FILE OR AS PART OF A PROTOCOL, it reads them as XON/XOFF characters and acts on them.

For example, XON/XOFF characters occur in binary files, and are used by Xmodem-type protocols. They may also come from the remote system. An XON from the remote system, after your modem has sent an XOFF, can result in buffer overflow.

Software flow control may prove satisfactory if you're only transferring text files; however, you may lose data if XON/XOFF characters occur in the data stream from other sources.

To select software flow control, write the &F2 configuration template to Y1.

```
                 AT &F2 &W <Enter>
```

```
---------------------------------
Software Flow Control Precautions
---------------------------------
If you canôt use hardware flow control and are doing Xmodem-
type protocol or binary file transfers, select a protocol
that performs error correction, and turn off the modem's
error control (AT&M0).

============================================================
Transmit Data Flow Control (&Hn)

This type of flow control regulates data your computer
transmits to the modem for transmission over the phone link.
The modem monitors its Transmit Data buffer as data comes
in.  If the buffer nears 90% capacity, the modem signals
the computer to stop transmitting.  When it has sent enough
data over the link to empty half the buffer, it signals the
computer to resume transmitting.



-------------------
When it is Required
-------------------
Transmit Data flow control should be enabled in the
following situations.

*  You're using error control (any allowable rate above
   300 bps), with or without data compression.  If data is
   resent due to errors, a continuous stream of data from
   the computer could overflow the modem's buffer.

*  The serial port rate is higher than the connection rate.
   For example, the serial port rate is 38.4K bps and the
   connection rate is 14.4K bps.

NOTE:  Set your software to either hardware or software flow
control.  Some programs also require that you turn off the
type you are not using.

&H0  Transmit Data flow control disabled.

&H1  Hardware flow control.  Default.  Your computer and
     software must support Clear to Send (CTS).  The modem
     drops the Clear to Send (CTS) signal to the computer
     when its buffer nears 90% capacity, and starts sending
     CTS again when the buffer is about half full.

&H2  Software flow control.  Your software must support
     XON/XOFF signaling.  The modem sends an XOFF to the
     terminal when its buffer nears 90% capacity, and sends
     an XON when the buffer is about half full.  Default in
     the &F2-Software Flow Control template.

&H3  Use both hardware and software flow control.  Select
     this option if you're not sure what your computer
     supports.
```

```
NOTE:  If possible, use hardware flow control.  See "Warning
on Software Flow Control," earlier in this guide for
details.


============================================================
Received Data Flow Control

Two commands--&Rn (hardware) and &In (software)--control the
flow of received data passed by the modem to your computer.
Because computers handle incoming data more quickly than the
modem receives it over the phone line, most applications
won't need this.




----------------------
Hardware Control (&Rn)
----------------------
When your computer drops its Request to Send (RTS) signal,
the modem stops passing along received data.  The computer
sends RTS again when it is ready to receive more data.

Your computer and software must support RTS.  You cannot use
this type of flow control, however, if your software
requires a constant RTS signal.

NOTE:  Use only for ARQ (error control) calls, because the
V.42 and MNP protocols control the data flow across the
phone link.  During non-ARQ calls, however, there is no way
to signal the remote modem to stop sending data.  If your
modem stops passing data to your computer and the remote
modem keeps sending, the Received Data buffer will overflow.

&R0  Reserved.

&R1  The modem ignores Request to Send (RTS).  This setting
     is required if your software does not support RTS.

&R2  Hardware flow control of received data enabled.
     Default.  The modem passes received data to your
     computer only on receipt of the RTS signal.

----------------------
Software Control (&In)
----------------------
When you send the modem a Ctrl-S (XOFF) command from the
keyboard, the modem stops passing received data to your
computer.  When you send a Ctrl-Q (XON) command, it resumes.

NOTE:  Because of the risk of data loss, &I1-5 are
recommended only if your data does not have XON/XOFF control
characters.  See "Warning on Software Flow Control" for
details.
```

```
&I0  Disables XON/XOFF flow control of received data.
     Recommended for non-ARQ calls.

&I1  The modem acts on your typed Ctrl-S/Ctrl-Q commands and
     passes them to the remote computer.  Not recommended
     for non-ARQ calls.  Use in ARQ mode only, but keep in
     mind that XON/XOFF characters sent to the remote
     computer may interfere with XON/XOFF signaling between
     it and the remote modem.  &I2 is preferred for ARQ
     calls.

&I2  The modem acts on your XON/XOFF commands, but removes
     them before sending data to the remote computer.
     Default in the &F2--Software Flow Control template.
     Recommended setting for ARQ mode, only.  It ensures
     that the remote computer does not confuse its modem's
     XON/XOFF characters with yours.

     If the call is not in ARQ mode, there is no flow
     control on the phone link.  If you send an XOFF to your
     modem and it stops passing data, it has no way to tell
     the remote computer and modem to stop sending for a
     while, and your modem's buffer may overflow.  See &I5
     for another alternative.

&I3  Host Mode.  Applies only to modems attached to HP
     mainframes using the ENQ/ACK protocol.  ARQ mode only.

&I4  Terminal Mode.  Applies only to modems attached to HP
     system terminals using the ENQ/ACK protocol.  ARQ mode
     only.

&I5  Enables phone link flow control when the connection is
     not under error control.  Both modems must use &I5.  In
     ARQ mode, the modem operates as if set to &I2.  It acts
     on XON/XOFF commands, but does not pass them on to the
     remote system.

     In non-ARQ mode, the modem acts as if set to &I0.  It
     does not look for local XON/OFF commands, but does look
     for any XON/XOFF characters coming in over the phone
     link from the remote computer.  The modem acts upon
     them and drops them from the data stream.

     Operators can signal the other modem to stop sending
     and control phone link data flow to keep their modem's
     buffer from overflowing, if both are set to &I5.


============================================================
SERIAL OPERATIONS
============================================================

The parameters described below are directly affected by the
serial connection and DIP switch settings, and apply to
external modems only.
```

```
==============================================================
Carrier Detect (&Cn)

Like DIP switch 6, this command controls Carrier Detect (CD)
signaling from the modem to the computer.

The power-on/reset default for response modes is set with
DIP switch 6.  The Sportster modem is shipped with DIP
switch 6 OFF, disabling override for normal operations.

Use the &Cn command to control Carrier Detect for a current
session, independent of the DIP switch setting.  This
command may not be stored in NVRAM.

Check your communications software manual to find the
required setting.

&C0  CD override, CD always ON.

&C1  Normal CD operations.  The modem sends a CD signal when
     connecting with another modem and drops CD upon
     disconnecting.  Most communications software programs
     require this setting.

==============================================================
Data Terminal Ready (&Dn)

Like DIP switch 1, this command controls the Data Terminal
Ready (DTR) signaling from the computer to the modem.

The power-on/reset default for DTR is set with DIP switch 1.
The Sportster modem is shipped with DIP switch 1 OFF,
disabling override for normal operations.

Use the &Dn command to DTR for a current session,
independent of the DIP switch setting.  This command may not
be stored in NVRAM.

Check your communications software manual to find the
required setting.

&D0  DTR override, modem ignores DTR.

&D1  Reserved.

&D2  Normal DTR operations.  The computer or terminal must
     send a DTR signal or the modem won't accept commands.
     Dropping DTR terminates a call.  Most communications
     software programs require this setting.

==============================================================
Data Set Ready (&Sn)

The modem sends your computer a Data Set Ready (DSR) signal.
(Data Set is industry jargon for modem.)  Few, if any,
commercial communications programs require the modem to
control DSR (&S1).  Leave the modem set for DSR override
```

```
(&S0), unless you know that your installation requires a
different setting.

&S0  DSR is always ON (override).  Default.

&S1  In Originate mode, the modem sends DSR after dialing,
     when it detects the remote modem’s answer tone.  In
     Answer mode, it sends DSR after sending an answer tone.


************************************************************
GETTING HELP
************************************************************

Checking the Help screens is the first step to recovery.
These screens give you the information youôll need to
identify a problem.  Once a problem is identified, it can
easily be solved.


============================================================
INQUIRIES (In)
============================================================

The Inquiry command has eight options.  The most commonly
used options display the following information.

ATI4  Current settings

ATI5  NVRAM settings

ATI6  Link diagnostics

I0   The modem returns a product code.  If you have a
     problem and call U.S. Robotics’ Technical Support
     Department, you may be asked for this product code.

I1   The modem performs a checksum of its read-only memory
     (ROM) and returns the result to the screen.  This
     function is used only in factory testing.  The modem
     should always read the same number.

I2   The modem performs a test of its random-access memory
     (RAM) and returns either the OK (0) or ERROR (4) result
     code, followed by OK when the test is completed.  You
     may want to use this command as a checkpoint if the
     modem appears to be malfunctioning.

I3   Reserved.

I4   The modem displays its current configuration.

I5   The modem displays the stored phone numbers and two
     templates (Y0 and Y1) stored in nonvolatile random
     access memory (NVRAM).  Activate the second screen by
     pressing any key.
```

```
I6   During a connection, the modem monitors and stores
     information about link operations.  When the call is
     ended, you can request a diagnostic summary.

     For calls under data compression, the number of
     characters sent may be less than the number of octets
     sent, due to buffering operations.

     Most terms used in the display are self explanatory
     except for  the following:

     Octets:  Compressed data units.  If the number of
              octets is greater than the  number of
              characters sent, the modems probably used MNP5
              compression on an already compressed file, and
              the result was expanded data.

     Blers:   Errors in data and protocol blocks.  If there
              were many block errors, your receiver may have
              experienced problems on the line.

     Blocks Resent:  These represent blocks the remote modem
              resent due to the previous category, Blers.

     Link Timeouts:  Protocol detection problems;
              communications were severed momentarily and
              the modems probably recovered.  This does
              not indicate the retry timeout.

     Link Naks:  Negative acknowledgments (one or more
              blocks).

     Data Compression:  Indicates the type of data
              compression negotiated for the call (V42BIS or
              MNP5) or NONE.  A V42BIS response includes the
              size of the dictionary and the maximum string
              length used, for example, 2048/32.

     Fallback:  Enabled/Disabled:  indicates whether or not
              the modems negotiated online fallback during
              the connection sequence.

     Protocol:  Indicates the error control protocol
              negotiated (LAPM, MNP, NONE).

     Speed:   The last rates at which the  receiver/
              transmitter were operating before
              disconnecting.

     Disconnect Reason:  Possible reasons the modem hung up
              are as follows:

              *  DTR dropped--The DTE dropped the Data
                 Terminal Ready signal, terminating the
                 call.

              *  Escape code--The operator sent the modem
```

```
   the +++ escape code.

*  Loss of carrier--The modem detected loss of
   the remote modem's carrier and waited the
   duration specified in Register S10 (default
   is 0.7 seconds).

*  Inactivity timeout--The modem detected no
   activity on the line for the duration
   specified in Register S19 (default is 0,
   timer disabled).

*  MNP incompatibility--The modem is set to
   &M5 and the remote modem does not have MNP
   compatibility, or there was an MNP
   negotiation procedure error.

*  Retransmit limit--The modems reached the
   maximum of 12 attempts to transfer a data
   frame without error.

*  LD received--The remote modem sent an MNP
   error control Link Disconnect request.

*  DISC--The remote modem sent a V.42
   Disconnect frame.

*  Loop loss disconnect--The modem detected a
   loss of current on the loop connecting
   it with the telephone company central
   office.  This usually occurs because the
   remote modem has hung up:  the central
   office drops current momentarily when
   there is a disconnect at the other end of a
   call.  Unless Register S38 is set higher
   than 0, the modem immediately hangs up at
   loop loss.

*  Unable to retrain--After several attempts,
   disturbances on the phone line prevented
   the modems from retraining
   (resynchronizing), and they could no longer
   transmit or receive data.

*  Invalid speed--The modem is set to &N1 or
   higher, for a fixed link rate, and the
   remote modem is not operating at the same
   rate.

*  XID timeout--The modems failed to negotiate
   the V.42 Detection (XID Exchange) phase.

*  SABME (Set Asynchronous Balance Mode
   Extended) timeout--The modems failed this
   part of V.42 link negotiation.

*  Break timeout--Incompatible processing of a
```

```
                 Break signal occurred.

              *  Invalid codeword--The modem received an
                 invalid V.42 bis (compression) frame.

              *  A rootless tree--The modem received an
                 invalid V.42 bis (compression) frame.

              *  Illegal command code--The modem received an
                 invalid V.42 bis (compression) frame.

              *  Extra stepup--The modem received an invalid
                 V.42 bis (compression) frame.

I7   The modem returns a product configuration.  If you have
     a problem and call U.S. Robotics' Technical Support
     staff, you may be asked to read this screen.


============================================================
S-REGISTER QUERY (SR?)
============================================================

This command allows you to view the contents of a particular
S-Register, as in the following example that requests the
contents of Register S0 ("On what ring will the modem
answer?").

                 ATS0? <Enter>


============================================================
STORED PHONE NUMBER QUERY (&Zn?)
============================================================

At this command, the modem returns the phone number stored
in NVRAM at position n, as in the following example that
includes a sample modem response.

                 AT&Z3? <Enter>
                 5551234


============================================================
LAST-DIALED NUMBER QUERY (DL?)
============================================================

At this command the modem displays the number stored in the
last-dialed number buffer.

                 ATDL? <Enter>



============================================================
HELP SCREENS
============================================================
```

```
Sportster modems provide four Help screens:  summaries of
the basic AT command set, extended ampersand (&) command
set, Dial command options, and S-Register functions.

--------------------
Stop/Restart Display
--------------------
The following command stops the display.  Hold down the
Control key and type S.

                <Ctrl>-S

To restart the display, use the same command or press <any
key>.

--------------
Cancel Display
--------------
Either of the following commands cancels the display.

                 <Ctrl>-C
                 <Ctrl>-K

============================================================
Basic Command Set ($)

At AT$, the Sportster displays a screen that shows a partial
summary of the command set.  A second screen, activated by
pressing any key, shows the remaining commands.

============================================================
Ampersand Command Set (&$)

At AT&$, the Sportster displays a screen that shows a
partial summary of the extended ampersand command set.  A
second screen, activated by pressing any key, shows the
remaining command set.

============================================================
Dialing (D$)

At ATD$, the Sportster displays the Dial command summary.

============================================================
S-Register Functions (S$)

At ATS$, the Sportster displays a screen that shows a
partial summary of the S-Register functions.  A second
screen, activated by pressing any key, shows the remaining
registers.

************************************************************
TESTING THE MODEM
************************************************************

Modem testing is available with the &Tn command and Register
```

16 (Dial test). All loopback testing conforms to ITU-T Recommendation V.54.

NOTE: Only one test can be performed at a given time. If you send a test command while the modem is in Test mode, you'll receive an ERROR message.

==
TESTING WITH &Tn
==

The tests supported through the &Tn command include Analog Loopback, Digital Loopback, and Remote Digital Loopback. You can key in your own data during testing, or use the modem's internal test pattern and error detector.

Always disable error control before testing. If the modem is detecting errors and retransmitting the affected data, your test results will be invalid.

==
Ending a Test--&T0, S18

Issue the &T0 command to terminate a test. Alternatively, set Register S18 to a specified number of seconds, for example, S18=10. When the 10 seconds are up, the modem automatically ends the test and returns to Command mode. If the test was Analog Loopback, the &T0 command hangs the modem up. If the test was Digital or Remote Digital Loopback, issue an ATH command to hang up the modem, or an ATZ command to hang up the modem and reset it to its defaults.

NOTE: If you use the S18 test timer, but in the process of testing you issue an ATZ command, S18 resets to zero and the timer is disabled. Also, you cannot store a value for S18 in nonvolatile memory; its power-on and reset default is always zero.

==
Analog Loopback-&T1, &T8

This test checks the operation of the modem's transmitter and receiver.

&T1

This AL option requires that you type data you can later verify at your screen.

1. The modem should be on hook in Command mode. If you wish, set Register S18 as a test timer. For example, insert S18=10 in the following command string before

```
    &T1.

                 AT &M0 S18=10 &T1 <Enter>

    The modem disables error control, sets the timer, enters
    Analog Loopback (AL) mode, and sends a CONNECT message.

2.  Type recognizable data so that you can verify it when
    it is looped back to the screen.

3.  End the test.  If you set S18, the modem automatically
    stops the test at the timeout, exits AL mode and
    responds OK.

    If you didn't set Register S18, wait one second and type
    +++ to end the test and return the modem to Command
    mode.  When the modem responds OK, type AT&T0 to
    terminate AL mode and hang up the modem.  (Typing ATH
    has the same effect.  Typing ATZ also has the same
    effect, but also resets the modem and restores your &M
    default.)

    The modem responds OK.  If the modem sends an ERROR
    message, you have issued an invalid command.

4.  If there were no errors, reset the modem to &M4, for
    error control, unless you've issued the ATZ reset
    command.

    NOTE:  If the modem is in Online-Command mode--that is,
    still connected to a remote modem--and you send it an
    &T1 or &T8 command, it drops the call, enters AL mode,
    sends a CONNECT result and waits for loopback
    characters.

---
&T8
---
This AL option causes the modem to send an internal test
pattern to its transmitter and loop it back to the receiver.
An internal error detector counts any errors and, when the
test is ended, sends the number of errors or 000 (no errors)
to the screen.

Since you don't type anything during this test, and the
modem does not send anything to the screen, this option
verifies only the modem.  If there are no errors but your
problem continues, it may be at the computer interface.

1.  The modem should be on hook in Command mode.  If you
    wish, set Register S18 as a test timer.  For example,
    insert S18=10 in the following command string before
    &T8.

                 AT &M0 S18=10 &T8 <Enter>

    The modem disables error control, sets the timer, and
```

```
    enters AL mode.  The modem sends its internal test
    pattern to the transmitter, and loops the pattern back
    to the receiver.  You will not see any data on your
    screen.

2.  End the test.  If you set S18, the modem automatically
    stops the test at the timeout.  If you didn't set
    Register S18, type AT&T0 to end the test.  Or use ATH
    or the command that resets the modem, ATZ.  Both of the
    latter end the test and hang up the modem.

    When the modem hangs up, it returns a three-digit code,
    followed by OK.  A code of 000 indicates no errors were
    found.  A code of 255 indicates 255 or more errors.  An
    ERROR message indicates that you issued an invalid
    command.

3.  If there were no errors, reset the modem to &M4 for
    error control unless you issued the ATZ command.

============================================================
&T2

This option is reserved.

============================================================
Digital Loopback-&T3

If your modem has passed the Analog Loopback (AL) test, this
test can help you locate a problem with a remote modem or
the telephone channel.

1.  Set the modem to &M0 to disable error control.
    Establish a connection with the remote modem.

2.  Bring the modem back to Online-Command mode with the
    +++ escape code.  Then send it the AT&T3 command.  The
    modem enters Digital Loopback (DL) mode.

3.  The remote user should type a short message.  It will
    be looped back by your modem's transmitter for
    verification on the remote screen.  You will not see the
    message or any other data.

4.  When the remote user has completed the test,  issue the
    AT&T0 command to end the test.  If you wish, return the
    modem online (ATO) to resume Data mode.  Or type either
    ATH or the command that resets the modem, ATZ.  The
    latter two commands end the test and hang up the modem.
    The modem responds OK.  If the modem sends an ERROR
    message, you have issued an invalid command.

============================================================
&T4, &T5

The &T4 option grants a remote modem's request for a Remote
Digital Loopback test.
```

The &T5 option cancels &T4 and your modem will not recognize a request for a Remote Digital Loopback test from a remote modem. This is the default so that your modem isn't subject to another user calling and tying up your modem without your permission.

==
Remote Digital Loopback-&T6, &T7

This test, like the local Digital Loopback test, verifies the condition of both modems and the phone link.

The request for and granting of Remote Digital Loopback testing requires that both modems use ITU-T V.54 standard signaling. The test MUST be performed at 2400 or 1200 bps. If the remote modem does not have the capability or is not set to respond, you will get an ERROR result code.

&T6

This RDL option requires that you send keyboard data to the modem and verify it when it is returned over the phone lines and to your screen.

1. Set your software to 2400 or 1200 bps. Set the modem to &M0. If you wish, set the S18 timer.

   Establish a connection with the remote modem. If you haven't already done so, arrange with the remote user to cooperate with your testing. The remote user should set his or her modem to acknowledge the RDL request, for example, AT&T4.

2. Bring the modem back to Online-Command mode with the +++ escape code. Send it the AT&T6 command. The modem enters RDL mode.

3. Type a short message. It will be looped back to your modem by the remote modem and to your screen for verification. (The remote user will not see your data.)

4. End the test. If you set Register S18 the modem automatically ends the test when the test timeout is reached. If you didn't set S18, type AT&T0 to end the test. If you wish, return the modem online (ATO) to resume Data mode. Or send either ATH or the command that resets the modem, ATZ. The latter two commands end the test and hang up the modem. The modem responds OK. If you issue an invalid command, the modem sends an ERROR message.

   Data errors indicate a problem with the remote modem or the phone link. If you have not performed analog loop-back testing with your modem, the problem may also lie with your modem.

```
5.  Reset the modem to &M4 unless you used the reset
    command, ATZ.

---
&T7
---
This test option causes the modem to send an internal test
pattern through the Remote Digital Loopback.  An internal
error detector counts any errors and, when the test is
ended, sends the number of errors or 000 (no errors) to the
screen.

You don't need to type anything during this test.  The modem
sends only its final error count to your screen.

1.  Set your software to 2400 or 1200 bps.  Set the modem
    to &M0.  If you wish, set the S18 timer.

    Establish a connection with the remote modem.  If you
    haven't already done so, arrange with the remote user to
    cooperate with your testing.  The remote user should set
    his or her modem to acknowledge the RDL request, for
    example, AT&T4.

2.  Bring the modem back to Online-Command mode with the
    +++ escape code.  Then send it the AT&T7 command.  The
    modem enters RDL mode.  The modem sends its internal
test
    pattern to the remote modem, which loops it back to
    your modem.  You will not see the data on your screen.

3.  End the test.  If you set S18, the modem automatically
    stops the test when the timer times out.  If you didn't
    set Register S18, type AT&T0 to end the test.  After you
    view the test results (next paragraph), return the modem
    online if you wish (ATO) and resume Data mode.  Or send
    either ATH or the command that resets the modem, ATZ.
    The latter two commands end the test and hang up the
    modem.

    When you terminate the test, the modem returns a three-
    digit code, followed by OK.  A code of 000 indicates no
    errors were found.  A code of 255 indicates 255 or more
    errors.  If you issue an invalid command, the modem
    sends an ERROR message.

    If you've performed an Analog Loopback and know your
    modem is working properly, errors indicate a problem
    with either the phone connection or the remote modem.

4.  Reset the modem to &M4 unless you've sent it the ATZ
    reset command.


============================================================
DIAL TEST-S16=2
```

```
The Dial test is used for factory-testing the frequencies of
tone dialing values.  When S-Register 16 is set to 2 and a
single tone is dialed (for example, ATD7 <Enter>), the modem
continues to transmit that tone until you press Enter again.
```

```
************************************************************
OTHER OPERATIONS
************************************************************

============================================================
FAX OPERATIONS
============================================================

============================================================
Fax Modem Guidelines

Fax operations require facsimile-compatible software that
can send or receive Group III faxes.  Follow the
instructions in your fax software manual.

The modem's normal operating mode is Data mode.  If your fax
software is typical, it automatically switches the modem to
Fax mode when you run the program, and resets the modem to
Data mode when you exit the program.

If you have a problem, however, and think the modem may be
in the wrong mode, you can use one of the following AT
commands to manually switch the modem.
```

Most users will never need to use these commands.

```
AT+FCLASS=0 <Enter>   (Switch to Data mode)
AT+FCLASS=1 <Enter>   (Switch to Fax mode)
```

If you are not sure whether the modem is in Data or Fax mode, type the following command.

```
AT+FCLASS? <Enter>
```

The modem returns a 0 to indicate Data mode or a 1 to indicate Fax mode.

NOTE: Whenever the fax modem is reset using the ATZ command, toggling the DTR signal, or turning the power off and on, the modem will be set to Data mode.

==

Fax Mode Flow Control Setting

Many facsimile software products use software flow control when the modem is in Fax mode. To allow compatibility with software products that use software flow control by default, U.S. Robotics fax modems switch to software flow control when entering Fax mode.

For the best information on modem settings, see your Fax software manual.

==

FCC Notice

FCC part 68, rules regarding fax operation, has been amended as follows:

> Telephone facsimile machines--identification of the sender of the message: It shall be unlawful for any person within the United States to use a computer or other electronic device to send any message via a telephone facsimile machine unless such a message clearly contains, in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent and an identification of the business, other entity, or individual sending the message and the telephone number of the sending machine or of such business, other entity, or individual. Telephone facsimile machines manufactured on and after December 20, 1992 must clearly mark such identifying information on each transmitted page.

==

A Note to Programmers

If you want to know more about the supported fax commands, refer to the standard for the Service Class 1 fax protocol.

```
     ANSI/EIA/TIA-578-1990 (EIA-578)
     Asynchronous Facsimile DCE Control Standard
     November, 1990  Approved:  October 22, 1990

You can obtain a copy of this standard by contacting Global
Engineering Documents, at 1-800-854-7179.


============================================================
VOICE/DATA COMMUNICATIONS
============================================================

When you install the Sportster, you have the option of
plugging your phone into the second modular jack of the
modem so it's available for voice calls.  You can also use
the phone to set up communications with another user whose
modem uses the AT command set, such as a U.S. Robotics or
U.S. Robotics-compatible modem.

============================================================
Preparation

First call the other user to establish the parity, word
length, and number of Stop bits the other person's modem
accepts.  Then turn the call over to your modems, as
follows.

============================================================
Procedures

1.  Without hanging up the phone, have your modem go off
    hook in Originate mode.  Type the following command.

                 ATD <Enter>

    NOTE:  Be sure the modem is NOT set to X2 or X4, or it
    will return the NO DIAL TONE result code and hang up.

2.  The other party should have the remote modem go off
    hook in Answer mode.  The following command is used to
    do this.

                 ATA <Enter>

3.  Now both of you can hang up your respective phones
    while the two modems establish the data link.  They will
    maintain the link until one of you gives your modem a
    command to disconnect.

    Either party's device can be the originate or answer
    modem; it doesn't matter who made the phone call.  But
    one modem must enter Originate mode and the other Answer
    mode.  You and the other party, therefore, must agree on
    which command, ATD or ATA, you will each use.
```

```
************************************************************
TECHNICAL SPECIFICATIONS
************************************************************

============================================================
COMPATIBILITY
============================================================

The Sportster modem conforms to the following standards,
ensuring compatibility with a wide base of installed modems.
ITU-T is the new signifier of what was formerly the CCITT
international standards body.

ITU-T V.32 bis       14.4K/12K/9600/7200/4800 bps
                        (14,400 modems only)

ITU-T V.32           9600/4800 bps

ITU-T V.22 bis       2400 bps

Bell 212A            1200 bps (also ITU-T V.22)

ITU-T V.23           1200 bps with 75 bps back channel
                        (Some United Kingdom and
                         European phone systems)

Bell 103             300 bps (ITU-T V.21 optional)

ITU-T V.42           LAPM error control, 1200 bps and
                         higher

ITU-T V.42 bis       Data compression, 1200 bps and higher
```

```
MNP                    Levels 2, 3 and 4 error control,
                           level 5 data compression,
                           1200 bps and higher

ITU-T V.54             Analog, digital, and remote digital
                           loopback testing


------------------------------------------------------------
Fax Modems
------------------------------------------------------------
TIA/EIA-578            Service Class 1 Asynchronous
                           Facsimile DCE Control
                           Standard

ITU-T V.17             14.4K/12K bps

ITU-T V.29             9600/7200 bps

ITU-T V.27 ter         4800/2400 bps

ITU-T V.21             300 bps

============================================================
THE SERIAL INTERFACE
============================================================

The serial interface information below applies only to
external modems.

============================================================
Description

The serial interface is a standard developed by the
Electronic Industries Association (EIA).  It defines the
signals and voltages used when data is exchanged
between a computer and a modem or serial printer.

The entire standard covers many more functions than are used
in most data communications applications.  Data is
transmitted between the devices over a shielded serial cable
with a 25-pin male (DB-25P) connector to the modem and a 25-
pin, 9-pin, 8-pin, or custom-built connector to the
computer.

NOTE:  FCC regulations require the use of shielded cable
when connecting a modem to a computer to ensure minimal
interference with radio and television.

============================================================
Pin Assignments

Pin assignments are factory-set in the Sportster modem to
match the standard DB-25 assignments in the following table.
DB-9 connectors for IBM PC/AT-compatible computers should be
wired at the computer end of the cable as shown in the DB-9
column.
```

Serial Interface Pin Definitions

DB-25	DB-9	Circuit	Function	Signal Source Computer -- Modem
1	*	AA	Chassis Ground	Both
2	3	BA	Transmitted Data	Computer
3	2	BB	Received Data	Modem
4	7	CA	Request to Send	Computer
5	8	CB	Clear to Send	Modem
6	6	CC	Data Set Ready	Modem
7	5	AB	Signal Ground	Both
8	1	CF	Carrier Detect	Modem
12	*	SCF	Speed Indicate	Modem
20	4	CD	Data Terminal Ready	Computer
22	9	CE	Ring Indicate	Modem

If you're using a Macintosh computer, ask your dealer for the correct modem cable; we recommend a Hardware Handshaking cable.

Macintosh 8-Pin DIN

DB-25	MAC	Function	Signal Source Computer -- Modem
20/5*	1	Output Handshake*	Computer/Modem*
4	2**	Input Handshake	Computer
2	3**	Transmit Data Negative***	Computer
7	4	Ground	Both
3	5	Receive Data Negative	Modem
--	6	Transmit Data Positive****	--
--	7	Not connected	--
--	8	Receive Data Positive	--

```
*     Adds CTS capability when in Hardware mode.
**    Hardware handshaking lines.
***   To do this, you must ground pin 6.
****  To do this, you must ground pin 8.
```

NOTE: A three-wire interface consists of Receive, Transmit, and Ground wires and does not support hardware flow control. Systems requiring three-wire interfaces must use software flow control. If your system doesnôt support software flow control, use no flow control but be sure to use an error-correcting protocol.

==
Minimum Requirements

Some computer equipment supports only a few of the serial signal functions set in the Sportster modem. The minimum required for the modem to operate is as follows.

Minimum Required Pins

DB-25 Pin	DB-9 Pin	8-Pin DIN	Function
2	3	3	Transmitted Data
3	2	5	Received Data
7	5	4	Signal Ground
20	4	1	Data Terminal Ready*

* Required if DIP switch 1 is OFF for normal DTR operations, override disabled.

Additional Flow Control Functions

If your computer and software support Clear to Send (CTS) and you wish to use Transmit Data hardware flow control (&H1), Pin 5 (DB-25) or Pin 8 (DB-9) is required.

If your computer and software support Request to Send (RTS) and you wish to use Received Data hardware flow control (&R2), Pin 4 (DB-25) or Pin 7 (DB-9) is required.

For 57.6K and 38.4K bps Serial Port Rate

Your software and computer must support the 57.6K or 38.4K bps rate. Make sure the serial cable is shielded. Cables are normally six feet long, but longer lengths are possible. If you encounter problems with signal degradation, try a shorter cable.

If you decide to build your own cable, use a low-capacitance cable. To further minimize the capacitance, connect only those functions (pins) that your application requires.

==

DEFAULT SETTINGS
==

==
Data Format

Both your software and the remote system must use the same 10-bit data format. If you donôt know the setup of the remote computerôs modem, phone ahead to find out what combination of word length, parity, and Stop bit is required.

Set your communications software to the required scheme. Some communications programs use a kind of shorthand for formats, such as 7-E-1 or 8-N-1. The modem detects the format from the AT prefix of the next command it receives from your keyboard or from your software.

Allowable Data Formats

Word Length	Parity (1 Bit)	Stop Bits
7	Even, Odd, Mark, Space	1
7	None	2
8	None	1

==
Template Settings

You can create one or two customized configurations and store one of them at a time in nonvolatile random-access memory (NVRAM) as your power-on/reset default using the &Wn command. As long as DIP switch 7 is OFF when you power-on or reset the modem, your defaults are loaded into the modem’s random-access memory (RAM). To view your NVRAM settings, use the ATI5 command.

The Sportster modem is preconfigured in the factory for the &F1--Hardware Flow Control template settings in NVRAM as Y0, and the &F2--Software Flow Control template settings in NVRAM as Y1.

Tables on the next pages list the settings of the permanent configuration templates &F1 (default), &F2, and &F0, as well as
parameters you can modify and store in the NVRAM configuration templates.

&F1--Hardware Flow Control Template
Factory Default

Feature &F1 Settings

```
ITU-T/Bell Answer Sequence           B0  ITU-T sequence
Online Echo                          F1  Online Echo OFF
Speaker Control                      M1  Speaker ON until
                                            CONNECT
Pulse/Tone Dialing                   P   Pulse Dialing
Result Code Options                  X4  All Result codes
ARQ Result Codes                     &A3 All protocol codes
                                            enabled
Serial port Rate                     &B1 Fixed serial port
                                            rate
Guard Tone                           &G0 No guard tone
Transmit Data Flow Control           &H1 Hardware flow
                                            control
Modem Testing                        &T5 Deny remote digital
                                            loopback
Received Data Hardware Flow Control  &R2 Enabled
Received Data Software Flow Control  &I0 Disabled
Data Compression                     &K1 Auto enable/disable
Error Control                        &M4 Auto select
Connection Rate                      &N0 Variable connection
                                            rate
Make/Break Ratio                     &P0 U.S./Canada ratio
Volume Control (internal)            L2  Medium volume
Data Set Ready (DSR)                 &S0 DSR always on
Break Handling                       &Y1 Break clears
                                            buffer; break
                                            then goes to
                                            remote modem

The following parameters are changed via your communications
software:

Stored Phone Numbers                 &Zn=s
Word Length                          8 bits*
Parity                               None*
Serial port Rate                     19.2 kbps*

* Initial Settings; match software settings of subsequent &W
commands.

The &F2 and &F0 templates largely resemble the &F1 template.
The tables below list only those settings that differ from
the &F1 template.




               &F2--Software Flow Control Template

Feature                              &F2  Settings

Transmit Data Flow Control           &H2  Transmit data
                                             software
                                             flow control
```

```
Receive Data Flow Control           &R0  Received data
                                            hardware
                                            flow control
                                            disabled
                                    &I2  Received data
                                            software
                                            flow control
                                            enabled


               &F0--Low Performance Template

Feature                             &F0  Settings

Result Code Options                 X1   Basic subset
ARQ Result Codes                    &A1  ARQ codes enabled
Serial port Rate                    &B0  Variable serial
                                            port rate
Transmit Data Flow Control          &H0  Disabled
Receive Data Flow Control           &R1  Disabled

The following parameters are changed via your communications
software:

Word Length                         7 bits*
Parity                              Even*
Serial port Rate                    9600 bps*

* Initial Settings; match software settings of subsequent &W
commands.
```

```
            NVRAM S-Register Options

NVRAM S-Register Options                  Template Settings

S0*  Number of rings to answer on                  1
S2   Escape code character                         43
S3   Carriage Return character                     13
S4   Line Feed character                           10
S5   Backspace character                           8
```

```
S6   Dial wait-time, sec.                          2
S7   Carrier wait-time, sec.                       60
S8   Dial pause, sec.                              2
S9   Carrier Detect time, 1/10th sec.              6
S10  Carrier loss wait-time, 1/10th sec.           7
S11  Tone duration, spacing, msec.                 70
S12  Escape code guard time, 1/50th sec.           50
S13  Bit-mapped functions                          0
S14  Bit-mapped functions                          0
S15  Bit-mapped functions                          0
S19  Inactivity/hang up timer                      0
S21  Break length, 1/100th msec.                   10
S22  XON character                                 17
S23  XOFF character                                19
S25  DTR recognition time, 1/100th sec.            5
S27  Bit-mapped functions                          0
S28  V.21/V.23 fallback delay, 1/10th msec.        8
S34  Bit-mapped functions                          6
S38  Disconnect wait time, sec.                    0

NOTE:  Bit-mapped registers have up to eight functions.  See
instructions under S13 in Appendix A of the "Quick
Installation Guide."

* The valid range of rings that can be stored in NVRAM for
S0 is 1-255.  S0=0 cannot be stored in NVRAM.  Regardless of
the NVRAM setting, DIP switch 5 must be OFF for the modem to
be in Auto Answer mode at power-on/reset.




************************************************************
MODEM CONCEPTS
************************************************************


============================================================
HOW MODEMS WORK
============================================================

Modem is a term based on the concept of MOdulation and
DEModulation.  A modem modulates (converts) digital data
(computer information) to analog data (fluctuations in tones
carried over a copper telephone wire).  The information is
```

```
carried over a telephone network until it reaches its
destination, where another modem demodulates the analog
signals and converts them back to digital data so the
computer there can use the information.

This ability to use the telephone network for quick,
inexpensive data exchange is a powerful tool used by
businesses and individuals worldwide to expand
business and personal networks.


============================================================
MODEM CONFIGURATION
============================================================

Modems come in all shapes and sizes and their ability to
communicate is based on the protocols they use, or rules
they follow to perform operations in identical ways.  They
may be preset or reset physically (DIP switches) and
logically (communications software) to best communicate with
the modem they are transferring information to and receiving
information from.

Much of this is done automatically by the modems when they
initially contact each other.  The calling modem contacts
the answering modem and introduces itself.  The modems
communicate via a series of signals to identify the
appropriate protocol and speed for efficient data transfer.
The answering modem either accepts the call or rejects the
call.  This transaction is called a "handshake."

Successful handshaking results in what is called "carrier."
When modems establish carrier, your modem sends a Carrier
Detect signal to your computer, indicating that the modems
are ready to transfer data.  If they fail to connect, your
modem sends your computer a No Carrier message.





============================================================
LINE TRAVEL
============================================================

Poor line quality may cause a decrease in efficient data
transmission.  In order to ensure the data sent and received
is reliable, error control was introduced by modem
manufacturers.  The modems check each data block received,
and if something went wrong between locations, the receiving
device instructs the sending device to resend the affected
block.

Modems send information at different rates, measured in bits
per second (bps).  Today, the figures can be staggering.  In
the most optimal situation, the Sportster can exchange data
as fast as 57,600 bps.
```

```
In most cases, though, the speed relies heavily on the
ability to adapt to line conditions at high speed.  This
adaptability is the most important feature of the Sportster.


=============================================================
DIGITAL DATA
=============================================================

Modems send data via asynchronous communication.  The
smallest data unit sent is made up of a defined word length
(7 or 8 bits each), a Start bit (a 0 that indicates where
the data unit begins), and one or two Stop bits.

Parity bits were the typical method of controlling errors
before cyclic redundancy check (CRC) error correction,
described below under :Error Control."  A parity bit is
either a 1 (odd parity) or a 0 (even parity), depending upon
whether the data segment has an odd or even number of binary
digits.  Some systems allow mark parity (parity is always
1--odd) or space parity (parity is always 0--even).  Parity
bits are used less often now that CRC is common.

The setting 8-N-1 (word length=8, parity=None, stop bits=1)
has become the most common data format in data
communications.  Both computers involved in a data transfer
must use the same parity, word length, and number of Stop
bits or connection isnôt possible and garbage characters
will display.  The software must first be set the same on
the computers at both ends of the data transfer before the
modems can operate effectively.  A simple phone call
to determine the settings at the other end can clear this up
quickly and easily.

The requirement to specify parity setting, even if it is
None (*-N-1), assures that users with older systems can
still communicate with newer modems.

=============================================================
FLOW CONTROL
=============================================================

Another important aspect of modem communications is flow
control, which manages the amount of data stored in buffers.
Buffers are used to store information temporarily before it
is passed on to a computer or modem.  Flow control is used
to prevent buffer overflow.  The system uses either hardware
or software (control characters) flow control.  U.S.
Robotics recommends the use of hardware flow control,
because actual data may be mistaken for the control
characters used in software flow control and the data may be
distorted.


=============================================================
ERROR CONTROL
```

==

Error control protects the integrity of data transferred over phone channels and is available for calls at 1200 bps and above. It can be disabled, although high-speed calls (above 2400 bps) should always be under error control. The operations defined in an error control protocol include the following.

* Establishment of compatibility

* Data formatting into blocks

* Error detection through Cyclic Redundancy Checking (CRC) CRC is based on algorithms that calculate a value for an entire block of data. The CRC value attached to each block sent must match the receiving modem's calculation. If not, the remote modem sends a negative acknowledgment to the sending modem.

* Positive acknowledgment of error-free blocks and negative acknowledgment of corrupted data blocks

* Retransmission of corrupted data blocks

Always set the Sportster for error control, &M4 (default) or &M5, for calls at speeds over 2400 bps.

The Sportster is set at the factory to &M4, causing it to try for an error control connection and, if that isnôt possible, to proceed with the call in Normal mode. The modem first tries for a V.42 connection, then an MNP connection. The information below is based on the Sportster's setting of &M4.

==

ITU-T V.42 Handshaking

The exchange of signals between two devices in order to establish a communications link is called handshaking. ITU-T V.42 includes a two-stage handshaking process.

* A Detection phase that is based on an exchange of predefined characters.

* LAPM (Link Access Procedures for Modems) Negotiation. In this phase, the modems identify their capabilities concerning maximum data-block size and the number of outstanding data blocks allowed before an acknowledgment is required.

==

MNP Handshaking

This protocol is supported by the ITU-T V.42 Recommendation.

```
It was originally developed by Microcom, Inc., and is now in
the public domain.

MNP handshaking begins with an MNP Link Request sent by the
calling modem.  If the remote modem doesn't recognize the
request, error control isn't possible.

============================================================
Data Compression

If the modems successfully establish a V.42 connection, they
also negotiate for V.42 bis data compression.  If they
successfully establish an MNP connection, they negotiate for
MNP5 data compression.

Modems using V.42 bis compression negotiate the following
options.

*  Dictionary size--that is, the amount of memory available
   for compression table entries.  (Entries are codes
   devised for redundant data.  The data is packed into
   shorter data units, called code words, and unpacked by
   the receiving modem.)

   Possible sizes are as follows.  U.S. Robotics modems use
   11-bit, or 2048-entry dictionaries, but drop down if the
   remote modem uses a 512- or 1024-entry dictionary.

               Bits        Entries
                9           512
                10          1024
                11          2048

*  Maximum string length of each entry.

As the dictionary fills, the modem deletes the oldest unused
strings.  V.42 bis compression is more efficient than MNP5
compression, in part because it dynamically deletes unusable
strings.  In addition, it works better with files that are
already compressed.  These include .ZIP files downloaded
from many Bulletin Boards and 8-bit binary files, which
appear to the modem to be compressed.

MNP5 compression should not be used with such files because
it adds data to them, which lessens throughput.  (The
additional data is stripped when the file is decompressed by
the remote modem.)  When transferring such files, it's best
to set the modem to &K3.  This allows V.42 bis compression
to work dynamically with the compressed data, but disables
MNP5.

============================================================
Flow Control

Flow control of data from the computer is required under
error control for two reasons.
```

1. The transmitting modem buffers a copy of each frame it transmits to the remote end until it is acknowledged by the receiving modem.

2. If errors are encountered, the transmitting modem must resend the corrupted data. This retransmission activity, combined with the steady stream of data from the computer, can overflow the buffer.

==
Online Fallback/Fall Forward

Under error control, if a disturbance on the phone line causes an error to a data block, the receiving modem replies with a negative acknowledgment. In response, the transmitting modem retrieves a copy of the original data block from its Transmit buffer, and every block it sent after that block, and retransmits them. This keeps the data error-free and in sequence.

However, there is a retransmit limit: the modems hang up if line disturbances are so severe that one of the modems has retransmitted the same block of data twelve times without a positive acknowledgment.

Because high-rate calls are more vulnerable than transmissions at 2400 bps and below, V.32 bis modems risk reaching the retransmit limit and hanging up. To prevent this, one of the modems requests that they fall back--that is, they reduce their rate from 14.4K to 12K bps, and then to 9600 bps or lower, if necessary. When line conditions improve, the modems fall forward to the next higher rate, up to the link rate of the call.

Online fallback/fall forward is defined in ITU-T recommendation V.32 bis for modems with top connection rates of 14.4K bps. The Sportster 9600, however, is a V.32 modem. V.32 modems fallback to 4800 bps and stay at that rate.

==
THROUGHPUT GUIDELINES
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The following guidelines should help you to make the most of your modem's advanced performance features. In many instances, experimentation and experience will indicate what works best for your applications.

Throughput is the volume of user information transferred per second, without Start and Stop bits and other overhead information. You'll obtain optimal throughput under the following conditions.

1. Your communications software supports a fixed serial port rate higher than the connection rate (for example, setting your software to lock into the 38.4K bps rate,

and retaining the default &B1 setting).

2. The call is under data compression.

3. You're transmitting text files. Throughput is higher for text files than other types of files, such as .EXE or .COM binary files.

4. File transfer may be slowed down by a file-transfer protocol. Many non-text files require a file-transfer protocol, but throughput results vary. Certain public domain file-transfer protocols, for example, have the following effects.

   Kermit   Newer versions of Kermit support packets up to 9K and a sliding window design to eliminate turnaround delay. With earlier versions, however, throughput may be severely reduced due to short block lengths (possibly under 128 bytes) and acknowledgment turnaround time.

   Xmodem   Throughput may be reduced if your version uses short block lengths, for example 128 bytes. Some versions use blocks of 1K byte, which is much better, although overhead (error control protocol information) still affects overall throughput.

   Ymodem   This protocol is similar to Xmodem with 1K byte block lengths, and allows multiple files to be sent in one transfer.

The above protocols further reduce throughput during error-control (ARQ) connections. The accuracy of the data is checked twice, by the file-transfer protocol and the modem. To avoid redundancy, disable modem error control by setting the modem to &M0.

The most current version of Zmodem can yield the most efficiency. Leave the modem at its error control default (&M4) and data compression default, &K1. Zmodem performs the same kind of compression as V.42 bis; it turns off its compression if files are already compressed.

An alternative protocol is Ymodem-G, with the modem left at its error control default, &M4. Ymodem-G assumes the modems are handling error control. Overhead is minimal, with throughput almost equal to that obtained with no file-transfer protocol.

However, keep in mind that Ymodem-G is only useful if the modems are using error control. In addition, follow this recommendation only if your machine and software support hardware flow control.

NOTE: Both modems must use the same protocol for data transfer to take place.

WARNING: If you are using an X-, Y- or Zmodem-type protocol, do NOT use the modem's software flow control.

==

Achievable Throughput Statistics

The table below indicates the maximum throughput, in characters per second (cps), that can be expected under the following optimal conditions:

* Serial port rate set at 57.6K bps; modem set to &B1 Your software and computer must support 57.6K bps in order to use that rate.)

* Connection (link) rate of 14.4K bps (assuming no protective fallback to a lower speed is necessary)

* V.42 bis compression negotiated for the call, and the default size 11-bit, 2048-entry dictionary

* Straight data (that is, not already compressed, and no file-transfer protocol)

* Transmission from a fast (for example, 386) computer

Throughput (cps) if set to 14.4K bps

File Type	MNP5	V.42 bis
Assembler or Compiler listing	2880	3840
Text file	2325-2625	3400-5760
Binary file: .EXE	2175-2400	2030-2600
Binary file: .COM	2100-2250	2050-2300
.ZIP files (common on BBS's)*	1500-1650	1700
Random binary 8-bit*	1460-1575	1700

* These files are already compressed or appear to the modem to be compressed. Additional MNP5 compression causes throughput lower than what can be expected using MNP without compression. We recommend setting the modem to &K3 when transferring these files, to allow V.42 bis but disable MNP5.

The following table indicates the maximum throughput, in characters per second (cps), that can normally be expected in the same conditions as the previous table, but with a serial port rate of 38.4K bps.

Throughput (cps) if set to 14.4K bps

File Type	MNP5	V.42 bis

```
Assembler or Compiler listing       2880        3840
Text file                           2325-2625   3400-3840
Binary file:  .EXE                  2175-2400   2030-2600
Binary file:  .COM                  2100-2250   2050-2300
.ZIP files (common on BBSs)*        1500-1650   1700
Random binary 8-bit*                1460-1575   1700
```

1.28 Infos about Louise, and his projects...

```
  The development is the future of AMIGA

  If you have unique informations about modems, please send it for me!


  Louise's E-Mail Address:     louise@bedrock.fido.hu
                               domihofi@elender.hu

  Louise's Post Address:       1399 Pf 701/836 BUDAPEST HUNGARY
                               (AMIGAonly P.O. Box)


  If you want to know more about the world largest AMIGA dictionary,
              the LSDictionary, just contact with NHL
                    (Native Human Laboratories)


  ThanX and greetings:
  --------------------

  AMIGAonly, Gizmo, Wintermute, Lord,
```

1.29 Maximising your modem for the Net

Maximising your modem for the Net
The Internet seems slow. Is it your modem? Is it the service provider or is it the server carring the Web page you are trying to download? Read this and at least you will get the best possible performance out of your modem.

The link between your computer and the Internet is a tenuous one. A thin piece of copper wire stretches from your house through several telephone exchanges to your Internet service provider's computer. But tenuous though it may be, you hardly ever notice this link.

At either end of the line there are two devices that keep the data flying down this thin copper wire. They are modems (a contraction of the term modulator/demodulator). They stuff data down that wire at tremendous speed and also handle error correction if something does go wrong in the transmission.

For many people who do not have the benefit of a corporate network - a modem, a telephone line and a dial up Internet account are the only way to establish a link from the desktop to the outside world. Browsing the World Wide Web, downloading files via FTP or sending e-mail messages around the world are all possible with a modem and Internet access software.

But modern fax modems do more than just allow access to the Internet. They provide fax capability to and from your desktop or laptop machine. They can also provide communications between remote offices or just between friends for something like a game of two-player Doom .

While the modem is often the forgotten technology, you can get the best out of your modem by understanding how it works and how to tune it to get its best performance. We will start by explaining modem technology to identify the main factors in controlling your modem's performance when accessing the Internet. By the end of this tutorial you should be able to ensure that your modem is delivering its maximum performance.

Before connecting to your Internet service provider you must ensure that the modem and software are set up correctly. There are three main areas to consider: Line Speed Interface or Terminal Speed Flow Control Many people confuse the terms line speed and interface speed. When thinking about modem communications it is important to remember that there are two separate speeds at which your modem communicates. Your modem will speak to your Internet service provider's modem at what is referred to as line speed, the speed the modems are exchanging information across the telephone line. Common speeds are 28,800 bits per second (sometimes referred to as V.34) or 14,400 (V.32bps). The terminal or interface speed, as opposed to line speed is the speed at which your modem communicates with your computer. Flow control regulates the flow of information between your computer and modem.

Line speed
Your modem's line speed is determined by the modem during the loud hand shaking routine at the beginning of the connection. The faster the line speed the two modems agree to operate at, the more quickly data can be sent to or from the Internet. As well, at high speeds you will spend less time waiting and you will lower your online charges.

The speed decided by the hand shaking process is dependent on the modem's analysis of the quality of the telephone line and of their respective capabilities and settings. So rather than you picking a speed, start your modem off at its highest speed setting and let it determine the optimum speed for the line you are using. Line quality can vary depending upon the load on your local exchange, the quality of cabling to your office or house and to your service provider's modems.

Typically, a V.34 modem will start out attempting to connect at its fastest speed of V.34 28,800 bits per second. If it can't negotiate a connection at that speed it will fall back to a lower speed. For example, the NetComm Roadster 288 will lower the speed by steps of 2400 bits per second until a successful connection is achieved.

However, if necessary, the modem can be forced to only connect at a specified speed using the AT+MS command. If you are experiencing difficulties connecting to your Internet service provider, you might try connecting at a slower speed. You will need to refer to the your modem reference manuals or command card for commands and settings. Also check your Internet access software for references as to how the settings should be configured.

Terminal speed

Terminal speed refers to the speed your computer or terminal is communicating with your modem. The terminal speed should always be set higher than the line speed so that your modem is transmitting or receiving data as quickly as possible.

To set the correct terminal speed for your modem and your computer, you must determine several facts: Firstly, the maximum terminal speed at which your modem can communicate with your computer needs to be determined. In the case of a typical V.34, the maximum terminal speed it supports might be 115,200 bits per second. For information specific to your modem refer to your modem specifications. Terminal speed may also be referred to as DTE speed.

The type and speed of the serial port of your computer will also determine the maximum speed at which you can communicate with your modem. If you are using a Microsoft DOS (including Windows 3.11) based machine you can investigate the type of serial port by using Microsoft Diagnostics.

To do this simply type MSD at the DOS prompt, select <O>Serial Ports<O> and note down the bottom line UART (Universal Asynchronous Receive and Transmit) number. This will be either 8250 or 16550 with each number referring to the capability or speed that your computer’s serial port can accommodate.

An 8250 UART with its one bit buffer can only support one bit of data at any one time, reducing the maximum speed at which it can communicate to 19200 bits per second. This is particularly the case with multi-tasking environments like Windows, as the serial port may not always be able to send data to the CPU immediately.

A 16550 UART can buffer 16 bits of data, allowing more data to be stored until your computer’s CPU is ready to receive information. 16550 serial ports allow terminal speeds of up to 115,200 bps ensuring that data is quickly transferred to or from your modem.

Once you have determined the type of serial ports and maximum terminal speed of your modem, refer to your Internet access software for references as to where the settings should be configured. In the case of terminal speed, there is no specific command that has to be set on the modem. The modem will automatically detect the speed at which the computer/.EEEEInternet access software is attempting to communicate and adjust accordingly. This is termed auto bauding.

If you have determined your computer has high speed serial ports, it is recommended that you configure your Internet access software to communicate at 38400 bps or higher - assuming your modem can support these speeds. This will ensure the fast transfer of data to or from your computer.

Flow control

Finally, to ensure that no data is lost when being transferred between your computer and modem it is necessary to specify a form of flow control. Flow control, as the name suggests, regulates the flow of information between your computer and modem. If your computer's serial port buffer is approaching its capacity, the computer will indicate to the modem that it is no longer ready to receive information and request the modem suspend transmitting until the computer indicates it is ready for further data.

In the case of data being transferred from your computer to your modem, flow control also operates, allowing the modem to inform the transmitting computer that its storage buffers are almost full and request the computer cease transmitting until the modem indicates it is ready to continue.

Hardware flow control generates signals along the serial cable to indicate that a regulation of the data flow is required. Software flow control, on the other hand, uses specific characters within the data to indicate the data flow should be slowed or restarted.

When setting flow control on your modem, it is important that both your modem and Internet access software be set to use the same type of flow control.

The recommended form of flow control is referred to as Hardware flow control, sometimes known as RTS/.EEEECTS or Hardware hand shaking. For commands for your modem please refer to the your modem's command guide.

So, by setting the modem to attempt the fastest line speed, and the optimum interface speed, as well as ensuring both the software and hardware are configured for the same form of flow control, you will be utilising your modem to its maximum potential.

Technobabble
The word modem is a contraction of 'modulator/demodulator'. Modems come with a string of number and letters that can be baffling for all but the technical experts. Here is our short guide to the number soup: V.42bis is a way of compressing data in the modem. Think of it as shrinking your letter to fit a smaller envelope.

V.42 is an error control protocol for sending data. This covers the way the data is bundled up before transmission. You could think of it as the envelope.

V.32, V.32bis and V.34 are all ways of sending and modulating the analog telephone signal to carry data. You can think of these schemes as different ways of sending your letter. You can send it express post or register mail or just normal mail. V.32 and V.32bis run at 9600 and 14,400 bits per second. V.34 is for 28,800 bits per second (V.FC also works at 28,800).

1.30 cardinal MVP288IV & MVP288XV Modems FAQ

Cardinal MVP288IV & MVP288XV Modems FAQ

Cardinal MVP288IV & MVP288XV Fax Modems with Voicemail FAQ
Answers to common questions and problems are provided in this document.

Question:Do the MVP288IV and the MVP288XV modems have a flash ROM?

Answer: Yes. All of Cardinal's current production modems (except the MVP144i and the MVP144XF) have a flash ROM. This allows fast and simple fIrmware updates. If an update is released, you can download a file from our BBS (717-293-3074, 8N1) or our FTP site and install the latest firmware immediately.

Question:Does the Version 1.4 Flash ROM Update apply to my MVP288IV (or MVP288XV) modem?

Answer: NO! That flash update only applies to the MVP288i and the MVP288XF modems. If your flash your modem with that update it will not work properly and the modem will have to be returned to Cardinal for repair - at your expense.

Question:How does Windows 95 configure a Plug-N-Play modem?

Answer: Plug and play modems in WIN95 DO NOT have an associated com port shown in device manager in ports. You can change the setting of the modem in device manager by highlighting the modem definition (ex. MVP144IV2, MVP288IV ...) and choosing properties/resources. You will have to deselect "Use automatic settings" and manually change the com port address and IRQ to the setting you desire. Select Basic Configuration 0002 This one will let you make all the changes.

We have found that on systems with a PNP hardware bios (or on systems where you can disable com ports from the keyboard in CMOS) WIN95 will occasionally detect the comport even though it is disabled. This is because the address still appears allocated to WIN95. To install a modem on one of these addresses you must remove that com port from ports in device manager, then reconfigure the modem for that address and IRQ, then restart windows (power off). When WIN95 restarts it will put the modem on the comport and configure the other comport as an unconfigured, other device. This is because the resources this port needs are not available.

Question:Can I use the MVP288IV (or the MVP288XV) modem as a speakerphone?.

Answer: No. The modem was never designed to be used as a speakerphone and cannot be used as such..

Question:What are good initialization strings for America Online, Compuserve, internet access, etc....?

Answer: These are suggested initialization strings. They are not guaranteed to work in all situations.

Recommended generic init string: AT&F&C1&D2 Compuserve: AT&F&C1&D2&Q6^M AOL: AT&F&C1&D2\N5^M Most Games: AT&F&Q6&K0S37=9 (locked 9600 bps) AT&F&Q6&K0S37=11 (locked 14400 bps) These Strings Set:

```
No Data Compression
No Error Correction
No Flow Control
Locked Baud Rate   Internet: AT&F&C1&D2   ATQ0V1E0M1L2   If the
ISP is using US Robotics modems try:
  AT&F&C1&D2+MS=74,1,300,28800
  (set time out to 60 seconds)
    If the Internet init strings don't work contact your ISP and
get  the brand   name and connection parameters of their modems. (ex.
error  correction,   data compression, flow control, echo result
codes, and any  other info they   feel is important.)

    If you continue to have connection problems get the brand name
and  connection parameters of the other modem. (ex. error correction,
data  compression, flow control, echo result codes, and any other info
that  may be important.) This will help us resolve connection
problems.

      Question:I am running Windows NT. Do you have Windows NT
drivers for  the   MVP288IV (or MVP288XV)?

    Answer: Unfortunately we are unable to provide support for
Windows NT   Applications at this time.

      Problem 1: When installing the modem under Windows 95 I get
the  error- file can   not be found when asked to insert Windows 95
CD or  DISK1.

    Solution: If you are using the Windows 95 CD-ROM you must point
 to the WIN95   path on the CD-ROM. When you get this error you will be
given  the option   to enter a path. Type in X :\WIN95 (where  x =
the drive letter of your CD   Rom. If you are using the floppy disk
version of Windows 95  these files  are not included. Microsoft did
not include the Voice View  files on the   floppy disk version of
Windows 95. You must choose to SKIP  these files.   DO NOT CANCEL as
this will cancel the modem installation. It  will   prompt you for
DISK 12 and at this point it will find the needed  files and
continue with the installation. This WILL NOT hinder the  performance of
  your modem in any way. For questions on obtaining these files,  you
must   contact Microsoft.

      Problem 2:When installing ICU software under Windows 3.1x I
get a  SHARE   violation error.

    Solution: Some programs (such as WordPerfect) use the DOS
share command.   This command sometimes sets parameters that are not
compatible with   the ICU software. In this case you should not try to
use the  ICU software.   The following steps will require a basic
knowledge of the IRQs  and   Com ports being used in your system, as
you will  be responsible for   choosing the comport and IRQ the modem
will be using. The  PLUGPLAY   lines should be removed from your
CONFIG.SYS  file and the [386Enh]   section of your SYSTEM.INI . On
the MODEM  INSTALLATION DISK#4   there is a hidden file called
PNPSET.EXE . For  complete instructions on   this programs use please
order document # 1300 from the  Faxback   service.
```

Problem 3:Windows 95 installs the modem but Windows 95 is unable to communicate with it.

Solution: The first thing that should be looked for is conflicts. In your DEVICE MANAGER there should be a section for MODEMS . Look here to see if your modem is being found. Also, make sure that the only device(s) listed here match what you have installed in your system. If there is an (!) or (?) in front of the modem then that indicates a setup problem or conflict. You should check that the comport address and IRQ does not conflict with any other devices in your system. If you do see a conflict the modems settings can be changed under PROPERTES/RESOURCES to a setting which is not in use by another device.

If the modem is not found look for a section under your DEVICE MANAGER called OTHER . Often, if Windows can not find or identify your modem it will place it in this section. If the modem is found here, it is probably due to the fact that Windows 95 was unable to find a valid location for it. Check to make sure that an IRQ of 3,4,5,6 or 7 is available on your system. Also, this problem can be caused when Windows doesn.t load the driver for the modem. You can access the DRIVERS section of the OTHER DEVICES and choose CHANGE DRIVER . Then select HAVE DISK and use the driver on DISK #1 of your modem installation software.

Question: Windows 95 recognizes the modem but my 16 bit applications will not see it. (ie. Faxworks or Talkshop)

Solution: Windows 95 does not always modify your SYSTEM.INI file to include the changes for your comport settings. In other words- the software may not be looking in the right place for the modem. Your Comports base address and IRQs are defined in the [386Enh] section of your SYSTEM.INI file. You should check these settings to make sure that they match your modems settings. The following lines need to be added to your SYSTEM.INI file in the [386enh] section:

com1irq=4

com1base=03f8

com2irq=3

com2base=02f8

com3irq=4

com3base=03e8

com4irq=3

com4base=02e8 The ... base= ... address for each com port will not change, but the IRQ will vary depending on how you have your system configured. ex. if your modem is on com3/irq5 the line should read: com3irq=5 . Also if you do not have a com installed leave the info after the = sign blank. ex. com4irq= com4base=

Question: Faxworks hangsup during the recording or retrieval of voice messages.

Solution: This problem can be caused in some cases by the phone system in your area. It can often be corrected by adding #CEXT=0 to the initialization string box in Fax Setup. The new string should readl AT&K3#CEXT=0

If this does not fix the problem you should uninstall it and reinstall the latest version of Faxworks which can be found on the Cardinal BBS at (717) 293-3074. The files are found in the VOICEMDM file library. All files are listed with a description which should enable you to find the new files quickly and easily. Due to copywrite laws these files may require a password in order to uncompress them. This password can be obtained from Technical Support or the BBS sysop after proper product ownership has been established.

There is also an uninstaller available on the BBS. It.s filename is FWUNINST.EXE. It is also self extracting but does not contain a password encryption. For more information on uninstalling Faxworks please order document number 1310 from the Cardinal Faxback service.

Question: After I installed the modem I don’t hear a dial tone, or hear the modem dialing, or hear the connection sounds.

Solution: The following is the fix we have come up with:
Using the Windows Explorer, click on the (+) at Windows directory.
Then click on: [-]Windows to highlight and expand files within. Locate the file: REGEDIT.EXE on the right side and click on it..

Select<code> Edit </code>and then Find

Type <code>dialsuffix</code>(There are no spaces in it.).

Delete the:<code>";"</code>(Leave the Parenthesis "( )" there.).

Click on <code>OK</code>

Close <code>REGEDIT.EXE</code>.

Once Windows 95 is restarted, the changes will take effect and you will hear the modem dial and negotiations sounds..

Question: I know my modem supports caller ID, but the Modem Reference Manual doesn.t mention how to use it.

Solution: Here is the caller ID info you need.

Caller ID Commands

#CID=0Disables Caller ID. (Default.)

#CID=1Enables Caller ID with formatted presentation to the DTE.

The modem will present the data items in

a Tag-Value pair format. The expected pairs are

data, time, caller code

(telephone number), and name.

#CID=2Enables Caller ID with unformatted presentation to

the DTE. The modem will present the entire packet

of information, excluding the leading U's, in ASCII

printable hex numbers.

#CID=?Returns the mode capabilities of the modem in a

list with each element separated by commas. A

complete caller ID document is available from our

Faxback service at 717-399-2308. Request

document #1320 Question:Will the MVP288IV or the MVP288XV work with Delrina Comm Suite?

Answer: The following modems have been approved for use with WinFax Pro7 and TalkWorks:

Cardinal - Cardinal 14.4 MVP144IV2**

Cardinal - Cardinal 28.8 MVP288IV**

Cardinal - Cardinal 28.8 MVP288XV**

** - Win95 modem detection will automatically select correct name, TalkWorks install will automatically install correct settings, no user selection required.

Question: I have an MVP288XV modem and I can not fax anything with WinFax Pro 7.0.

Solution: WinFax PRO 7.0 has the ability to control the DTE speed (ie: baud rate) of the fax modem serial port. Typically the DTE speed is set to 19200 bits/sec. In the case of four Cardinal modem models (MVP288IV, MVP288XV, MVP288IS, and MVP288XS), and ONLY these modems, this parameter was incorrectly set to 38,400bps in the modem database that was shipped with the TalkWorks release.

While many fax modems will operate correctly with a DTE speed of 38,400bps, these two Cardinal modems will not.

There are several solutions available for this problem:

Select the correct faxing parameters for either of the two Cardinal modems as follows:

Within WinFax, select Modem from the Setup menu

Highlight the Cardinal modem entry, then hold down the

SHIFT key and click on the Properties button.

Click Yes on the next panel.

Hold down the SHIFT key and click Next

When the modem interrogation completes, hold down the SHIFT key and click Next

Select the entry Rockwell Fax/Voice , then click Next , then click Finish .

Your Cardinal MVP288IS or MVP288XS modem should now work properly with WinFax.

Use the DelTest utility that is shipped with WinFax (use the Edit the Registry function) to adjust the CommSuite_Settings/ Modem_x/FaxDTESpeed parameter from 38,400bps to 19,200bps.

Download an updated DCCMODEM.DAT file, which will have the Cardinal modem parameters corrected. This file will be made available in the near future from Symantec’s BBS. (By end of February)

Question: I have installed ICU (Windows 3.1 Plug-N-Play software) and it will not let me configure the modem on Com1 or 2 or it is causing other problems in my machine.

Solution: We have seen occasional problems with ICU that don’t allow you to install the modem properly. We recommend you remove the ICU program and install the file PNPSET.EXE . The following instructions will help you complete this.

Removing The ISA Configuration utility (ICU)

In the root directory on c:\ you must delete the file ESCD.RF .

In the CONFIG.SYS you must delete the line that says, DEVICE=C:\PLUGPLAY\... then save your changes.

In the SYSTEM.INI , in the [386Enh] section, delete the lines that start with DEVICE=C:\PLUGPLAY ... then save your changes.

In the WIN.INI file under the [windows] section, RUN= should have no reference to ICU or PLUGPLAY after the equals sign. Save your changes if any were made.

Delete the directories C:\PLUGPLAY and C:\ICU

Exit windows and reboot your system.

Installing PNPSET

You must first determine which COM port and IRQ is available in your machine that will accept the modem without conflict. We recommend you run Microsoft Diagnostics (MSD) from a DOS prompt (do not shell out to DOS from Windows). The com port addresses are as follows: com1:03f8, com2:02f8, com3:03e8, com4:02e8

Exit Windows and get to the root directory DOS prompt (C:\)

Put Disk 4 of 4 in the floppy drive and change to that drive. A: (ENTER)

Type ATTRIB -H (ENTER) (unhide all hidden files)

Type COPY PNPSET.EXE C:\ (ENTER) (copy the file to your root directory)

Change back to your C drive. C: (ENTER)

Type EDIT AUTOEXEC.BAT (ENTER)

Add this line to the autoexec.bat: PNPSET /RESET COM IRQ (Where COM is the number of the com port where you want the modem and IRQ is the number of the interupt where you want the modem. ex: PNPSET /RESET 2 3 - the modem will be configured for COM2 IRQ3) This line should be added at the beginning of the AUTOEXEC.BAT file. Save your changes.

Exit EDIT and reboot your system.

PNPSET is now installed on your system and the modem will now appear to the system as a non Plug & Play modem.

Problem 10:When I installed the modem, Windows 95 detected it and asked for Manufacturers Disk 1. Then it asked for the Windows 95 upgrade diskette 1. It couldn.t find FILEXFER.CNT or FILEXFER.HLP or FILEXFER.EXE.......

Solution: Files Not Included on Windows 95 Upgrade Diskettes

These files are required for direct operation of VoiceView by Windows 95. They do not affect the operation of the modem, FaxWorks, Talk Shop, or other communications software.

FTE.DLL

VVEXE32.EXE

WSVV.VXD

WINSOCK.DLL

WSOCK32.DLL

WSOCK.VXD

VTDI.386

FILEXFER.EXE

FILEXFER.HLP

FILEXFER.CNT

These files are included on the Windows 95 CDRom upgrade but not on the Windows 95 diskette upgrade and the Windows 95 OEM CDRom (with cabinets - diskettes on CDRom). These files may exist on the full version (CDRom and Diskette) of WIN95 but this has not been confirmed. Cardinal Technologies, Inc. is unable to supply these files. Microsoft will not allow distribution of these files due to licensing. At this time we only have information on a few of the missing files which are listed below. It is recommended you contact Microsoft for further guidance.

To install the files when you receive them, reload the modem driver in control panel/device manager/modem/properties/driver. Select "Change Driver" and follow the prompts, substituting the floppy with the voice view files for the WIN95 diskettes. .

The VoiceView setup files are available via FTP at the following address.

ftp.microsoft.com/softlib/MSLfiles/vvsetup.exe .

This self extracting file contains:.

FTE.DLL

VVEXE32.DLL

WSVV.VXD

FILEXFER.EXE

FILEXFER.HLP

FILEXFER.CNT

Unfortunately, this doesn't have the winsock files. This file should also be availabe via MicroSoft BBS and CompuServe with the same name..

Problem 11:When I play voice mail messages through my sound card I get garbled sound or I do not hear any sound. Why?

Solution: :If you are connecting the modem to a sound card and your speakers are also connected to the sound card you will not be able to hear messages replayed. The user's manual getting started guide is incorrect in stating/diagraming a connection to a sound card. The output from the modem is NOT compatible with the input of sound cards. The only way you can play your messages through speakers is to connect them directly to the modem. We recommend you use an unamplified speaker. This also applies to microphone options..

1.31 FAQ for USR 28k modems

```
  Informations based on MailList...


. Area: R-USR ..............................................................
  Msg#: 7739                                       Date: 10-05-94  22:07
  From: Ed Reilly                                  Read: Yes    Replied: No
    To: Ray Bornstein                              Mark:
  Subj: 28.8 CONNECTS
............................................................................
 -=> Quoting Ed Reilly to Ray Bornstein <=-

 ER> Ray, I hate to say this, for myself even, but the USR 28,800 is PURE
 ER> BS.  I have read threads on Compuserve and Many local BBSs' and NOBODY
 ER> can  connect to ANYTHING above 19,XXX. But even worse is that NOBODY
 ER> from USR  will even come CLOSE to answering the problem...the only
 ER> thing I can say  is... FRAUD. They KEEP blaming everything else and
 ER> claim to have NOTHING  to do with the problem. Yet my old BOCCAMODEM
 ER> 14.4 could AT LEAST  CONNECT at over 19,XXX, and BOCCAMODEM was noo
 ER> PRIZE!
 ER> I have just bought the USR Sportster Data/Fax Modem V.34 with V.FC
 ER> this  evening. I offer a challenge to USR to PROVE this is NOT a
 ER> FRAUD!!!
 ER> If I'm wrong...TELL ME HOW! Anybody from USR up to it????

 ER> Thanks,
 ER> Ed
 ER> -!-
 ER> . RM 1.3  . Eval Day 11 .
 ER> * Channel 1(R) * 617-354-3230 * Cambridge MA * 130 lines
 ER> * PostLink(tm) v1.20  CHANNEL1 (#15) : RelayNet(tm)



. Area: HST ................................................................
  Msg#: 32276                                      Date: 10-08-94  15:57
  From: Mark Bursky                                Read: Yes    Replied: No
    To: Phil Roberts                               Mark:
  Subj: Re: Problems
............................................................................
 -=> Quoting Mark Bursky to Phil Roberts <=-

 MB> The flashing ARQ indicator is only when I'm uploading files. When I
 MB> connect to other VFC BBS's everything will go fine than all of a sudden
 MB> the carrier drops. This happens on a daily basis. It seems like if the
 MB> modem is receiving a lot of line noise that it would try to retrain to
 MB> the next lower baud rate, but when I look at the ati6 results the baud
 MB> rate is the same as when I logged on. I'm confused. Thanks for your
 MB> help, I really appreciate it.
 MB> -!- Xenolink 1.90
 MB>  ! Origin: Mouse Trap * Serving Amigas Since 1987 * 619-464-2134
 MB> (1:202/122)
```

```
. Area: HST ...................................................................
  Msg#: 32515                                      Date: 10-12-94  10:48
  From: Joe Frankiewicz                            Read: Yes    Replied: No
    To: Gene Lowry                                 Mark:
  Subj: HST Connects between V.34
...............................................................................
 -=> Quoting Joe Frankiewicz to Gene Lowry <=-

 -> Joe "Bub", feel free to jump in any time and tell me what I'm doing
 -> wrong in trying to get an HST connect between V.everythings without
 -> setting B1 in the called modem.


 JF> Use S56=192 S54=128 B1 on the originating side, that should do it.

 JF> Joe




. Area: HST ...................................................................
  Msg#: 32446                                      Date: 10-09-94  02:30
  From: Gene Lowry                                 Read: Yes    Replied: No
    To: Charles Johnston                           Mark:
  Subj: HST Connects between V.34
...............................................................................
 -=> Quoting Gene Lowry to Charles Johnston <=-

 GL> Charles,
 GL> You asked me some days ago to look into a problem establishing an HST
 GL> connect  between two V.34 Dual Standard Couriers (at least I think it
 GL> was you). I finally had some time today to do some work on the problem,
 GL> I also have to  tell you that is wasn't pleasant.
 GL> On over a dozen attempts, calling from a daughter board V.everything
 GL> to my  single board V.everything, I got only one connect at 16.8 HST.
 GL> The rest  either got a V.32 (pick your variant, mostly V.32bis) or
 GL> failed to connect at  all.
 GL> In all cases the single board V.everything on my BBS was set to answer
 GL> V.32  (B0) while I tried almost every trick in the book with the
 GL> daughter board  V.everything to get an HST connect.
 GL> The one connect I got was with S27=4, S34=135, S56=192 and B1 set on
 GL> the  dialing modem.  Repeated tries with the same configuration failed
 GL> to connect  at all as did many other configurations I tried.
 GL> Lacking two or either model to test with, I don't know that it's a
 GL> pecularity  of the daughter board modem, more likely a characteristic
 GL> of the breed IMHO. I will be writing up a formal problem report for USR
 GL> later today (read after  sleep).
 GL> Joe "Bub", feel free to jump in any time and tell me what I'm doing
 GL> wrong in  trying to get an HST connect between V.everythings without
 GL> setting B1 in the  called modem.

 GL> Gene Lowry
 GL>


 GL> -!- msged 2.07
 GL>  ! Origin: Bigfoot's RBBS - Tucson,AZ - HST - (8:902/1) or  (1:300/11)
```

```
. Area: HST ..................................................................
  Msg#: 32602                                       Date: 10-12-94  17:25
  From: Francois Roy                                Read: Yes    Replied: No
    To: Sam Watson                                  Mark:
  Subj: Dropped Carrier
..............................................................................
 -=> Quoting Francois Roy to Sam Watson <=-

 SW> just drops carrier. I do reset the modem with a AT&F1
 SW> followed by a comma and some other simple setups that I have
 SW> found work well.

 FR> Check if one of those "other simple setups that you have found to
 FR> work well" include a setting for S19.  That register is an inactivity
 FR> timeout; if set to a value other than 0, the modem hangs up when that
 FR> many minutes elapse with no activity.
 FR>
 FR> -!- msgedsq 2.1
 FR>  ! Origin: Ready & Determined (1:163/506)



. Area: HST ..................................................................
  Msg#: 32485                                       Date: 10-10-94  14:23
  From: Sam Watson                                  Read: Yes    Replied: No
    To: All                                         Mark:
  Subj: Dropped Carrier
..............................................................................
 -=> Quoting Sam Watson to All <=-

 SW> I have a USR V Everything on a 486sx and am using Intermail as a
 SW> front  end to a BBS. I have recently noticed that the modem will
 SW> sometimes  drop carrier if the users pauses for a min or two between
 SW> receiving  data and entering any information. It happens with all baud
 SW> rates and  configurations. It seems that if there is no data on the
 SW> line for a min  or two it just drops carrier. I do reset the modem with
 SW> a AT&F1  followed by a comma and some other simple setups that I have
 SW> found work  well. The only thing is dropping carrier if the line is
 SW> idle for a few  min.
 SW>
 SW> Any information that could be suggested would be appreciated. BTW i
 SW> have the node locked at 38400 baud. I found that if I lock InterMail
 SW> and the BBS software at any higher baud rate there is a problem (looks
 SW> like incorrect baud rate is passed to the BBS) when the BBS loads. I
 SW> have had a Zoom 28.8 VFC on this node and it would lock at the higher
 SW> baud rate and transfer to the BBS at the higher baud rate. I would
 SW> prefer to leave the USR 28.8 Courier on this node but due to the
 SW> problems I have encountered I may have to take the USR off and put
 SW> another Zoom on.
 SW>
 SW> Sam Watson

 SW> -!- TriToss (tm) 1.03 - #78
 SW>  ! Origin: My House BBS Inc. * Bolingbrook IL (1:2235/175)
```

. Area: HST ....
Msg#: 32163 Date: 10-06-94 19:54
From: Gene Lowry Read: Yes Replied: No
To: Robert Dunnill Mark:
Subj: Connect Speeds
....
-=> Quoting Gene Lowry to Robert Dunnill <=-

GL> In a message of <Oct 02 94> Robert Dunnill (1:153/968) writes:

RD> I take it Courier V.FC/V.34 28.8K connects are rare? I have only seen
RD> one in the three weeks I've had mine; usually, it's 26.4.

GL> It all depends on the quality of the telco lines you go through and
GL> the number of switches.
GL> Gene Lowry

GL>

GL> -!- msged 2.07
GL> ! Origin: Bigfoot's RBBS - Tucson,AZ - HST - (8:902/1) or (1:300/11)

. Area: HST ....
Msg#: 32121 Date: 10-02-94 20:51
From: Robert Dunnill Read: Yes Replied: No
To: Gene Lowry Mark:
Subj: Connect Speeds
....
-=> Quoting Robert Dunnill to Gene Lowry <=-

-=> Quoting Gene Lowry to Donald Durel <=-

GL> I hate to tell you this, but this may be as good as it gets. In my
GL> experience with the V.34s, I can get a 28.8 connect if I stay within
GL> my central office. If I cross central office boundaries then 26.4 is
GL> about as it gets although they're pretty consistent. If I go long
GL> distance, usually it's 26.4, other times 24.0. Sometimes during the
GL> day on 800 numbers as low as 21.6. Gene Lowry

RD> I take it Courier V.FC/V.34 28.8K connects are rare? I have only seen
RD> one in the three weeks I've had mine; usually, it's 26.4.

RD> ... Sorry about the crayon. They won't let me use any sharp objects.
RD> -!- FMail 0.94
RD> ! Origin: ABACUS-I BBS * Richmond B.C. 14.4V32 604-272-4311
RD> (1:153/968.0)

. Area: HST ....
Msg#: 32381 Date: 10-10-94 21:19
From: Clay Tinsley Read: Yes Replied: No

```
   To: Jeff Archambeau                              Mark:
  Subj: can't connect high speed
.................................................................................
 -=> Quoting Clay Tinsley to Jeff Archambeau <=-

 JA> I JUST bought a 28.8 sportster with v.everything(except 34)
 JA> it's got 14.4 fax, etc. I tried calling some BBS's in the
 JA> area, but have only gotten a conect of 21.6 or less. I only
 JA> got the 21.6 once, and mostly 19.2 on the others. I don't
 JA> know what do do! Here's my init string. Is it something in
 JA> here, or what?

 CT> I hope you don't expect to get 28.8 connects all the time with a
 CT> 28.8 modem - it's not like a 2400b or even a 14.4 - 28.8 is pushing the
 CT> phone system to the max, and connects in the 19.2-26.4 range are pretty
 CT> normal.
 CT> If you own your dwelling, you might check the phone wires running
 CT> from your telephone line entry point, and even run new wire if what you
 CT> have is old. It may help, but it also may not make any difference.

 CT> Keep in mind that a 19.2 connect can get decent throughput.  I
 CT> often see 2500-2600 cps on compressed files with 19.2 connects.

 CT>
 CT> -!- Msgedsq 2.2e
 CT>  ! Origin: Verbose Ink * 214-437-0914 * V34/VFC/V32t/H16/V32b/FAX
 CT> (1:124/5125)



. Area: R-USR ....................................................................
  Msg#: 7616                                        Date: 09-26-94  16:04
  From: Bill Garfield                               Read: Yes    Replied: No
    To: Ray Bornstein                               Mark:
  Subj: 28.8 CONNECTS
.................................................................................
 -=> Quoting Bill Garfield to Ray Bornstein <=-

 RB> I have a U.S.Robotics Dual Standard Courier 28.8 modem with fax and ASL.
 RB> I was hoping to get some feedback from others about 28.8 and 26400
 RB> connects. My connects at 28.8 and even 264000 are few and very far
 RB> between. As a matter of fact I havn't yet to connect with anyone at

 BG> USR gave you good info.

 BG> 28800 requires 33% more bandwidth than does 14.4 and 26400 requires
 BG> 25% more bandwidth than 14.4. and 24000 requires about 15% more than
 BG> 14.4 -
 BG> There's more than just bandwidth that enters into the equation, but
 BG> bandwidth is certainly one of the key ingrediants.

 BG> -!-
 BG> . OLX 3.3 . Ate yerz ago i cudent evin pernownz injuneer, now i r one



. Area: R-USR ....................................................................
```

```
 Msg#: 7944                                         Date: 10-13-94  23:21
 From: Drew Perry                                   Read: Yes    Replied: No
   To: Technical Support/all                        Mark:
 Subj: 26400/28800 Connects
..............................................................................
 -=> Quoting Drew Perry to Technical Support/all <=-

 DP> I recently, like many others, purchased a Sportster 28.8 which I
 DP> enjoy. However I noticed that when I connect, I connect at 26400 on my
 DP> end and the host system says Connect at 28.8.  When I type ATI6 the
 DP> connect speed is given as 26.4/28.8.  I was wondering why I seem unable
 DP> to get 28.8, but the host is.

 DP> Drew Perry
 DP> -!-
 DP> * Motown - L.A. BBS * Anaheim, CA * (714)535-1319
 DP> * PostLink(tm) v1.20  LABBS (#279) : RelayNet(tm)



. Area: HST ..................................................................
 Msg#: 32567                                        Date: 10-11-94  02:28
 From: William Grinolds                             Read: Yes    Replied: No
   To: Craig Smith                                  Mark:
 Subj: USR<->VFC
..............................................................................
 -=> Quoting William Grinolds to Craig Smith <=-

 >  I need some help. I just received my USR Courier on Wednesday. I'd like
 > to
 > find if there is any way to improve the connection between the USR and a
 > Zoom
 > VFC. I've noticed that the Zoom tends to get "confused" or the USR just
 > drops
 > off. I instructed the Zoomer to use -K0 to disable the MNP10 on his end,
 > and
 > this seemed to help. I'd still like to improve the connect, though..

 WG> USR's implementation of V.FC isn't quite as good as Zoom's as far as
 WG> connect speed.  But, of course, it is superior in that it constantly
 WG> probes the line and changes speeds as necessary.  On normal
 WG> voice-quality phone lines that are using the digital switching
 WG> stations, don't expect a connect much higher than 21.6.  Now, V.34 on
 WG> the other hand, you can sometimes get 26.4 and even 28.8. It has a lot
 WG> to do with how your phone lines are wired.  The more direct the line
 WG> (with no junction boxes, etc.) and if you use shielded wire, the
 WG> better your connects will be.

 WG> Bill

 WG> -!-
 WG>  ! Origin: ST:TNG BBS, (210)509-3272[V.34] / (210)647-5366[V.32bis]
 WG> (1:387/601)



. Area: HST ..................................................................
```

```
 Msg#: 32352                                          Date: 10-10-94  07:14
 From: Gil Mitchell                                   Read: Yes    Replied: No
   To: Craig Smith                                    Mark:
 Subj: USR<->VFC
.............................................................................
 -=> Quoting Gil Mitchell to Craig Smith <=-

 GM> Craig Smith proclaimed in a message to All:

 CS>  I need some help. I just received my USR Courier on
 CS> Wednesday. I'd like to  find if there is any way to improve
 CS> the connection between the USR and a Zoom  VFC. I've noticed
 CS> that the Zoom tends to get "confused" or the USR just drops
 CS> off. I instructed the Zoomer to use -K0 to disable the MNP10
 CS> on his end, and  this seemed to help. I'd still like to
 CS> improve the connect, though..

 GM> After 50-minutes on-line with USR tech-support; found that s27=32
 GM> (disable v.42bis) was a solution here. According to the "techie" there
 GM> is a problem with the handshake between USR-v.34s and Rockwell based
 GM> v.FCs.
 GM> CU gil

 GM> OS2ing is Doing it RIGHT in Sand Springs,OK.
 GM> -!-
 GM>  ! Origin: BSOOM!!! OS/2 Country (v.FC) 918-241-5405 (1:170/306)



. Area: HST .................................................................
 Msg#: 32301                                          Date: 10-09-94  13:01
 From: Mark Taylor                                    Read: Yes    Replied: No
   To: Bruce Feuchuk                                  Mark:
 Subj: Usr ds v.34 modem
.............................................................................
 -=> Quoting Mark Taylor to Bruce Feuchuk <=-

 MT> Bruce Feuchuk wrote in a message to Gene Lowry:

 BF> S10=20 to S10=7

 MT> Increasing the size of your S10 register will keep YOUR modem from
 MT> hanging up on a BBS caller who can't disable call-waiting. If you run a
 MT> BBS, you should (IMHO) always have your S10 register set higher than
 MT> the default.
 MT> Mark

 MT> marktaylor@vnet.ibm.com

 MT> -!- timEd/2-B11
 MT>  ! Origin: HillTop/2 - Hamilton, IN  -=USA=-  (219)488-3812 (1:236/10)



. Area: Main Board ..........................................................
 Msg#: 54100                                          Date: 10-12-94  15:50
 From: Technical Support                              Read: Yes    Replied: No
```

```
   To: Bob Michalyshyn                            Mark:
  Subj: Modem Speeds
..............................................................................
 -=> Quoting Technical Support to Bob Michalyshyn <=-


 -> I have a question with regards to my modems login speeds. I have a Dual Std.
 -> with the V.FC , V34 upgrade and I have yet to log on to any BBS that
 -> supports 28,800 V.FC or V34 including this board at the max speed. The best
 -> speed I have ever gotten is 26,400. I am using Procomm Plus for

 TS> Lower connect speeds are caused by noise or poor bandwidth problems on
 TS> the phone line.   Try removing ALL other devices from the line, like
 TS> answering machines, extension phones, surge filters, etc.   Try running
 TS> new good-quality cable from the modem directly to the telco interface
 TS> box on the outside of the house.  The problem may also lie in the cable
 TS> between your house and the telco office, but you'd have to contact the
 TS> phone company to get that checked. Also be aware that problems at the
 TS> OTHER end of the connection will also cause this.   It only takes one
 TS> bottleneck to slow everything down.
 TS> The modem's ATI11 screen will tell you what is happening.   The SYMBOL
 TS> RATE parameter is indicative of the bandwidth available.   If the modem
 TS> cannot achieve a symbol rate of 3200 because of poor bandwidth, you
 TS> will never see anything faster than 26400.    If you are getting a 3200
 TS> symbol rate but the speed is slow, then the problem is good old
 TS> fashioned noise.



. Area: Main Board ...........................................................
  Msg#: 54082           Rec'd                     Date: 10-12-94  15:21
  From: Technical Support                         Read: Yes    Replied: No
    To: Chris Mcclenahan                          Mark:
  Subj: v.34
..............................................................................
 -=> Quoting Technical Support to Chris Mcclenahan <=-


 -> I have a USR Courier Dual Standard v.FC, v.34 28.8k modem.  I have had it
 -> for about a month now, and I have not ONCE made a connection to another
 -> 28.8k modem, even another v.34 at more than 26.4k....  I even got a short
 -> 2ft. serial cable.... still, no more than 26.4k..... what do you think the
 -> problem could be?  Thanks a lot-- Chris McClenahan

 TS> Have you used the latest USRSDL.EXE upgrade?   That may help a bit,
 TS> but it sounds like your problem is in the phone lines.   Try removing
 TS> any answering machines, extension phones, surge filters, etc from the
 TS> line.   Replace any old phone jacks, jumper cords, or inside wiring.



. Area: R-USR ................................................................
  Msg#: 7501                                      Date: 09-19-94  16:20
  From: Bill Garfield                             Read: Yes    Replied: No
    To: Lee Bosch                                 Mark:
  Subj: I can't believe it!
..............................................................................
```

```
-=> Quoting Bill Garfield to Lee Bosch <=-

LB>   I finally figured out what my problem with hooking to the H****

LB>   MY BLOODY PHONE WIRING POLARITY WAS REVERSED!!!

BG> Lee, if reversing polarity of the phone wires "fixed" your problem,
BG> then I rather suspect that the problem was actually either:

BG> 1.  A loose or corroded connection at the NI which you of course fixed
BG> by mere accident in the course of making the wiring changes there,
BG> or
BG> 2.  A polarity-sensitive phone device *other than* your modem which
BG> was -causing- line loading or impedance problems.  This is why we
BG> suggest disconnecting **everything**  when hunting for these
BG> ghosts.
BG> Often times the most obvious area of concern is the one frequently
BG> overlooked.  This is the overvoltage/spike protector built into
BG> many of the A/C line conditioning units, uninterruptible power
BG> supplies, PC master switch control units, and the plug-in phone line
BG> protectors from Rat Shack.  -START- by disconnecting these.

BG> I don't know where or how this polarity myth got going, but it's
BG> nothing more than an old wive's tale.  The USR Courier modems are not
BG> polarity sensitive, period. <-- Please note the period.

BG> If reversing line polarity shows demonstrable, repeatable, conclusive,
BG> and measurable performance differences, then there is indeed a
BG> problem. Such problems would of course include the distinct possibility
BG> of a damaged/defective modem.
BG> ~~~~~~~ ~~~~~~~~~


BG> * OLX 3.0 * HANGING: Bungee-jumping in beta trials



. Area: R-USR ..........................................................
  Msg#: 7776           Rec'd                        Date: 10-07-94  16:42
  From: Bill Garfield                               Read: Yes    Replied: No
    To: Steve Ellis                                 Mark:
  Subj: 28.8 CONNECTS
.........................................................................
 -=> Quoting Bill Garfield to Steve Ellis <=-

 SE>         I am in need of some help with my phone co and the SLC system
 SE> they use.  They have been out to my house on two occassions and tell me
 SE> that everything is within tolerences.  I am using the Sporster V.34
 SE> (external) and am only able to see 19.k connects and a periodic 21.6.
 SE> I have taken the modem to neighboring communities (here in St. Paul,
 SE> Minnesota) and have seen 28.8 connects, so I know the modem (and my
 SE> setup) is working properly.

 SE>         I'd sure appreciate any help you can give.  The phone co has
 SE> been very nice about it, but I get the impression they have done about
 SE> all they are going to do unless I can come up with something more to
 SE> tell them...
```

```
 BG> Hello Steve.

 BG> Usually the biggest headache with the SLC-96 (Subscriber Loop
 BG> Concentrator) is poor bandwidth.  The high frequencies fall off too
 BG> rapidly beginning just above 3000 Hz.  For the record, these things
 BG> also come under many different names, including: RT (Remote Terminal),
 BG> Pair Gain, Subscriber Mux (multiplexor) - it all depends on what area
 BG> of the country you're in.
 BG> Using USR's higher-end Courier product I've seen generally 1
 BG> step better results through the "slick" than I do with the Sportster,
 BG> but don't take that to the bank - it's merely my own experience.  If
 BG> you know someone who has one of the new Courier V.Everything modems you
 BG> may want to see if you can borrow it to test this theory.  It could
 BG> simply be that you need a little higher tech modem to deal with the
 BG> extreme limitations of the "slick".
 BG> Try also disconnecting **everything** from the phone line
 BG> except for your modem. - By everything, I mean exactly that - including
 BG> any surge protection devices that you may have connected.  There are
 BG> also scattered reports that sometimes reversing the polarity of the
 BG> telephone line can have an effect, though there's not much that's been
 BG> offered in the way of supporting evidence.  The easiest way to do this
 BG> is get a second phone cord and a double female coupler.  A standard
 BG> telephone "silver-satin" phone cord is, by design, a crossover cable,
 BG> so two of them in line together with the double female coupler should
 BG> effectively reverse line polarity from what it normally is.  IF THIS
 BG> HELPS, then have the phone co. come back out and check your line for
 BG> "balance" See if you can find out who the manufacturer of the
 BG> SLC is. If it's Western Electric or AT&T, you should be able to achieve
 BG> at least 24,000 bps through it on most calls.  If it's an offshore
 BG> brand from then results may be not as good.
 BG> Keep us posted as to your results.  FYI I no longer monitor
 BG> Conference 0 (Main Board) on USR's support bbs - it just became too
 BG> unweildy.
 BG> -!-
 BG> . OLX 3.3 . Tandy Corporation & Rat Shack:  Creators of the 286/SX



. Area: R-USR .............................................................
  Msg#: 7756           Rec'd                         Date: 10-07-94  06:03
  From: Steve Ellis                                  Read: Yes    Replied: No
    To: Bill Garfield                                Mark:
  Subj: 28.8 CONNECTS
...................................................................
 -=> Quoting Steve Ellis to Bill Garfield <=-

 SE->
 ->      The phone tech said that my community uses a "SLIC 90"  (or
 -> something like that) system to enable them to provide service to more

 JF> ARRRGGGGHHH!!!

 JF> Those stupid SLIC's cause more trouble than you'd believe.   Your
 JF> analysis of the problem is right on the head.

 JF> You might want to try leaving this info in an e-mail to a fella named
```

```
JF> BILL GARFIELD.   He's not a USR employee, but he does know a few
JF> things about the SLIC box, and he might be able to give you some advice
JF> about what to tell the phone guys.

JF> FWIW, it is possible to get good connections through a SLIC, if
JF> everything is just right.

SE> Hello Bill,

SE> I am in need of some help with my phone co and the SLC system
SE> they use.  They have been out to my house on two occassions and tell
SE> me that everything is within tolerences.  I am using the Sporster V.34
SE> (external) and am only able to see 19.k connects and a periodic 21.6.
SE> I have taken the modem to neighboring communities (here in St. Paul,
SE> Minnesota) and have seen 28.8 connects, so I know the modem (and my
SE> setup) is working properly.

SE> I'd sure appreciate any help you can give.  The phone co has
SE> been very nice about it, but I get the impression they have done about
SE> all they are going to do unless I can come up with something more to
SE> tell them...

SE> ¶Þ¯$^1$¯
SE> §

SE> (sorry about posting this in two areas, but I'm getting desperate for
SE> help)

SE> ... Gun control is hitting what you aim at.
SE> ___ Blue Wave/QWK v2.12



. Area: R-USR ..........................................................
 Msg#: 7637                                      Date: 09-28-94  20:52
 From: Tom Devlin                                Read: Yes    Replied: No
   To: Nilesh Agarwalla                          Mark:
 Subj: V.FC ONLY...NO V.34
........................................................................
-=> Quoting Tom Devlin to Nilesh Agarwalla <=-

NA>I can't get a v.34 connect. Only a v.FC connect...even with another USR
NA>v.34.

TD> Make sure that S54=64 and S56=0.

NA>I have the 8/26/94 code installed which was released on 9/9/94.

TD> Did you do an AT&F1&W after you installed the new code?

NA>Also...I only get 26400 v.FC connects.

TD> Read back in this conference for discussions of phone line quality.
TD> -!-
TD> * Channel 1(R) * 617-354-7077 * Cambridge MA * 100 lines
TD> * PostLink(tm) v1.20  CHANNEL1 (#15) : RelayNet(tm)
```

```
. Area: R-USR ..................................................................
  Msg#: 7618                                          Date: 09-26-94  20:21
  From: Doug Haire                                    Read: Yes    Replied: No
    To: Ray Bornstein                                 Mark:
  Subj: 28.8 CONNECTS
................................................................................
 -=> Quoting Doug Haire to Ray Bornstein <=-

 DH> RB|21000 connect seem to be what I am getting. I spoke with USR and
 DH> they |claim that at 26400 and 28.8 requires a larger bandwidth of the
 DH> phone |line clearly placing the blame on poor line conditions. AT&T
 DH> is my long |distance carrier and even when I call USR it's at 24000
 DH> or 21000.
 DH> It's your phone line, not which carrier you use, in this case. You
 DH> could test this by taking it someone else's location and using their
 DH> phone line but only if you already know their phone line is good.
 DH> There's not much you can do unless the problem is internal to your
 DH> house/apartment. You can disconnect all other phone devices, if any,
 DH> from your line and see if that helps. You can run a phone cord direct
 DH> to the interface box test jack, if it's fairly accessible from a
 DH> window, and see if you get an improvement. You can try a different
 DH> phone cord (strangely enough, that seems to have helped a few people).
 DH> You can try re-terminating your connections (they can get corroded).

 DH> I am fortunate, my usual connection is 26400 with a few 28800's tossed
 DH> in and a few 24000's, I rarely get worse than that.

 DH> -!-
 DH> . SLMR 2.1a #40 . Cruising the Information Superhighway in a '47
 DH> DeSoto. * Telephone Exchange 407-791-2474 V.32bis ZyXel 19200!
 DH> * PostLink(tm) v1.20  TELEPHNE (#222) : RelayNet(tm)



. Area: R-USR ..................................................................
  Msg#: 7617                                          Date: 09-26-94  22:08
  From: Bill Garfield                                 Read: Yes    Replied: No
    To: Ray Bornstein                                 Mark:
  Subj: 28.8 CONNECTS
................................................................................
 -=> Quoting Bill Garfield to Ray Bornstein <=-

 BG> Expecting 28,800 bps?  Your results may vary.

 BG> If you find that you're unable to achieve full speed 28,800 bps
 BG> connections or your modem sometimes behaves erratically, the reason is
 BG> possibly a phone line problem. Either insufficient bandwidth, poor
 BG> signal to noise ratio, or an imbalance in the phone lines... either
 BG> yours, the phone lines of the system you are calling, or in the lines
 BG> and telephone switching equipment anywhere along the way.

 BG> Here are the minimums:
 BG> ^^^^^^^^
 BG> 28,800 bps V.FC/V.34 -REQUIRES- 3200 Hz bandwidth, from 320 - 3520 Hz.
 BG> 26,400 bps V.FC/V.34 -REQUIRES- 3000 Hz bandwidth, from 375 - 3375 Hz.
```

```
BG> 24,000 bps V.FC/V.34 -REQUIRES- 2800 Hz bandwidth, from 467 - 3267 Hz.

BG> by contrast..

BG> A 21,600/19,200/16,800 link requires a usable bandwidth of only 2400
BG> Hz, from 600 - 3000 Hz. This is the same amount required for V32 &
BG> V32-bis (4800, 9600 & 14,400).

BG> Alas, while most U.S. domestic phone lines can easily support the
BG> requirements of 9600/V.32 and 14400/V.32 bis, some may not have
BG> the technical parameters necessary to support V.FC and V.34 at
BG> *FULL* speed.  This, in a nutshell, is what you (and some others) may
BG> be experiencing.

BG> Compared to V.32 & V.32 bis, 28,800 bps requires 33% more bandwidth,
BG> 26,400 bps requires 25% more bandwidth and 24,000 bps needs 17% more
BG> bandwidth. This additional bandwidth *MUST* be there from end to end,
BG> from one modem to the other.  Either you have it or you don't, and
BG> your modem is telling you by its performance.

BG> As the domestic telephone companies race to install fiber optic
BG> cables, the bandwidth situation should gradually improve.  Until
BG> then...
BG> ***********************************************************************
BG> ***** * There ARE several things you can -try- for improving at home
BG> modeming:   * * Go throughout the house and disconnect -ALL- telephonic
BG> devices attached * * to the phone line.  This includes extension
BG> phones, answering machines,  * * fax machines, caller-id boxes,
BG> line-in-use indicators, cordless phone    * * base units, demon
BG> dialers, and voltage spike protectors or line filters  * * like those
BG> commonly found in PC Desktop master-switch power directors    * * and
BG> power line conditioning units. If you find that any of this helps,   *
BG> * then start plugging things back in one by one until the culprit is
BG> * * identified.  It may even be a combination of things.
BG> * *
BG> * * If your telephone wiring is a rat's nest and/or
BG> you've strung some       * * extension lines yourself and not used
BG> genuine telephone-type wiring,     * * consider having a professional
BG> replace your haywired additions. Your     * * telephone wiring should
BG> also be WELL AWAY FROM the A/C power wiring in   * * walls & ceilings.
BG> *
BG> ***********************************************************************
BG> ***** As always, your mileage will vary.


BG> * OLX 3.0 * HANGING: Bungee-jumping in beta trials
```

1.32 The Modem Dictionary v2.00

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                    The Modem Dictionary
              (C) Copyright 1993 R. Scott Perry
                    All Rights Reserved
                        Version 2.00
```

"What is this, why, and who is this guy?"

I feel that this dictionary fills a major void. In my years of using BBS's, I have never seen such a dictionary. The closest thing I've seen was a text file that had about 40 words listed. These words included "RAM" "ROM" "Microcomputer" "Telex" and a bunch of other words that aren't really that important to understand computer telecommunications. I've seen some books about "modeming" in bookstores, but they tend to be expensive ($15-$49), and I don't recall seeing any dictionaries of terms relating to modems. Also, many terms are easy to confuse and it can be very difficult to find definitions for these terms. I have seen terms used incorrectly in advertisements by modem manufacturers and in many, many magazine articles. I hope that this dictionary can be used as a good source of reference for confusing terms.

Why do I feel qualified to write a dictionary such as this? I bought my first modem more than seven years ago and have been using computers for twice as long. Not only have I used many different computers and modems, I have seen the days where 1200bps BBS's were rare because most people had 300bps modems. For about a year I ran my own BBS, which was quite successful at the time. While I only had about 150K of storage for messages and files, I was able to get over 500 users in that year. I have also gathered, read, and searched through hundreds of text files, magazines, and program documentation, just to help define words and find new words for this dictionary. I have also spoken to representatives of major companies to help find out the truth behind the more confusing terms.

LEGAL STUFF

NOTES

Note 1: It was difficult to decide what words to include and what words not to include. I tried to include every term relating to computer telecommunications that the average user needs to know, or might come across and be curious about. Some words (such as PSK) are easily found in manuals for modems, but are hard to find definitions for. I tried to include as many of these as possible.

Note 2: Since there are so many words defined here, and many of them are complex and easily misunderstood, I wouldn't be surprised if there are a couple errors of some sort. I tried to be as careful as I could, but it is possible that there may be some mistakes. If you notice any mistakes, or have suggestions of words to add (or take out), please let me know. I correct all known mistakes in future version.

Note 3: Check out the appendixes at the end of the file! They contain a list of Emoticons :) and another list containing abbreviations (such as BTW and CUL8R).

MAKING COPIES OF THIS DICTIONARY

This dictionary is being marketing as freeware. It is copyrighted, and you may not make any changes to it without my permission.

O You may give copies to anyone you know, provided you do not charge for the copies.

O Any BBS may have this dictionary available for downloading.

O Any shareware distributors (including CD-ROM developers) may distribute this. I'd really appreciate a note saying that you are doing so.

O If you SELL any communications products, and wish to distribute this dictionary with your product(s), you MUST get my permission first (if you do not, it is considered copyright infringement). Send requests to the address listed below.

O If you wish to QUOTE this dictionary in any media, such as in an article for a computer magazine, you must give me credit. Also, you must let me know that you have quoted the dictionary. Just send a note to the address below.

PAYMENT? NO!

I've obviously put in countless hours over the past 6 years creating this dictionary. Just searching through new articles and information to find new words takes hours.

As mentioned above, this dictionary is being marketed as freeware. Feel free to use it as much as you want. However, if you find that you are benefiting from it, I'd appreciate a quick note or postcard saying so.

I'd also love to hear how you are using this dictionary. Since its first public release in 1989, the dictionary has been used: in training courses run by modem manufacturers; as a reference for term papers for school; as a reference for an article and a speech for Bar Associations; by SysOps for new user messages; and more. It has also been praised by Uncle Hanks Shareware Review Newsletter (May ’93).

"How do I reach the author?"

I’m always looking to improve the dictionary. Send any comments/suggestions/notices/praise/complaints/etc. to:

R. Scott Perry
178 Morton Street
Newton Centre, MA 02159

Hopefully, at some point there will be a BBS to call to get the latest version of the Telecommunications Dictionary, as well as to use as an easy way to contact me.

I hope you enjoy this dictionary!

Notes about the entries

* [Also called <entry>] and [Same as <entry>] mean that there are more than one word for a certain concept. Do not bother looking at <entry>, it will just refer you back to the original entry.

* [See also <entry>] at the end of a definition refers you to more information or an entry that may help you understand the original entry better. Also, a word and it’s opposite will often refer to each another.

* [See <entry>] appearing directly after the term indicates that the definition is the same as <entry>, and you should look there.

* BBS is used here generically to denote any service that you can call up with your computer, whether it is a bulletin board, a pay service, or even a mainframe.

* Some entries refer to computers in general, but an understanding of them is sometimes needed to understand other entries.

The Dictionary

---Numbers---

8N1 - The most common modem format. [See also format].

42A Block - This is a box about two inches square, with a modular jack, that separates the wires coming from the phone company. You can plug a phone or modem into this jacking, using a modular cord. [See also modular cord, modular jack, modular plug].

103 - Officially, 'Bell 103' which is the standard controlling transmission at 300 bps in the United States. It was created by AT&T. [See also 212A, V.21].

212A - Officially, 'Bell 212A' which is the standard controlling transmission at 1200 bps in the United States. It was created by AT&T. [See also 103, V.22].

300 bps (baud) - A transmission speed that is now almost never used, although most modems will allow communication at the speed (since it was common in the early 1980's). It is roughly equal to 30 characters per second.

1200 bps (baud) - In the mid 1980s this was the most common transmission speed, until 2400 bps became popular/cheaper. It is roughly equal to 120 characters per second.

2400 bps (baud) - A fairly high-speed transmission speed that towards the end of the 1980s gained popularity. It is roughly equal to 240 characters per second.

3400 hertz - The highest pitch that a telephone line will transmit. This cutoff limits the ways in which computers can communicate over telephone lines.

8250 UART - The UART used for the communications ports on most older computers. [See also UART].

9600 bps (baud) - This, along with 14,400 bps are the 2 standard speeds for high-speed modems. It can transmit and receive approximately 960 characters per second (without compression).

14400 bps - Currently, the fastest standard speed for high-speed modems.

28800 bps - The highest speed obtainable using the proposed V.fast standard.

16450 UART - The UART used with some 286 computers. [See also UART].

16550 UART - This is the UART used with most newer computers and high speed modems. There are several variations, but they all include one main feature: they include buffering, so that if data comes in or is sent faster than the computer/modem can accept it, the UART will hold the data (up to 16 bytes) until the computer/modem is ready for it. [See also UART].

16550A UART - See 16550 UART.

16550AF UART - See 16550 UART.

16550AFN UART - See 16550 UART.

---A---

abort - [1] The command word used with editors that allows you to exit, destroying your message. [2] The character used to stop characters from a block of text appearing on your screen. Usually the spacebar or CTRL-X are used to abort a message.

access - Refers to an intangible amount (usually represented by a security level or flags) that indicate to what extent you are allowed to use a BBS. When used in a term such as ‘you will be granted access’, it means the amount of access that new users will generally receive.

account - A term that refers to information that a BBS has about you. It is usually referred to by an ID number or your name. The information it contains can include any information that you have at some point given the BBS, usually including your name, phone number, and security level. [See also user number].

account number - See user number.

Acculink - A packet switched network that is used to save money on long-distance telecommunications.

ACK - A character (CTRL-F) that ACKnowledges something, usually that a certain amount of data has been received correctly. [See also NAK].

acoustic coupler - This was common many years ago, but rare now. It is a cradle in which you would place the handset of a phone. This would be connected to a modem, and the modem would access the phone line through this coupler. Modern modems connect directly to the phone line. [See also acoustic modem].

acoustic modem - A modem that uses an acoustic coupler. [See also acoustic coupler].

adaptive data compression - See ADC.

adaptive dialing - When a modem can determine whether to dial pulse or tone. It will try dialing with tones first. If that doesn’t work, it will dial pulse.

adaptive equalization - Modems that have this feature "listen" to the phone line to find the bandwidth with the least noise, and use that part of the band for transmission. This allows for less interference from noise.

ADC - Adaptive Data Compression. A method of data compression developed by Hayes, with a possible compression ratio of 2:1.

address - Similar to a physical mailing address, an address lets people know how you can be reached on a network. It may consist of numbers or words, for example, 1:212/113 or joe@usc.edu. [See also matrix address, network address].

alias - A name that users can use on a bulletin board that is not their own. Aliases are usually used by young BBS users and those who pirate software or do other illegal activities. Some examples of aliases are 'Cracker Kid', 'Starbuck', and 'Midnight Killer'. [Also called handle]. [See also user name].

America On-line - A commercial on-line service.

ampersand - A character (&) that usually means 'and'.

analog - As far as electronic signals are concerned, analog refers to signals that can represent an infinite range of numbers, as opposed to digital which can only be distinct whole numbers. Analog data often comes from measurements. The sound a modem makes over the phone is analog since it can be any of a number of different frequencies. [See also digital].

anonymous - Refers to a message, where the author was able to leave out his name. On some BBS's you are allowed to post anonymous messages so that others won't know who you are. The SysOp usually can find out who the author is, however.

ANSI - ANSI is an organization that sets standards. ANSI graphics, however, is a set of cursor control codes which originated on the VT100 smart terminal. Many BBS's use these codes to help improve the sending of characters to communications programs. It uses the escape character, followed by other characters, which allows movement of the cursor on the screen, a change of color, and more.

answering computer - This is the computer that is being called. Therefore, it is usually the BBS or mainframe. [See also originating computer].

answering machine - See voice mail.

answer frequency - The frequency of the carrier that a modem uses when it has been called by another computer. [See also originate frequency].

answer mode - When a modem is ready to pick up the phone when it rings. After picking up the phone, the modem will attempt to make a connection with another modem. All BBS's are in answer mode. [See also originate mode].

apostrophe - The character '. It is usually used in contractions of words, such as "don't".

ARC - When a filename has the extension ARC, it means that it is an archive that has been compressed with the program PKARC. To get the files out of the archive, you need to use the program PKXARC. You should be able to find this program on many BBS's. [See also archive, unarchive].

archive - [noun] A group of programs that are together, usually compressed, in one file. [verb] the process of combining those files. There are a number of software packages which will compress files into an archive, and most programs on BBS's have been archived with one of these software packages. [See also unarchive, compress, ZIP, ARJ, ARC, PAK, LZH].

area code - The 3-digit number used by the telephone company to designate a geographic area. Each state in the United States has 1 or more area codes. If you call a phone number in a different area code, you must dial "1" and then the area code before the phone number. If you call a number within your area code, you just dial the phone number (if it is long distance within your area code, you must dial "1" and then the number).

ARJ - [1] A file extension that indicates that the file was compressed with the program ARJ. [2] The program ARJ, used to archive and un-archive files with the ARJ extension. [See also archive, unarchive].

ARPA-NET - The network from which Internet was formed.

ASCII - An acronym for American Standard Code of Information Interchange. It uses 7 bits to represent all uppercase and lowercase characters, as well as numbers, punctuation marks, and other characters. ASCII often uses 8 bits in the form of bytes and ignores the first bit. [See also EBCDIC].

ASCII transfer - When a text file is sent directly as it is, without any special codes.

asterisk - The character *.

asynchronous communication - This is when the beginning and end of each byte that is sent over the phone lines is marked somehow. This way, if there is line noise, the modem can find out right away where the next byte should start. [See also synchronous communication].

AT command - Any instructions sent to a modem that begin with "AT". See also Hayes AT command set.

AT command set - See Hayes AT command set.

at sign - The character @. Often read as 'at'.

AT&T - American Telephone and Telegraph, the inventors of the first modem.

attended mode - This is the mode that a communications program is in while you are operating it. [See also unattended mode].

attention characters - The letters "AT", which get the modem's attention that you are about to send it a command. [See also Hayes AT command set].

audio monitor - A speaker that is included as part of a modem. It allows you to listen to whatever sound is on the phone line. This is often used to let you hear busy signals or make sure that the other modem picks up the carrier.

auto-answer - When a modem has the ability to automatically pick up the phone when the phone rings and then attempt to connect with another computer.

auto-answer LED - When this LED (found on some external modems) lights up, it means that the modem is ready to answer the phone when the phone rings (it will then try to connect to another modem). If it is not lit, the modem will not answer the phone. [See also LED indicators].

auto-baud detect - The ability of a modem to change to a lower bps rate if the computer it is calling is unable to communicate at the requested speed.

auto-dial - When a modem is capable of dialing a phone number, so that you don't have to dial manually. Almost all modems have this ability.

auto-download - The feature of some file transfer protocols whereby a BBS can automatically make your communications program start a download or upload (if your communications program has this capability too). This saves some time for the user, who would otherwise have to set up his program to upload or download.

auto fall-back - See fall-back.

auto-kill - A feature on some BBS's that will delete a message on a board if a certain threshold limit is reached. For example, a BBS might delete the second message on a board if there are already 100 messages and someone posts another message. This would limit the board to 100 messages, but still keep the first message (which is usually left by the SysOp).

auto-redial - A feature that allows a modem or a communications program to dial a number again after it finds out that the number is busy. This is very handy when trying to get through to popular bulletin boards that are often busy.

auto-reliable - The ability of a modem to be able to communicate both with modems that do have error-control and/or data compression, and those that do not.

auto-reply - To send a message (either public or private) immediately after reading a message on a BBS. Usually, this is used to respond to the author of the original message.

auto-syncing driver - This is the part of a BBS program that automatically determines the bps rate of a caller. [See also manual-syncing driver].

auto-typing - This is when a communications program can upload information to a BBS as if the user were typing in the information. For example, the user might type a message into a file, and then the communications program can send it to a BBS (which assumes the user is actually typing the message) to post as a message.

---B---

backdoor - A way of getting into certain BBS's and getting full access, without using a regular account. Usually the author of the BBS program built the backdoor into the program so that he could get access to any BBS running his software. Backdoors are less common today than they used to be.

background send/receive - The ability of a fax/modem to send or receive faxes while the computer is being used for other purposes.

backslash - The character \.

backspace - The character (CTRL-H) that causes the cursor on your screen to move back one space. [See also destructive backspace, non-destructive backspace].

bandwidth - A range of radio, audio, or other frequencies. Telephone lines have a bandwidth from 300 hertz to 3400 hertz. Since it is so limited, a modem must carefully change data into sounds that "fit" within this range. Similar to frequency spectrum.

bannerware - A software program that is free to use and copy, but advertises another program or product. [See also public domain].

batch file transfer - This is when more than one file is sent at a time by a file transfer protocol. The user will tell the BBS what files he wants, and then the BBS will send all the files before the user needs to do anything else.

baud - A term referring to the speed at which modems communicate. Technically, it is the number of changes in an electronic signal per second. Since the number of changes used to be the same as the number of bits sent or received per second, bps and baud are often used interchangeably. However, there is a difference, which is very often confused. For example, many 1200bps modems were advertised as 1200 baud, even though they operate at 600 baud. They send out 2 bits 600 times a second, which means that it is 600 baud. However, since it is so often misunderstood, you can assume that when you see "baud" it means bits per second, unless it is stated otherwise. The term comes from the scientist J. M. E. Baudot. [See also bps, dibit].

BBS - An acronym for Bulletin Board System. Usually it is a home computer that has a modem attached and is waiting for calls from other computers. It can, however, also refer to commercial services (such as CompuServe and Prodigy) and any other computers that you can call via telephone lines. BBS's almost always allow you to leave messages for other users. Most BBS's have programs that you can download and use on your computer. BBS can also be expanded more simply to 'bulletin board'.

BCC - Block Check Character. This is used to help make sure that a group of data has not been accidentally altered.

Bell 103 - See 103.

Bell 212A - See 212A.

bisync - Refers to a modem that synchronizes with an electronic signal over the telephone lines that marks the beginning of blocks of data. It is one of a number of synchronous protocols.

bit - A Binary digIT. It is a number in base 2 (binary), which means that it can only be a 0 or a 1. It is used in the expression 'bits per second'. [See also byte].

bitstream - BBS's and related activities. For example, you could say that a lot of public domain programs can be found in the bitstream.

blind dial - This is when a modem will dial a number without waiting for a dial tone. Some long-distance telephone services require a number to be dialed, even though there is no dial tone. In this case, your modem should be set to blind dial.

block - A group of data bytes. For example, when downloading a program, blocks of 128 or 1024 characters are often sent.

block check character - See BCC.

block size - This term, when used with either error control or data compression protocols, refers to the number of characters to be sent at one time. If error control is used, the codes are sent immediately following this block. Typical block sizes are 64, 128, 192, or 256 characters. Small block sizes are better when the line quality is bad (such as for long distance calls), while large block sizes are better during good connections (such as for local calls).

board - [1] See BBS. [2] See message base.

bps - Bits Per Second. The transmission speed of most modems is measured in baud or bps. Bps is literally the number of bits sent by the modem every second. [See also baud].

braces - The characters { and }. [See also left brace, right brace].

brackets - The characters [and]. [See also left bracket, right bracket].

break signal - This is a signal sent from one modem to another that lasts for about a second. It is sometimes used to try to clear up synchronization problems. On CCITT V.42 modems, there are more specialized procedures involved with the break signal, such as regarding the timing. In V.42 there are three kinds of break signals. [See also expedited signaling, destructive signaling, in sequence signaling].

browse - To go through the list of titles of messages or files on a BBS and note which ones you want to read. On some BBS's, you can search through the messages and look for specific words. This can be handy if there are lots of messages, and you do not want to go through them all.

buffer - [1] (verb) To save all incoming data in memory. [2] (verb) to temporarily save incoming data until the computer has a chance to process it. [3] (noun) The place in memory where the saved information is stored, as in "I have a 32K buffer."

bulk mailing - Used on a BBS when you send the same message to more than one person. This saves you from having to rewrite the message. [See also E-mail].

bulletin - A special message posted on a BBS, usually written by the SysOp. In most cases all users are expected to read any new bulletins that may have been posted since their last call.

bulletin board - [1] See BBS. [2] Sometimes same as message base.

bulletin board system - See BBS.

busy - When a bulletin board is being used by as many users as it can handle, which is when all the telephone lines are being used.

busy signal - The sound that you hear on a phone when the phone number you are trying to reach is in use (busy). It usually consists of 60 cycles per minute. [See also audio monitor].

byte - A group of 8 bits. It usually represents one character. [See also ASCII].

---C---

call back unit - A device that can be attached to the phone line of a BBS to make it more secure. After you connect with the BBS and tell it who you are, the device will then call your phone number. This is used to make a very secure system to help prevent hackers from invading a system. It then becomes very difficult, if not impossible, for a hacker to get into the computer system.

caller - Anyone who connects with a BBS. It is usually used in a phrase such as "You are caller #4328."

caller I.D. - A code that is sent over the phone lines in some areas when a person makes a phone call. This code includes the phone number of the person making the call. Some modems are able to understand this signal, and let you know who is calling you before you answer the phone.

caller log - A list of callers who have called a BBS within a given time period. The list may also keep information such as the bps rate of the caller. This is used so that the SysOp can keep track of users, as well as any hackers, if they call the BBS.

call progress monitoring - This is when your modem tells you what is happening when you dial another computer. It will tell you that it has dialed the number, if the number is busy, if you connect, etc.

call waiting - A service that the phone company offers that allows the customer to hear a special sound on the phone if there is an incoming call while the customer is talking on the phone. The customer can then talk with either caller. This is a nice service unless you have a modem and call BBS's. If you are connected with a BBS and someone else calls you, you will be disconnected. In most areas there is a special 2 or 3 digit number that you can dial before a phone call that will disconnect call waiting for that call. If you have call waiting, check your phonebook or call the phone company to find out how to disconnect call waiting.

capital letters - See uppercase.

capture - To 'catch' text that is being sent to your computer from a BBS and put it in a buffer or a file.

capture buffer - The area in a computer's memory where a communications program stores incoming data that is to be saved. [Also called capture memory]. [See also buffer].

capture memory - See capture buffer.

card (peripheral) - Any computer peripheral that can be connected directly, inside a computer. Internal modems are usually peripheral cards.

caret - The character ^.

carriage return - See return.

carrier - The tone that the modem sends over the phone lines before any data is sent on it. It has a fixed frequency and a fixed amplitude. It is then modified to indicate data.

carrier detect - The wire in an RS-232C cable that holds the information as to whether or not the modem senses a carrier (and therefore is connected to another computer). [Also called CD].

carrier detect threshold - A way of measuring how well a modem can detect valid data over noisy phone lines. It is measured in negative dBm's (decibel-milliwatts). The bigger the number (the more negative) the better. For example, -45 dBm is better than -40 dBm. [Same as receive sensitivity].

carrier detect LED - This LED will light up on an external modem when it senses a carrier on the phone line. This indicates that the modem is connected to another modem. [See also LED indicators].

carrier frequency - This is the frequency which a modem uses to transmit or receive data.

carrier loss time - The amount of time your modem will remain on the line when the carrier is lost. It will stay on the line for this amount of time, to see if the carrier comes back. If the carrier does not come back, the modem will hang up the phone line.

CAS - Communications Applications Specification. This is a standard for fax communications. The other fax standards are class 1, class 2, and class 3. [See also class 1, 2, 3].

CB simulator - A computer service where there are multiple phone lines (usually at least 5). The CB simulator allows all the users to send messages to one another while they are on-line. It usually allows you to send both public messages that everyone who is on-line can see and private messages that only one specific user can see.

CCITT - International Telegraph and Telephone Consultative Committee. This group, created by the United Nations, establishes certain standards for data transmission. Their transmission, data compression, and error control standards all begin with V, for example V.22. To find the standards in this dictionary, look up the standard name, i.e. V.42. Note that this organization is now referred to as ITU-TSS. [See also ITU-TSS].

CD - See carrier detect.

character - Any letter, numeral or symbol. [See also ASCII].

character format - See format.

characters per second - The number of bytes or characters that can be sent over the phone lines in 1 second. This is determined by dividing the bps rate by the number of bits it takes to send one byte (usually 10--the start bit, 8 bits of data, and the stop bit). So, a 2400bps modem can send 240 characters per second (2400/10). [Same as CPS].

chat - A mode that allows two or more people (almost always a SysOp and a user on a BBS) to communicate directly with each other using the modem. Usually, each person can see what the other is typing at all times and can interrupt them (a beeping sound with a CTRL-G is useful to interrupt with). [See also page (verb)].

chat mode - This is when a communications program is set up so that the user can "chat" with someone on the other end of the line. One way this can work is that anything that is typed by the other person is printed on the top half of the screen, but anything you type would appear on the bottom half of the screen. [See also chat].

checksum - A number that represents a larger group of numbers in order to check for errors in data transmission. It is commonly used when downloading a program, as well as in error control protocols. The checksum is the result of a mathematical equation, such as adding all the numbers in a block together (although it is usually more complex than that).

chip set - A group of important IC chips on a modem (or other computer peripheral) that are all made by the same manufacturer. While there are many companies that make modems, there are only a few that make the chips for them. Because the chip manufacturer is making the chips for many companies, they produce more chips, and the price of the chips is lower than if each company produced their own. This decreases the price of the modems on the market.

Christensen protocol - See Xmodem.

CIM - CompuServe Information Manager. This is a program created by CompuServe which is supposed to make it easier to use CompuServe.

circular dialing queue - This is used in some communications programs to allow you to enter a list of phone numbers to call, and it will keep going through the list and dialing numbers until it reaches one of them. This is useful if you are trying to reach BBS's that are often busy.

CIS - Compuserve Information Service. See CompuServe.

city code - With many foreign countries, you need to dial a city code before the phone number you are trying to reach. You must dial the country code before the city code. The city code will be from 1 to 5 digits. [See also country code].

class 1, 2, 3 - Fax standards. [See also CAS].

clear to send - See CTS.

columns - A measurement of the width of your screen as measured by the number of characters your screen can fit across it. BBS's often ask for your screen width. Most computers have a screen width of 80 columns.

COM port - IBM and compatible computers have the ability to hook up devices (such as modems and mice) to the computer, through ports. These ports are called COM ports, and are numbered 1-8. While all 8 could be used, usually only #1 and #2 are used, while #3 and #4 are used occasionally. [See also selectable COM port].

comm program - See communications program.

command buffer - The place in your modem's memory where it stores the commands that you give it. [See also buffer].

command echo - When this is on, any AT command sent to the modem will then be sent back from the modem to the computer. For example, if you were to type "ATS11=40," the modem would act on the command, and then send "ATS11=40" back to the computer.

command mode - This is when your modem interprets what you type as commands, rather than just sending the data over the phone line. [See also data mode, terminal mode, voice mode].

command set - A list of all the possible commands that you can give something, such as a modem, a BASIC program, or a BBS. [See also Hayes AT command set].

commands - Instructions that you can give to a modem, a BBS, or another similar device.

commercial host system - An on-line system that you can call up, that is operated by a company that charges you to use it.

commercial software - Software that is copyrighted and may not legally be distributed by BBS's or copied and given to other users. [See also public domain, copyright].

communication - The idea of transferring one's thoughts or ideas to another person. This can be through speaking, radio, T.V., telephones, mail, etc.

Communications Applications Specification - See CAS.

communications program - A program that controls a modem, and has features that allow the user to do such things as upload, download, etc. It is similar to a terminal program but more sophisticated. It used to be used interchangeably with terminal program. [Same as comm program].

compatible - When one object can work just like another. Although the term is usually used with computers, it is often used with modems. Many modems are compatible with other popular modems. [See also V.42 compatible].

compliant - See V.42 compliant.

compress - To make data take up less space. Archiving programs do this, which means that files will take less time to transfer with modems. Many modems now have the ability to automatically compress the information they send and receive. [See also archive, data compression].

compression ratio - The ratio of the original size of data that is sent to the compressed size. For example, a 3:1 compression ratio means that the original data takes up 3 times the amount of space as the compressed data, and a modem would transfer the data 3 times more quickly than if it was not compressed.

CompuServe - The first major commercial on-line service.

CompuServe Information Service (CIS) - See CompuServe.

computer network - See LAN.

conference - A group of related messages on a BBS. Often, many BBS's are linked together for a conference (so that all users on all the BBS's see the messages and can reply to them). For example, there may be a conference just on Windows. [Same as forum].

configure - To set something to your liking. To configure a BBS, you may have to tell it your screen width, whether you need line feeds and other such information.

configuration - Configuration is the information describing what your computer's hardware and software is like, so that a BBS can send information properly. For example, you need to tell a BBS how wide your screen is.

connect - [1] To get to a point where you can start communicating with a BBS, as in "I have connected with the BBS." [2] Any point after you have established contact with a BBS, as in "I am still connected with the BBS" or "I have been connected with the bulletin board for just over an hour."

connect speed - The speed, in bps, which your modem uses when it connects with a BBS. This speed will depend on the speed of your modem, and the BBS's modem. It will be no higher than the lower of the two speeds. If you have a 2400bps modem, and call a 1200bps BBS, your connect speed should be 1200bps.

connection - The actual contact with a BBS. It is used most often in expressions such as "I have a bad connection," meaning that there is line noise.

control character - Any of the 32 ASCII characters that do not print on your screen or printer. These characters are usually used to control your computer. [See also CTRL].

copyright - A term meaning that a program or text file is protected by the government so that it may not legally be copied, except to make backup copies, or as specified by the author of the program. You should not upload a copyrighted program to a

BBS, unless it is shareware or freeware. [See shareware, freeware].

Co-SysOp - A term similar to a vice president. The Co-SysOp of a BBS has more access to the BBS than any other user except the SysOp. The Co-SysOp might check messages to make sure that they are suitable for the BBS (not containing illegal messages), and he may be able to validate users. Sometimes a Co-SysOp is just a title given to someone who helped the BBS a lot by doing things such as posting messages and uploading. Also, many times there is more than one Co-SysOp. [See also SysOp].

country code - The code that the telephone company uses to designate a certain country. If you need to call a BBS (or a person) in a foreign country, you need to dial the country code, then usually the city code, and then the local phone number. The country code will be 2 to 3 digits. [See also city code].

CPS - See characters per second.

<CR> - Carriage Return. See return.

CRC - Stands for Cyclic Redundancy Check. CRC is a system to make sure that a block of data (usually from a downloaded program) is as free from error as possible. It is usually 16 or 32 bits long (CRC-16 and CRC-32 respectively).

crash - When a BBS is harmed in such a way that it is temporarily inoperable. The usual cause is that some files are destroyed, either by accident or by a hacker. Some people try to crash BBS's, a fact that most users (and especially SysOps) think is sad.

crash recovery - This feature of some file transfer protocols allows a user to continue a download or upload that had been interrupted. With this system, a user will not have to receive the data that had already been sent before the disconnection, which will save time.

crippleware - This is software, usually distributed as shareware, but it is not the complete program. If it is a game, it might only let you play the first level. If it is a database program, it might only let you have 50 entries (whereas the real version would have more). Some SysOps refuse to have programs on their system that are crippled.

cross-link - This occurs when 2 or more echos are joined together, either accidently or purposely. If this happens, the joined echos then contain the same messages.

CRT - Cathode Ray Tube. This is another name for a computer monitor.

CTRL - The abbreviation for ConTRoL. This abbreviation is followed by a dash and then a character, such as CTRL-C, meaning the control character C. [See also control character].

CTRL-G - The control character G, which usually causes the computer to produce a beeping sound.

CTS - Clear To Send. This is when the modem lets the other computer know that it can send information to the other computer. [See also flow control, RTS].

CTS/RTS - The method of flow control that uses the CTS and RTS signals. It is built into the hardware, not software. [See also CTS, RTS, flow control].

cursor - The marker that points out where text will next appear on your screen. It can be one of many things, usually a plain white or flashing square, or an underline character.

cyclic redundancy check - See CRC.

cycling - When a light (such as the RD light) on an external modem continuously turns on and off.

---D---

DARPA - The United States Defense Advanced Research Projects Agency.

dash - The character -.

data - A group of characters that represents meaningful information. This information can be anything, ranging from bank account numbers to computer programs. [See also information].

database - [1] A program that keeps track of data, such as the information contained on mailing labels, or the price of stocks. [2] A large group of data. The sum of the information that you can receive on extensive pay services such as CompuServe can be considered a database.

database hack - A way that hackers attempt to gain access to someone's account on a BBS. They create a list of common passwords (such as SECRET and MINE) and try every one on an account to see if it is the right password. Because of this, an intelligent BBS user will not use easy-to-guess passwords.

data bits - [1] The number of bits that the modem uses to represent one byte. This is usually 8, though it can be 7 since ASCII needs only 7 of the 8 bits. [See also format]. [2] the actual bits within a byte being sent through the phone lines.

data byte - A byte of information that is being sent over the phone lines.

data carrier detect - See DCD.

data communications equipment - See DCE.

data compression - Some modems have the capability to 'squash' data so that it takes up less space. When another modem (that also has this capability) receives the data, it 'unsquashes' the data to its original form. By using data compression, a modem can send information faster. It's a lot like shorthand--all the information is still there, but it takes less space and is quicker. [See also MNP-5, V.42bis].

data grade - A phone line that is set up by the phone company to be more convenient for data communications. It should have better electronic characteristics than a regular phone line. [See also voice grade].

data mode - The mode that a modem is in where all information typed on the computer will be sent through the modem, and all information received by the modem will be placed on the screen. [See also command mode, terminal mode, voice mode]. [Same as on-line mode].

data modem - A modem that does not have the ability to send or receive fax transmissions.

data rate - See data transmission rate.

data set ready - See DSR.

data terminal equipment - See DTE.

data terminal ready - See DTR.

data throughput - See effective transfer rate.

data transmission rate - The speed at which data travels. For example, data may be sent at 115,200bps. [Same as transmission rate, transmission speed, data rate]. [See also bps].

dB - See decibel.

dBm - Decibel referred to one milliwatt. This is used to measure certain levels, such as transmit level. [See also transmit level, receive level, carrier detect threshold].

DB-25 - The 25 pin plug that connects an RS-232C cable to the RS-232 port.

DCD - Data Carrier Detect. This tells the computer whether or not the modem is connected to another modem.

DCE - Data Communications Equipment. These are computer peripherals that communicate. A modem is a DCE. [See also DTE].

decibel - A unit describing how loud one sound is compared to another. [Same as dB].

decompress - The process of converting compressed data back to its original form. [See also archive].

decoy program - A program or text sent on mainframes and multi-line BBS's that simulates the log-on procedure. The unsuspecting user will see this and enter his password, and the person who made the decoy program will get the password and can use the account.

default - A setting or an answer to a question that is automatically assumed. If 80 columns is a default, then you only have to change it if you want something other than 80 columns.

delay time - The time it takes between sending data on a computer and receiving a response from the remote computer. If the delay is long, most file transfer protocols will slow down. [See also protocol].

Delphi - One of the major on-line services. As of this writing, it does not support high speed modems.

demodulate - To convert the tones that a modem sends over the phone lines back into data. [See also modulate].

department name - This is the last piece of information needed for an internet address. [See also internet address].

destructive backspace - A term that indicates that your communications program deletes the character the cursor is on when it receives the backspace character. [See also non-destructive backspace].

destructive signaling - This is a type of break signal that causes all data to be destroyed while the break signal is being sent. [See also break signal].

dial - To send out either the tones or pulses that the phone company needs to understand what number you are calling. Most modems will dial automatically (auto-dial).

dialing speed - See touchtone dialing speed.

dialout facility - A service where you call a computer, and from that computer you can call other computers. It is usually used with packet switching networks, which saves you money on long distance calls.

dialup line - A telephone line connected to the telephone company. This is a regular phone line. [Compare to leased line].

dialup modem - A modem that is used over normal (dialup) telephone lines.

dial modifiers - Any commands that are sent to a modem which change the way a phone number is dialed. For example: tone, pulse, and pause.

dial tone - The sound that you hear when you pick up the phone if it is ready to have an outgoing call made. Your modem, if it can dial, should understand this tone.

dibit - Two bits sent simultaneously by a modem. For example, a modem can operate at 1200bps and 600 baud. What happens in this case is that 600 times a second, the modem sends out a dibit (two bits). Therefore, it is sending 1200 (600 times 2) bits per second. [See also bps, baud].

dictionary - The V.42bis data compression protocol stores certain data that is being sent/received in a "dictionary," which it refers to when compressing/decompressing data. [See also V.42bis, dictionary size]. [Same as encoder dictionary].

dictionary size - This is the number of characters in the dictionary used for the V.42bis data compression protocol. It is usually 2048, but can also be 1024, 512, or 4096. [See also dictionary, V.42bis].

digital - A system using discrete numbers to represent data. In computer systems, these are the numbers 0 and 1 (for binary). [See also analog].

digital signal processing - This is what is used to perform echo cancellation on a CCITT V.32/V.42 modem. [Same as DSP]. [See also echo cancellation].

DIP switch - DIP stands for Dual In-line Package. DIP switches are a group of small switches placed together on electronic equipment. Many modems have these. The switches can be changed to alter various settings. For example, one DIP switch on a modem may change the status of the DTR.

direct mode - See MNP direct mode.

disconnect - To hang up the phone and cause the connection between your modem and another computer to be stopped. Most BBS programs have a way of disconnecting a user who has called the bulletin board, if it is needed.

disk capture - This is when a communications program will save incoming information to the disk. This is useful if you are receiving a text file that you want to read later.

dither tone - See echo suppressor defeat tone.

domain - The domain is the main category for an internet address. [See also domain name].

domain name - This is the name for an internet domain. The most common domains are COM (commercial), EDU (educational), and GOV (government).

door - A gateway that will allow a bulletin board to run a program while a user is on the BBS. Games are popular doors on BBS's, although doors can be used for serious purposes, too.

down - A word meaning that a bulletin board is not working, so that you can not connect with it. This can mean that there was a crash, or it could simply mean that the SysOp is playing a game on his computer. Often a SysOp will leave a phone connected to his BBS line off the hook when he is using the computer so that you will get a busy signal. [See also running].

download - To receive a computer file from a bulletin board. It is usually a computer program, but can also be a text file. [See also upload, protocol].

DSP - See Digital Signal Processing.

DSR - Data Set Ready. This indicates that the modem is on, and ready to accept input from the computer (either commands or data to be sent over the phone line). [Same as modem ready].

DTE - Data Terminal Equipment. This is computer equipment which is not directly responsible for communicating, for example, the computer itself and printers. [See also DCE].

DTMF - Dual Tone Multi-Frequency. This is used in tone dialing. It is a method where 2 distinct tones are sent for each digit dialed.

DTR - Stands for Data Terminal Ready. The DTR signal is sent from the computer to the modem, to let the modem know that the computer is ready to communicate.

dumb modem - A modem that only sends and receives characters to or from the phone line. [See also smart modem].

dumb terminal - A keyboard and monitor that receive and send information either to or from another computer or a phone line. It is up to the other computer to do anything else, such as word wrap. [See also terminal, smart terminal].

duplex - The capability of both sides of a connection to send information at the same time. Full duplex is the same as duplex. When you are talking on the telephone to someone you are using duplex (you can both talk at the same time if you want to). [See also half duplex].

---E---

EBCDIC - Stands for Extended Binary-Coded Decimal Interchange Code. It is a way of coding characters. It is similar to ASCII, but it uses 8 bits instead of 7. [See also ASCII].

EBBS - Electronic Bulletin Board System. See BBS.

echo - [1] A reference to an echomail conference. For example, "This echo has too many messages." [2] A character that is sent back from a BBS instead of the character that was sent to the BBS. For example, if you enter your password on a BBS it will often say 'dots will echo', meaning that it will send a period for every character in your password (it is a safety feature). [3] When a bulletin board or your terminal program sends back the characters that you type. If the bulletin board does not send back the characters, your terminal program should print them to your screen as you type them. [4] Echo on the phone lines is when you hear an echo on a long distance call. This can interfere with modem transmissions. [See also local echo, echo suppression].

echomail - Many BBS's have message bases that are shared with other BBS's. Usually late at night the BBS's will exchange any new messages. This way a user on one BBS can interact with users on other BBS's. Sometimes echomail can extend across the world.

echo canceling - This is included in the CCITT V.32 standard. It attempts to cancel echoing on long distance calls, which otherwise would interfere with the transmission. It sends the exact opposite of the sound it receives, which cancels the echo. [See also echo suppression, digital signal processing].

echo suppression - Echo suppression is a technique that the phone company uses in an attempt to make long distance voice calls sound better, by minimizing echo. However, this can cause the carrier of a modem to be lost (or at least garbled, causing a loss of data). In order to prevent this problem, a modem needs to send a certain tone over the phone line at all times. [See also echo suppression defeat tone].

echo suppression defeat tone - This is a signal sent over the phone lines by some modems in an attempt to cancel out the negative effects of echo suppression. In the Bell standard, it is 2225Hz +/- 10Hz, in CCITT standards it is 2100Hz +/- 15Hz. [Same as dither tone]. [See also echo suppression].

editor - The part of the BBS that allows you to enter a message and edit it.

effective throughput rate - See effective transfer rate.

effective transfer rate - This is the rate at which data can be sent after data compression has been accounted for. For example, a modem may be rated at 9600bps. If it uses data compression with a ratio that averages 2:1, it has an effective transfer rate of 19,200bps. While only 9600 bits are sent over the phone line, they represent 19,200 bits of real information after they are decoded. [Same as throughput, data throughput, effective throughput rate]. [See also raw speed, data compression].

EIA - Electronics Industry Association. They developed the RS-232C standard. [See also RS-232C].

electronic mail - See E-mail.

E-mail - Electronic mail. Messages that are sent to individual people. You choose who to send the message to and (usually) only that person receives the message. (Some BBS programs allow you to send bulk E-mail, which goes to more than one person, but the concept is still the same.) Originally, you could only send mail to people on the same BBS. Now, through networks, it is possible to send mail to anyone on any BBS in the network.

emoticons - See emotion icons.

emotion icons - These are groups of several characters that are used to express emotion over the phone line. For example, :) is a happy face (when you look at it from the side). Similarly, :(is a sad face. [Same as emoticons]. [See Appendix B].

emulate - When a communications program imitates a certain brand of terminal.

encoder dictionary - See dictionary.

encryption - Coding data so that people who are not supposed to see the data will not be able to understand it.

ENQ character - This is the same as Control-E, ASCII value 5. It stands for Enquiry.

EOF - Stands for End Of File. It is the character CTRL-Z, which can mark the end of a text file.

equalization - When a modem adjusts its transmit level for different frequencies, to account for the greater loss at certain frequencies over the phone line. [See also transmit level, receive level].

error - When there is line noise and one or more characters are changed. This is especially noticeable when downloading or uploading a program. In this case the error must be detected, and the data must be re-sent (or else the file will be destroyed). [See also line noise].

error control - The ability of a modem to notice errors in transmission, and have any incorrect data re-sent. [See also MNP 1-4, LAPM, V.42].

error correction - See error control. (Error control is a more correct term, since the modem does not correct incorrect data, it just has it sent again).

error free - When referring to data transmission, error free refers to communications equipment in which data is transmitted perfectly. This is actually an impossible situation, but it is possible to have data that is very, very close to error-free.

ESC - See escape key.

escape character - ASCII character 27. [See also escape key, ASCII].

escape character guard time - See guard time.

escape code - See escape sequence.

escape key - The key marked ESC on a computer keyboard. It is often used to 'escape' out of a program or procedure in a program. Also, the ASCII character (ASCII 27) is used by ANSI to produce limited graphics. [Same as ESC]. [See also ANSI].

escape sequence - A sequence of characters (usually +++) that instruct a modem to change from data mode to command mode, if they are typed with a certain delay before and after they are typed. [See also data mode, command mode, guard time].

even parity - This indicates that the parity bit is always set such that the sum of the "1" bits in each byte that is sent, plus the parity bit, is an even number. [See also parity bit, format].

executive mode - When a user is connected to a bulletin board, but the SysOp is controlling the bulletin board. The most common use of an executive mode is when the SysOp validates users without the user having to hang up.

exit - See logoff.

expedited signaling - Break signals that are sent before any other data. All data will remain intact. [See also break signal].

expert mode - Many BBS's have this feature, which allows a user who feels that he knows the system well to save time by not having menus sent to his system. If he forgets some commands that are available, he can have the menu appear. Otherwise, the menus will not appear. This is especially helpful at slow speeds.

extension - The extension of a filename on an MS-DOS system is the last three characters, which are separated from the rest of the filename by a period. For example, the filename SPREDSHT.WKS has the extension "WKS". [See also archive].

external modem - A modem that is located outside of the computer. It is hooked up to the computer with a cable, most commonly an RS-232C cable. [Same as stand-alone modem]. [See also internal modem].

external program - A computer program that is separate from another program. When BBS software runs a program that is separate from it, it is called an external program. [See also door].

external protocol - This is a file transfer program that is not built into your comm program, but the comm program is able to run it anyway (as an external program). [See also internal protocol].

extract - To take out files from an archive. [See also archive, unarchive].

---F---

factory configuration - The way that your modem was set up when it left the factory. Typing ATZ normally returns your modem to the factory configuration.

fall-back - The ability of a modem to change to a lower speed when there is a problem communicating at the higher speed (usually caused by line noise). [Same as auto fall-back].

fall-forward - This is when a modem will change to a faster speed if line conditions improve after a fall-back occurs.

fax - Short for facsimile. It is a copy of a piece of paper that is sent over the phone lines by a fax machine. Some modems also have fax machines built in them, so that they can send and/or receive faxes. [See also faxmodem].

faxmodem - A modem that also has the capability of sending and receiving faxes. [See also fax].

FCC - Federal Communications Commission. This is the government agency that is responsible for making sure that phone lines are being used correctly and that radio interference is at acceptable levels.

FDM - Frequency Division Multiplexing. A way that some modems transmit full duplex information, by splitting the telephone bandwidth into two sections. One is used to receive data, the other is used to send data. This method can be used at speeds of up to 2400bps. [See also modulate].

feature negotiation - This is when a modem can determine the best protocol to use when connecting to another modem. This includes the fastest speed, error control, and data compression. It is part of hand-shaking. [Same as negotiation scheme].

feed - The connection between a BBS and a message network. When a BBS "loses its feed," that means that it is no longer receiving messages from the network, and can not send to the network.

feedback - A message that is sent by a user to the SysOp of a bulletin board. While it is meant to be a way for the user to let the SysOp know of any complaints or compliments they may have, it is more often a convenient way of sending E-mail to the SysOp.

fidonet - A public network connecting thousands of BBS's around the world.

filter - When a communications program or a BBS program takes out certain characters or words and doesn't accept them. For example, a bulletin board program may filter out CTRL-G's so that the SysOp does not hear the beeping. Also, some BBS programs have the ability to take out obscene words from messages. [See also profanity filter].

filter device - A piece of hardware which goes between the modem and the phone line of a BBS. When a user calls up, they will either have a voice or computer connection that asks them for a special password before they can gain access to the main computer system. This makes it more difficult for hackers to get into the system, but is also more of a burden for the legitimate users.

FINGER - On internet, a function that allows you to determine if a user is connected to the network.

flash - On a normal telephone, this is when you quickly push down and release the off-hook button. It is often used for call waiting. Many modems have a command that will simulate this action.

flag - A piece of information that is either TRUE or FALSE. It is used in some bulletin board security systems to indicate whether the user has access to certain parts of the bulletin board. It is also used by modems for certain indicators such as DTR.

flow control - A method of controlling when information is sent. One method is Xon/Xoff, where a BBS will send information until your computer sends an Xoff (CTRL-S). It will resume sending information when you send an Xon (CTRL-Q). [See also Xon/Xoff, CTS/RTS].

format - Information such as "8N1" that describes the way that your computer and a bulletin board should be connected. The first digit is normally 7 or 8, the number of data bits. The second character is a letter describing the parity (N for None, M for Mark, S for Space, O for Odd, and E for Even). The last number is the number of stop bits. 8N1 is the most common format. Data is sent as follows: Start bit (0) - 7 or 8 bits of data - (parity bit, if used) - stop bit (1) - (gap bits, if used) [Same as settings].

forum - See conference.

forward - To send E-mail that you received to someone else.

FOSSIL driver - Fido-Opus-SEAdog Standard Interface Layer. This is a program that allows BBS and related programs to communicate with different types of modems, keyboard, and monitors.

framing bits - Bits that are used to separate characters. The bits themselves are not used as information. [See also stop bits, start bits].

framing error - This occurs when the UART in a modem does not detect a stop bit. The modems are probably out of sync with each other.

freeware - Computer programs that are copyrighted, but they may be legally copied if there is no payment involved. They are almost the same as public domain programs, except that public domain programs are not copyrighted and may be sold for payment. Freeware programs often can not be changed when they are distributed. [See also public domain].

freq - Short for "File REQuest." It is used to get program(s) from a BBS, without logging on. In order to do this, you need to be part of a network that that the BBS is also part of.

frequency division multiplexing - See FDM

frequency shift keying - See FSK.

frequency spectrum - A range of frequencies having similar characteristics. All sounds we hear are grouped as the audio frequency spectrum. Similar to bandwidth.

FSK - Frequency Shift Keying. This method that low-speed modems use to transmit information over phone lines uses 4 frequencies, which are used to represent 0's and 1's for both sending and receiving. These modems can only operate up to a speed of 600bps at full duplex (or 1200bps at half duplex). [See also modulation].

FTP - File Transfer Protocol. This is the method of transfering files on internet.

full duplex - See duplex.

full flow - See streaming.

---G---

gap - See gap bits.

gap bits - A series of 0's that are sometimes sent between data bytes over the phone lines.

garbage - Unwanted characters that appear because of either line noise or incorrect settings. [See also line noise, format].

gateway - A connection between one network and another. For example, on some commercial on-line services, you can reserve airplane tickets. This usually involves the on-line service you called connecting to the airline's computer.

general file - Any kind of text on a bulletin board that is not specifically E-mail, a bulletin of any sort, or a message. Usually they are long files for the user's information. Some examples of general files are: a file containing more information on the bulletin board program, a newspaper article about a controversial issue, and an article that explains how to make your own disk drive.

GENIE - One of the major on-line services.

global scan - When a bulletin board goes through all the messages on all boards to check for new messages that the user has not yet read. This is very useful as it prevents the user from having to go through each board to check for new messages. [See also quickscan].

goodbye - See logoff.

group III FAX - The standard controlling fax communication.

guard time - When the escape sequence is sent to your modem, the guard time is the amount of time that must occur between characters of the escape code, for it to be considered the escape code. Otherwise, it will assume you are entering data that is meant to be sent to the other modem. [See also escape code, data mode, command mode].

guard tone - A tone that is sometimes sent over the phone line for echo suppression. 1800 hertz and 550 hertz are sometimes used.

guest - When a user is just looking at a bulletin board and does not want to receive an account there. The user usually has the same privileges as a new user who has not yet been validated. Many bulletin board programs allow guests. This is a good feature, since the SysOp does not have to validate users who will not be calling the board more than once or twice.

---H---

hacker - [1] A programmer who likes to experiment with computers (this is the type of person who often will not read the documentation to software before using it, so he can figure out how to use it by himself). [2] A person who attempts to abuse the privileges of computer BBS's and other services. His activities may range from getting and exploring an account he is not supposed to have on a mainframe computer to attempting to crash a bulletin board. These people are unwanted by most BBS's. They are often not malicious. The media sometimes confuses them with phreakers. [See also phreaker].

half card - For IBM compatible computers, this is a card that is smaller than normal (about half the size). It does not affect the operation of the modem.

half duplex - This is a mode which allows only one modem at a time to transmit information. When one modem is finished, the other can then start to transmit. [Same as simplex]. [See also duplex].

hand-shaking - The process of establishing an electronic link between two modems. Handshaking lets both modems know information such as the speed they will be using, and whether or not the modems have the same type of error correction capability. [See also feature negotiation].

handle - See alias.

hang - When a bulletin board all of a sudden starts to do nothing. That is, it will not accept calls or even let the SysOp type anything until the computer is reset. This can be caused by a problem with the BBS software, or the computer itself.

hang up - When someone closes a switch which stops a telephone connection. This either happens when someone puts a telephone receiver into its cradle or when the person instructs the modem to hang up.

hardware error control - This is when error control is performed by the modem, not the communications program. [See also error control].

Hayes compatible - Any modem which operates in the same way as the modems developed by Hayes. Most modems up to 2400bps are Hayes compatible.

Hayes AT command set - This is the set of commands used to operate Hayes modems and Hayes compatible modems. Almost all of the commands start with AT.

help file - Many BBS systems will include information on how to run the system in case you are having troubles. Often just pressing "H" or a question mark at the main menu will show you the information, but with some systems you have to find the help file somewhere, occasionally amidst the files to be downloaded.

hertz - A unit of frequency, which equals cycles per second.

high speed - A modem that operates at a high speed. In most cases it is assumed to be at least 9600bps.

host - The computer that is being used to store information from other computers. Every BBS is a host, and so are pay services. On a network, hosts are all the computers that are connected to the network.

host program - A computer program that allows your computer to accept incoming calls, and let the callers upload or download files. It is limited compared to a BBS. If you want to do anything more, such as record information or print it out, you usually have to do the programming yourself. [Similar to unattended mode].

hot-keys - A term which means that you only have to press one key at a menu, rather than several. You don't have to hit the return key. Usually you can do this while a menu is being sent to your computer (so you don't have to wait for the whole menu to be sent).

HS/LINK - A file transfer protocol that allows you to upload and download at the same time, which can theoretically double your transferring time.

HST - High Speed Technology. A high speed protocol developed by US Robotics. It allows for 14400bps one way, and 450bps the other way. The two computers can switch when one has more information to send than the other. It is not compatible with the CCITT protocol.

hyphen - The character -.

Hz. - See hertz.

---I---

IBM graphics - On IBM computers, there is a group of "graphic" characters (such as lines, used to make boxes) that can be shown on the screen. Some BBS's will send these graphic characters if requested. Most non-IBM computers will not recognize these characters. These characters' bytes have their 8th bit set to 1.

ID number - See user number.

idle time - When a computer is not being used. This refers to either a computer running a BBS that is not busy, or a caller that is not sending anything or receiving anything. Some BBS's will hang up a user if there is a certain amount of idle time (such as a minute).

inactivity timer - When this is on, a modem will automatically disconnect from a remote computer after a given amount of time passes without any information sent or received.

incoming - Information that is being sent to your computer.

information - Any data that is sent between computers. Data usually refers to numbers and small pieces of information. Information is usually used for larger things, such as text files. [See also data].

initialize - To set up either hardware or software to work correctly with your system. Many modems have to be initialized each time they are used so they 'know' how to act with the communications program. When your software initializes your modem, it may tell the modem to expect 2400 baud and no parity, as well as the fact that you do not want any information to echo on your screen.

[See also initialization string].

initialization string - This is the command that your communications program sends to the modem when the program is started. In most cases, it is an AT command just like you would type in. [See also initialization].

interdigit interval - When pulse dialing is used, you need a certain amount of time free of "clicks" so that the phone company knows when each digit is finished. When you are dialing on a rotary phone, you don't need to worry about this because the time it takes to turn the dial is sufficient. A modem that sends pulse codes must wait a specified amount of time before going from one digit to the next in a phone number. A value between 1/2 second a 1 second is usually used.

internal modem - A modem that is 'hidden' inside your computer. Outside of your computer you will only see the phone cord. An internal modem can either be on a peripheral card that is placed inside your computer, or it can be built into your computer. [See also external modem].

internal protocol - A file transfer protocol that comes as part of a comm program, and is not separate from it. [See also external protocol].

International Telephone Union - See ITU.

internet - This is the largest network of BBS's. It was originally started by the U.S. Government. It connects hundreds of thousands of host computers.

internet address - This is an address used to reach someone on the internet. It is actually a 32-bit number assigned by the U.S. Government agency DDN Network Information Center. It is broken down into 4 parts, the domain, the organization, the system, and the department. [Same as IP address].

internet format - An address on internet. For example, Joe_User@place.loc.edu.

internet relay chat - On the internet, it is possible for 2 or more users to talk to each other in "semi-real time", meaning that their messages may take a while to reach each other, but quick enough that they can wait for replys and "chat."

interrupt - An interrupt, as far as modems and computers are concerned, is an electronic signal that tells the computer that something important is happening. Most modems can be set up by software to send an interrupt every time a character is received by the modem. When operating at fast speeds, this makes sure that the computer doesn't miss characters as it is printing them on the screen or saving them to a disk.

in sequence signaling - Break signals that are sent in the proper order among data, as opposed to expedited signaling (which will send the signal before other data). No data is harmed, it all remains intact. [See also break signal].

IP - Internet Protocol. See internet address.

IP address - Internet Protocol address. See internet address.

IRC - See Internet Relay Chat.

ITU - International Telephone Union, a part of the United Nations involving telephone systems. Its divisions are responsible for creating standards, and helping underdeveloped countries with their phone systems. [See also ITU-TSS].

ITU-TSS - Telecommunications Standards Sector of the International Telephone Union. ITU-TSS can be considered the new name of the CCITT. It is responsible for creating standards relating to computer telecommunications, namely the V. series of standards. It is expected to be able to bring standards to the industry faster than the CCITT was able to. [See also ITU, CCITT].

---J---

jack - The small plastic box that your phone cord connects to on your wall.

jump - A command used on some BBS's to go from one board or section on a BBS to another.

jumper - This is a piece of plastic and metal that can be moved on an internal modem to change a setting, such as the COM port to be used. [See also selectable COM port].

---K---

K - When K is placed after a number, it means 1024 times that number. If you computer has 640K that means that it has a little more than 640,000 bytes of memory. Often communications software will tell you that you have a certain amount of free memory to use as a buffer.

Kermit protocol - An almost error-free file transfer protocol usually used for text transfers. It was developed at Columbia University. [See also protocol].

keyboard macro - A macro that will allow you to hit one or several keys and have the program act as though you had typed a lot directly from the keyboard. [See also macro].

kill - When referring to a message on a bulletin board, it means deleting that message from the board. Usually you can only delete the messages that you write (unless you are a SysOp).

---L---

LAN - Local Area Network. This is a group of computers that are all connected. Usually, there is one computer that controls all peripherals (such as printers and a hard disk drive). The other computers are linked to the controlling computer, which lets the other computers take turns using the peripherals. [Same as computer network].

LAPB - Link Access Procedure Balanced. This is a form of error control found in X.32 packet switched networks.

LAPM - Link Access Procedure for Modems. A type of error control used by some modems. It is included in the V.42 protocol (V.42bis also includes it, since V.42bis includes all V.42 error control methods). It is NOT a compression method, even though some modem manufacturers have incorrectly advertised it as such. [See also V.42, error control].

leased line - A telephone line that directly connects two comput- ers. It is usually rented from the telephone company. A leased line doesn’t have many of the electronic restrictions that a dialup line has, so data can be sent faster. However, data therefore can only be sent between those two computers. [Compare to dialup line]. [Same as private line].

LED indicators - The lights on external modems that indicate conditions such as speed, RD, DCD, etc.

leech - A person who downloads a lot from a BBS, and does not contribute much to the BBS by uploading programs or using the message bases.

left-brace - The character {. It’s not used often.

left-bracket - The character [.

letter - [1] The characters A-Z (uppercase or lowercase) [2] Another term for a message posted on a BBS.

LF - Line Feed. This is a control character (ASCII 10) that is used on some computers and printers to move down one line (on the screen or paper). It is usually used right after a carriage return. [See also return].

LHARC - A program that will extract archives with the extension "LZH". [See also archive, LZH].

line - [1] A row of characters on your screen, for example, many computers have screens with 25 lines. [See also columns]. [2]

The connection between your computer and a BBS. Most commonly used in the term "line noise." [3] A phone line connected to a BBS. For example, a BBS might advertise that it has "4 lines," meaning that 4 people can call the BBS and use it at the same time. [Same as node].

line delay - See delay time.

linefeed - See LF.

line noise - This is interference on the telephone lines. It will cause a character or many characters of garbage to appear on your screen. In general, the higher the bps rate of your modem, the more line noise will appear. However, error control protocols strive to eliminate line noise (and get rid of most of it). [See also error control].

link access procedure - See LAPM, LAPB.

local - On a computer that is running a BBS, there are 1 or more phone lines connected to it. However, the SysOp can usually use the BBS, too, from the keyboard. This is considered a local connection.

local analog loopback - Tests the connection between a modem and the computer. [See also local digital loopback].

local area network - See LAN.

local call - A phone call to a phone number in your local area, which will not incur long distance charges. [See also long distance call].

local digital loopback - Tests the connections between a computer, the modem, the phone line, and the remote computer. [See also local analog loopback].

local echo - This is when a communications program will send information (either that you type or from a file) to your screen, as well as to the other modem. Usually local echo is not used, and the BBS you are connected to will send the information back to you, and only then will the communications program print what you typed on your screen.

local number - The phone number used after a country code, area code and/or a city code. In the United States, it is 7 digits long.

log - A log is a file that keeps track of some kind of use. In a communications program, it might keep track of what BBS's you call. A BBS can keep a user log, which is a file that indicates which users called up and when. [See also user log].

logic bomb - This is part of a software program that will do something malicious. For example, the author of a BBS program might have the program set up so that if he enters his initials in a certain point while the program is running, it will destroy all of the files on the BBS. These are no longer as common as they used to be.

logoff - To leave a BBS. When you choose to logoff, the BBS will usually ask if that's what you really want to do, then it will hangup. It may also ask if you want to leave a note to the SysOp. [Same as exit, quit, goodbye].

logon - The process of connecting to a BBS. The is what occurs after you have called the computer and the phone starts to ring, but before you actually start using the BBS. "Logon" can also include the process of entering your name and password (which is also called sign-on). [See also signon].

long distance call - A telephone call that is outside your local calling area, and that you must pay for. [See also local call].

lowercase - The letters that are normally used, such as in this sentence. The other kind of letters are UPPERCASE. [See also uppercase].

lurk - This is a term used on some CB simulators, which means that the person is leaving his computer for a while (and therefore will not be able to respond to messages).

LZH - This file extension refers to an archive that was compressed with the program LHARC. You need to get the program LHARC from a BBS before you can un-archive the file. [See also archive, unarchive, LHARC].

---M---

macro - A series of instructions or text that can be entered by hitting a couple of keys. For example, a communication program might let you enter your user name and password just by hitting CTRL-N. [See also trigger character].

mailer - A program used by BBS's that allows for other BBS's to call, so that mail and/or files can be transfered automatically between the two.

mainframe - A large computer that many people can use at the same time. Usually, a mainframe computer is owned by a large company, and it has a lot of memory and storage for its users. Some mainframes have phone lines connected to them so that employees (or other authorized people) can use the mainframe from home.

make/break pulse ratio - During pulse dialing, the make/break pulse ratio is the ratio of the time that the phone is off the hook to the time the phone is on the hook. In America and Canada, it should be 39/61.

manual-syncing driver - This is what a BBS uses if the BBS program can not determine directly what the user's bps rate is, and the user must hit the return key several times before the BBS can figure out the user's speed.

mark - When you are looking at the titles of messages to read, some BBS programs will allow you to choose certain ones you want to read. This is called marking.

mark bit - A bit that is set to 1. [See also space bit].

mark parity - This is when the parity bit is always set to a binary 1. [See also parity bit, format].

matrix - See topology.

matrix address - The address of a node on a network. [See also address].

maximum string length - In V.42bis data compression, this refers to the maximum length of data (in characters) represented by one word. It can range from 6 to 250 characters, although it is usually 32.

menu - A list of options that you can choose from. A BBS might have a menu that lets you choose from reading messages, downloading, or logging off. In reality, there would be many more options.

message - Any text that is left in a message base on a BBS. These can range from questions for other users to answer, to information on new computer programs, to just about any topic you could imagine. [See also message base].

message base - A group of messages on a BBS pertaining to a certain topic. For example, a BBS might have message bases for general messages, computer-related messages, and social information. Some BBS's have dozens or even hundreds of message bases. [Same as subboard, board].

message network - A network of BBS's that transfer messages between each other. [See also network].

minicomputer - A scaled-down version of a mainframe. A minicomputer usually has many terminals connected to it, and can run many programs at the same time. It is more powerful than a microcomputer.

MNP - Microcom Networking Protocol. A type of error control and data compression, created by Microcom, that many newer modems use. It is built into the modem, unlike software error correction in file transfer protocols. There are different MNP levels. Levels 1-4 are error control protocols, and level 5 is a data compression protocol that can compress data to about 50% of its original size. A modem with MNP-5 also has MNP-4. MNP 1-4 is also included in the CCITT V.42 error correction system.

MNP direct mode - This is a mode used on modems with the MNP protocols, where the speeds from the modem to the remote modem and to the computer are the same. Also, there is no buffering, and no flow control. [Same as direct mode]. [See also MNP normal mode].

MNP normal mode - This is the more common mode used with modems that have MNP capability, where the speed from the computer to the modem can be higher than the connection between the modem and the remote modem. This mode uses buffering to prevent lost data. [Same as normal mode]. [See also MNP direct mode].

mode - The state that a computer or a program is in. For example, a computer can be in a text mode, and a communications program can be in a chat mode (which operates differently than the normal mode).

modem - MODulator/DEModulator. This is a computer peripheral which allows a computer to communicate over telephone lines. This is the heart of computer telecommunications. The main factor that differentiates modems is their speed, measured in bps.

modem ready - See DSR.

moderator - The person who is in charge of a conference. This person usually checks to make sure that all rules are followed (for example, that people do not swear).

modify - See edit.

modular cord - A standard telephone cord, with a modular plug at either end. [Same as modular line. [See also modular jack, modular plug].

modular jack - The square hole in which you put telephone cord (that has a modular plug). [See also modular cord, modular plug, 42A block].

modular line - See modular cord.

modular plug - The square piece of plastic at the end of a telephone cord. It plugs into a modular jack. [See also modular cord, modular jack].

modulate - When a modem changes information from computer bits into tones that can be transmitted over the phone lines. Different methods of modulation are PSK, FSK, and FDM. [See also demodulate, PSK, FSK, FDM].

modulation scheme - The method that a modem uses to modulate data. [See also PSK, FSK, FDM].

MTA - Message Transfer Agent. This is what moves data across a network under the X.400 electronic mail system. [See also X.400].

multiple-speed - This refers to a modem that can operate at several speeds. Most modems are capable of doing this. While a modem may be listed as having a speed of 2400bps, it most likely also can operate at 1200bps and 300bps.

multiple-state modulation - A modulation scheme that sends more than one bit per baud.

multi-line BBS - A BBS that has more than one line or node. [See also line].

---N---

NAK - This control character (CTRL-U) is sometimes used by communications or BBS programs (usually in file transfers) to indicate that the information it received was bad. NAK stands for Negative AcKnowledgement. [See also ACK].

navigator - A program that makes it easier to access the various functions of an on-line service.

negotiation scheme - See feature negotiation.

netmail - Messages that are sent over networks of BBS's to specific people. It is the same as E-mail, except that E-mail goes to a user on the same BBS that you are calling. Netmail goes to a user connected to a BBS that is on a network of BBS's that is hooked up to the BBS you call. [See also E-mail].

network - A group of BBS's that are "linked" together. This means that the BBS's share messages and sometimes files. Usually the BBS's will call each other late at night to get the messages and files. [See also echomail].

network address - In order for a message to find its way to the correct BBS in a network, it must include an address. Every node in a network should have its own address. [See also address].

new user - When you use a BBS, usually you will have the status of new user for the first few calls, until the SysOp verifies your account (at which time you will normally be considered a registered user). A new user usually has less privileges, such as not being able to download programs.

news - Some BBS programs will have announcements that are shown when you log on to the BBS. These are often referred to as news, since they often inform you of changes to the BBS. [Same as system news]. [See also sign-on message].

next - A command in BBS programs that will let you view the next message in the message base.

node - [1] See line. [2] A BBS that is connected to a network. It has an address that lets everyone know how to reach it from the network. [See also address].

nodelist - A list of all the nodes on a network, along with their addresses. This is used by some mailers to find out how to send out messages. [See also node].

noise - See line noise.

noise level - See noise power.

noise power - The "loudness" or strength of noise on a phone line. It is measured in -dBm's. [See also signal power].

non-destructive backspace - This is when a communications program will not delete any characters on the screen when the backspace key is pressed. [See also destructive backspace].

non-volatile memory - This is memory that many modems have which is not destroyed when the power is turned off. Using this memory, you can store a certain configuration in the memory, and have the modem automatically use the configuration when you turn it on.

normal mode - See MNP normal mode.

NSF - National Science Foundation. See NSFNET.

NSFNET - The National Science Foundation network. The NSF is a government agency. This network was the basis for the internet.

null character - The ASCII character 0, or CTRL-@. This character usually will not be printed on the screen. It was originally used when communications programs were slower and could not receive information as fast as it was sent, so BBS programs would send these characters after every line to slow down the speed at which information had to be received.

null modem - A special connection between two computers that will make the computers think that they are hooked up to a modem, so that the two computers can communicate with each other.

numeric result codes - These are result codes that are printed as numbers, rather than words. [See also result codes, verbal result codes].

---O---

odd parity - This indicates that the parity bit is always set so that the sum of the bits set to 1 in a byte, plus the parity bit, is an odd number. [See also parity, format].

off hook - The state that your telephone is in when you pick it up. In non-computer life, it usually means when the telephone connection is accidentally disconnected, such as "Someone must have left the phone off the hook." A modem that takes the phone "off hook" is taking control of the phone line, and it will usually then dial a phone number for you. When a telephone line is "off hook," you are not able to receive calls from other people, unless you have call waiting. [See also on hook].

off hook button - This is the button on a real telephone that is depressed when you put down the receiver. It signals the phone company when your phone is off hook, and ready to place calls.

off-line - When your computer is not connected to another BBS. [See also on line].

offline mail reader - A program that allows you to read messages and reply to them after you call a BBS. This can save you money if you call BBS's long distance (because you do not spend the time reading messages while online with the BBS). Also, it makes it easier for other callers to reach the BBS, since you spend less time on line.

on hook - When your telephone is not being used, and it is ready to ring if someone calls. [See also off hook].

on-line - When your computer is connected to a BBS. For example, some communications programs will keep track of how long you have been on line. This lets you know how long you have been connected to the BBS.

on-line conference - This is when a group of people "get together" and have a conference using their computers. Some of the major on-line services do this. [Same as real-time conference].

on-line games - Any game that is played on a BBS. Sometimes they are played in real time against other players who are using the BBS at the same time, and sometimes they are played by making a move and waiting for their opponent(s) to make their move when they next call. [See also Role Playing Game].

on-line information service - Any on-line service that provides information. Most commercial systems fall into this category. [See also on-line service].

on-line mode - See data mode.

on-line navigator - See navigator.

on-line service - While this can refer to any computer that is hooked up to the phone line, it usually means a pay service such as Compuserve or GEnie. [Same as on-line system]. [See also on-line information service].

on-line system - See on-line service.

organization name - This is part of an internet address. It is usually an abbreviation of the name of the company or organization that controls the computers at that point in the network.

[See also internet address].

originate - To call another computer and connect to it. The originating computer is the one that placed the telephone call (as opposed to the BBS, which is the answering computer).

originate-only modems - Some older modems only operate using an originate frequency, which means that if you try calling one, you must change your modem to send an answer tone. This can be done on many modems by typing ATDT, the phone number you want to call, and then the letter R (before hitting return).

originating computer - The computer which dials another computer. This is most likely referring to your computer (unless you have a BBS, or other people are calling your phone number, and you have your computer's modem answer the phone). [See also answering computer].

originate frequency - This is the frequency of the carrier that is used by the modem that places a call to another modem. [See also answer frequency].

originate mode - This is when a modem is ready to place a call, rather than accept an incoming call. [See also answer mode].

---P---

packer - A program that some BBS's have which takes new messages, and packs them together to be sent out by a mailer. [See also mailer].

packet - [1] A group of bits sent by a modem that comprise a byte of information. [2] A group of bytes sent by a file transfer protocol.

packet radio - The equivalent of a BBS, but with with radio connections instead of telephone connections. It requires an amateur (ham) radio setup, instead of a modem. With the right setup, you can read/send messages and even files, using radio waves.

packet switching network - A telecommunications service that transmits data from one computer to another using packets of data. They usually have telephone numbers in most areas of the country so that users can connect to on-line services without toll charges.

pad - This happens when a file that is being transferred ends in the middle of a block of data. The communications program must add blank data to fill up the block. This is called padding. [See also protocol].

PAD - Packet Assembler/Disassembler. This is a device that disassembles incoming packets, and assembles outgoing packets.

page - [1] (noun) A page is one screen's worth of information. Many BBS's will automatically wait for you to press a key after it has sent you a page of information. [2] (verb) to alert the SysOp that you would like to speak with him. Many BBS's will allow you to do this, and it will make beeping sounds so that the SysOp will know you want to talk to him. [Same as yell]. [See also chat].

PAK - [1] The extension for files archived with the program of the same name. You need the program PAK to un-arc an archive with this extension. [2] The program itself. [See also archive, unarchive].

parallel - This is when a computer sends data one byte (or any number of bits other than one) at a time. This is faster than the alternative, serial. [See also serial].

parallel interface - Any interface that transmits or receives more than one bit at a time. In most cases, 8 bits are transferred at a time. The RS-232C standard involves a parallel interface. [See also serial interface].

parity bit - Most modems have the capability to send an extra bit for every byte sent, which is used to help sense errors. This is called the parity bit. It can be set to no parity, mark parity, space parity, odd parity or even parity. Most BBS's do not use a parity bit. [See also format, mark, space, odd, even].

password - A special code that only you should know. This code will allow you to gain access to your account on a computer. Different BBS's have different rules as to how long your password can be and what characters can be used. You should not use a password that is easy to guess (such as your name, or "password"), because a hacker might try to gain access to your account by guessing your password.

pause - On most modems, you can send the modem a command that will pause at some point while dialing a number. This can be useful on PBX systems, if you have to wait for a dial tone.

PBX - Private Branch Exchange. This is the telephone system that many offices have, allowing extensions for each telephone, and a connection to the main telephone system.

PC-Pursuit - A packet switching network that allows people to save money on long distance calling, if they use modems.

phase shift keying - See PSK.

phone number - A number identifying a specific phone line. In the United States, a phone number consists of a 3 digit area code and a 7 digit number. If you call BBS's in other countries, there may be a specific country code and city code that is part of the phone number. You can find many of these codes in a phone book. A BBS will usually ask you to tell it your phone number before you can be a registered user.

phreaker - A person who spends a lot of time trying to find out as much as possible about the telephone company, and how it works. They often try to find out ways to make long distance calls for free. Some steal calls from telephone credit card users, some steal calls from the phone company directly, and others don't make "free" long distance calls. They are sometimes confused with hackers. [See also hacker].

pick up - To pick up a carrier is when the 2 modems recognize each other's signals over a phone line. After this point the two computers can communicate.

ping-pong - A 9600bps and 4800bps protocol developed by Hayes. It features fast turnaround.

pins - The ports on the back of your computer and an external modem will have pins. Each pin has a certain function, such as letting the computer know that the modem is online. The pins from a computer's port and the modem are connected by a cable.

PKARC - The program which will make an archive with the extension "ARC". [See also archive, unarchive, ARC].

PKUNZIP - The program which will un-arc a file that has the extension ZIP. [See also unarchive, archive, ZIP].

PKXARC - The program which will un-arc an archive created with PKARC. [See also unarchive, archive, ARC].

PKZIP - The program which will create an archive with the extension "ZIP". It is one of the most popular archive programs. [See also archive, unarchive, ZIP].

pocket modem - An external modem that is small enough to be easily portable. It usually either uses a battery for power, or it can get its power from the phone line.

point - A person who has his computer connected to a node on a network. This person has a special address for his computer. A person who has a point is considered part of the network. If you just call a BBS, you are not considered part of the network. [See also node].

poll - [verb] The process when a computer checks to see whether a peripheral or another computer has data to send. [noun] See vote.

post - To save a message that you have written on a BBS so that other people can see it. [Same as leave message].

private - When referring to a message, it means that only a specific person or several people that you specify can view the message. [See also public].

private branch exchange - See PBX.

private line - See leased line.

privileged - Some BBS's have a privileged user level, where the user can do more than a regular user. For example, they may be able to download more programs than regular users. [See also user level].

profanity filter - Some BBS's have a special function that will take out specified words (usually swears) from messages that people leave. That way, the BBS will automatically keep itself "clean," even if users try to leave swears in their messages.

prompt - A character or group of characters that are meant to remind the user of a BBS that he needs to enter some information. It might say "What now?" or it might list the name of the message base the user is currently in, or a list of possible commands.

protocol - [1] When referring to file transfers, a protocol is a method of sending and receiving a program. There are many methods available, each with different advantages and disadvantages. [See also upload, download, Xmodem, Ymodem, Zmodem, Kermit]. [2] Protocol is also used to describe the way that hardware error control is managed. [See also error control].

PSK - Phase Shift Keying. In this method of modulation/demodulation, there are two frequencies used (usually 1200 hertz and 2400 hertz). There are 4 different phase angles (0, 90, 180, and 270 degrees), representing dibits 00, 01, 10, and 11. This is usually used for 1200bps transmission. Note that the baud rate using PSK is really 1/2 of the bps rate, since 2 bits are sent at a time instead of one. [See also modulation].

PSTN - Public Switched Telephone Network. This is the regular phone lines that just about everybody uses.

public - When referring to a message, it means that the message is available for everyone to see. [See also private].

public domain - A program that is in the public domain usually has no copyright, and can be copied legally by anybody. BBS's often have public domain software available for people to download. [See also shareware, freeware, commercial software, bannerware].

public messaging - A fancy term that means to read and/or leave messages in a message base.

public switched telephone network - See PSTN.

pulse dialing - A method that some phones use to dial numbers. It involves a series of "clicks." Most modems support this type of dialing, which is the only type available in some remote areas. The other method of dialing is tone dialing. [See also tone dialing].

---Q---

quickscan - An option used by some bulletin board programs which will let you check several message bases to see if there are any new messages. [See also global scan].

quit - See logoff.

---R---

rack mounted modems - Some multi-line BBS's use rack mounted modems, so that the modems can be easily and safely stored.

raw speed - The speed at which a modem can actually transmit data, before compression or other factors. [See also effective transfer rate].

RD - Receive Data. This is the wire in an RS-232C cable that receives data.

real-time conference - See on-line conference.

receive - To transfer information from another computer to your computer. To receive a file is the same as downloading the file. [See also send].

receive data LED - On external modems, this LED will light up when the modem is receiving data. [See also LED indicators].

receive level - The "loudness" of the sound that is received by a modem. It is measured in -dBm's. A modem will have a certain range which it can understand, for example, -33dBm to -9dBm. [See also equalization].

receive sensitivity - See carrier detect threshold.

register - A location in memory that stores a value which refers to something specific. This value can be changed. For example, most modems have a register that holds a number which tells the modem how many rings it should wait for before picking up the phone.

registered user - This is the most common user level on most BBS's. It usually allows reasonable usage of the BBS (perhaps it will give you a time limit of 45 minutes per day, and let you download up to 200K of programs per day). [Same as regular user]. [See also user level].

regular user - See registered user.

reliable link - A connection that is "error-free," meaning that an error control protocol is being used. [See also auto-reliable link].

remote - A computer in a different location. For a BBS, the user is at a remote location (since they are connected by the phone line, and not right there). For a user, the BBS is at a remote location.

request to send - See RTS.

reread - After a message is sent to your computer from a BBS, the reread command will send the message again. This can be useful if the message is long, and you miss part of it.

reset - A modem can be reset. This will change any options (such as parity and speed) to the values that they have when the modem is first used. This can be useful if you change some values for the modem and aren't sure what they do, and then you find that the modem won't work. Resetting the modem will fix everything for you.

response format - The way that a modem sends certain information to the computer. It can either be verbal (such as "BUSY" or "NO CARRIER"), or it can be numeric ("7" or "3").

response time - How long it takes for the computer or modem to respond to a certain condition. For example, a carrier detect response time of 10ms means that it takes the modem 10 milliseconds to figure out that there is a carrier.

result codes - These are either numbers or words that the modem sends to the communications program (which will usually print them on the screen for you to see) that indicate how the modem responded to an action you requested. For example, if you tell the modem to dial a number, it may respond with "CONNECT 1200", which is a result code that means that the computer dialed the number and connected to a computer on the other end. [See also numeric result codes, verbal result codes].

retrain - Some modems have the capability of monitoring the phone line to "see" how good the connection is. If the line quality is poor, these modems can "retrain"--they change their equalization so as to better accommodate the lines. [See also equalization].

retransmit - To transmit information that was previously sent. Whenever an error is encountered, retransmitting the data will fix the problem.

return - ASCII character 13. This is the key marked "RETURN" or "ENTER". It will advance the cursor to the next line. On some printers, it will just move the print head to the left hand side, and the printer then needs a linefeed to move to the next line. [Same as carriage return, <CR>].

reverse - When you are in a message base, you may find this command which will allow you to read messages is backwards order (from newest to oldest messages).

reverse mode - When a modem switches the signals it should send. For example, in reverse mode, a modem that dials another computer will act as though it just received the call. Some modems only let you dial out (they do not accept calls). In order to call one of these modems, you would have to set your modem to reverse mode, and then call the computer.

RI signal - See ring indicator signal.

right brace - The character }.

right bracket - The character].

ring - When someone calls you on the telephone, the sound that your phone makes is called a "ring." Also, when you call someone (or a computer), it will ring before they pick it up. This indicates that the number is not busy, but nobody has picked up the phone yet.

ringback - The sound that you hear over the phone that indicates that the phone is ringing on the other end, and not busy. It sounds a lot like a phone actually ringing.

ringing indicator LED - This is an LED on some external modems that lights up when the phone is ringing. [See also LED indicators].

ring indicator signal - This is the line on an RS-232C cable that indicates that the phone is ringing.

RJ-11 - This is a normal phone jack. Modems usually have 2 jacks like this, one to connect to the phone line, and the other to connect to a telephone (that you can use when the modem isn't being used).

RPG - See Role Playing Game

Role Playing Game - Some computers don't act as places to leave messages or programs, but instead let you play a game. On these computers, you have a character and call up the computer to move around in a world with other characters (other people who call up), and you interact with them (for example, you may try to kill the character). [Same as RPG]. [See also on-line games].

rotary - A phone that dials with the pulse method. [See also pulse dialing, tone dialing].

RS-232 - The name of a specific type of port on the back of some computers, or peripherals such as modems. It has 9 or 25 pins. [See also RS-232C].

RS-232C - The name of a standard (created by the Electronics Industry Association) for communication between a computer and a serial device. The interface consists of 25 wires, although a variation contains 9 wires. Computers and peripherals which both have an RS-232 port can be connected easily with an RS-232C cable.

running - Working. If a BBS is running, then it is working correctly and people can call it. [See also down].

RTS - Request To Send. This is when the computer tells the modem that it wants to send information to the other computer. It is only used in half duplex mode. [See also flow control, CTS].

---S---

S register - A type of register that modems use. [See also register].

scan - To look through messages or file descriptions to either find new messages or files or look for certain key words within the messages or descriptions.

screen width - The number of characters that a computer can display on one line. On most modern computers, it is 80 columns. [Same as video width]. [See also columns].

script language - Many communications programs allow the user to write a program, or script, which allows them to use the communications program without actually typing anything. It is often used to call BBS's late at night to download programs or look for new messages. This way, the user does not have to be there when the communications takes place.

scripting language - See script language.

sector - A unit to measure storage space. It usually refers to 256 bytes. It is rarely used any more.

security level - Some BBS programs have different user levels, usually numbered, which allow different levels of access. For example, 0 might refer to an unregistered user, 10 a registered user, and 99 for the SysOp. Each has different levels of access on the BBS. [Similar to user level].

selectable COM ports - On internal modems for IBM compatible computers, this allows you to change something on the modem (usually a jumper or DIP switch) to allow you to change which COM port the modem will be connected to. [See also COM port, jumper, DIP switch].

selftest - The ability of a modem to test itself to make sure it is functioning properly.

send - To transfer information from one computer to another. To send a file is called uploading the file. [See also receive].

SendFax(TM) - A modem that can send faxes, but not receive them.

serial - The method used when a computer sends and receives data one bit at a time. Contrast this to parallel. [See also parallel].

serial interface - An interface that transmits only 1 bit at a time. [See also parallel interface].

serial port - A port on a computer that is used to transmit and receive data in a serial fashion (one bit at a time). [See also RS-232C].

service class - The level of MNP protocol that is being used, such as MNP Class 4 or MNP Class 5. [See also MNP].

settings - See format.

set-up - (noun) - Information that a BBS has about your computer. (verb) - To give the information about your computer to a BBS. This information usually includes screen width, whether or not you want hot-keys, and other miscellaneous information.

shareware - Programs that can be distributed freely, but you must pay for these programs if you use them. They usually allow you to try them for a specified period of time and then you must either pay for the program or get rid of it. Many BBS's have shareware programs that you can download without paying the BBS, but you must remember that if you use a shareware program you are supposed to pay for it. [See also public domain].

shell virus - A virus which places itself either before or after a program on a disk or in memory. It can be easy to detect such a virus, since the length of the program will be longer after the virus hits than it was before. [See also virus].

SIG - Special Interest Group. This is similar to a message base, but it may also contain files. It is generally used on large services, such as CompuServe. [See also SIGop].

SIGop - SIG OPerator. The coordinator of a SIG. This person is responsible for checking messages to make sure that they pertain to the topic of the SIG. [See also SIG].

signal power - The loudness or strength of what a modem sends over the phone line. It is measured in -dBm's. [See also noise power].

sign-off message - A message that is displayed when you log off a BBS. Often the message will include the numbers of other BBS's, and in some cases the BBS will allow you to leave a message for the next user to call the BBS.

sign-on - The procedure of letting a BBS know who you are. This involves giving the computer information such as you user number, name, password, and sometimes even phone number. [See also logon].

sign-on message - A message that is displayed by a BBS after you sign on. Often news about the BBS will go here. On some BBS's you can leave a sign-on message for the next caller. [See also news].

simplex - See half duplex.

smart modem - Originally the brand name of a modem, it refers to a modem which has capabilities which make it 'smart'. Most modems now sold are considered smart. Basically, it means that the modem has many features. [See also dumb modem].

smart terminal - A terminal that is capable of certain editing features. [See also terminal, dumb terminal, terminal emulation].

space bit - A bit set to zero.

space parity - This is when the parity bit is always set as a binary 0. [See also parity bit, format].

special interest group - See SIG.

speed - This refers to the bps rate of a modem. The most common modem speeds are 300bps, 1200bps, 2400bps, and 9600bps. [See also effective transfer rate].

stand-alone modem - See external modem.

stand-alone program - A program, usually that allows you to do file transfers, that is separate from your comm program, but can be called by it.

start bit - This framing bit indicates that the data byte will be following. It is always a binary 0. [See also format, framing bits].

statistics - Any information that a BBS keeps on its users. Some BBS's keep track of how many messages a user posts, how many programs the user uploads or downloads, and even how many times the user calls.

stats - See statistics.

status line - In communications programs, sometimes the bottom line of the screen will contain a status line, which has information such as the speed of the modem, the parity, how long you have been connected to a BBS and other such information.

status lights - See LED indicators.

stop bit - When a modem sends a byte of data, it usually sends one or two framing bits after the data byte, before the next byte is sent. These bit(s) are called stop bits. They are always a binary 1. [See also format, framing bits].

streaming - When a file transfer protocol sends data continuously, without waiting to make sure there are no errors. A streaming protocol should check for errors, but if an error occurs the file transfer should be stopped. A streaming protocol should only be used with modems that have hardware error control. [See also Ymodem-g, protocol]. [Same as full flow].

streaming Ymodem - See Ymodem-g.

STU-III - Secure Telephone Unit, generation III. This is a system used by the government that makes voice and data calls much more secure.

subboard - See message base.

subject - Most BBS's require that you leave a short description about any messages that you post on the BBS. This description is referred to as the subject of the message. [Same as title].

subop - A term used for the operator of a subboard. Some BBS's allow a person besides the SysOp to control a specific message base. This person would be able to kill any messages that he/she felt were inappropriate.

synchronous communication - With synchronous communication, data bytes are not marked with a beginning and end, but instead are sent at a specific interval. When computers send data to modems, it is synchronous communication. When modems send the information they get from the computer, the modem usually will add start and stop bits to identify the bytes. That is asynchronous communication. [See also asynchronous communication].

SysOp - Short for SYStems OPerator. This is the person who is in charge of a BBS. He has the power to change anyone's user level, delete users, delete or edit messages. Usually this is the same person who paid for the BBS equipment and pays for the phone line. [See also Co-SysOp].

SysOp window - Some BBS programs have an area of the computer screen (on the computer that the BBS runs on, not the user's screen) that gives information about the user who is on-line, such as his password, where he is from and his phone number. This is called the SysOp window, and is for the convenience of the SysOp. [Similar to top of screen display].

system - [1] Your computer. When a BBS asks for your system configuration, it is referring to information about your computer, such as screen width. [2] A BBS.

system files - Any computer files that are used by an operating system, or in the case of BBS's, files that are used by the BBS program that do not get changed.

system name - Part of an internet address. [See also internet address].

system news - See news.

---T---

tab - The key on your keyboard that will move the cursor forward about 5 spaces. It is not an ASCII character (it is similar to a function key, since it does not output a single character).

tag - To choose what you want from a list. A BBS might let you tag certain files to download all at once. Also, you can tag certain message areas. This way, the BBS will assume those are the only message areas you are interested in, and it will not send you messages from other areas.

tagline - When using an offline mail reader, you often have the option of including a "tagline" at the end of your messages. This is often a funny saying or a quote, and usually takes up just 1 line.

talk mode - See voice mode.

TCM - Trellis Coded Modulation. This is a form of error control used on some modems.

TCP - Transmission Control Protocol. This is used to control the flow of data on the internet.

TCP/IP - Transmission Control Protocol and Internet Protocol combined.

TD - Transmit Data. This is the wire in an RS-232C cable that is used to transmit information.

Telco - Abbreviation for Telephone Company.

telecomm - Short for telecommunications. See telecommunications.

telecommunication(s) - This word has no precise definition, but is frequently used. Its definition ranges from "any form of communication over a distance" to "any communication by electric means" to "two computers 'talking' to each other via modems." Methods of communications that probably are considered telecommu-nications: BBS's, telephones, TV's and fax machines. The word is used both in singular and plural.

telecommuting - The idea of company employees working from home, rather than their office. At home, they can communicate with the office (and other entities) by modem or voice calls.

telecomputing - Using computers to communicate. This usually involves using modems to communicate over the phone lines, but can also involve other media such as the air waves.

Telenet - The packet-switched network that is used for PC-Pursuit, which is operated by U.S. Sprint.

term program - See terminal program.

terminal - A CRT and keyboard that are connected to either a computer or a modem. [See also smart terminal, dumb terminal].

terminal emulation - When a communications program can simulate the operations of a smart terminal.

terminal mode - Some modems have a built in terminal program. On these modems, if that program is running, the modem is said to be in its terminal mode. It also refers to the state where a modem is ready to accept commands, although command mode is the preferred term.

terminal program - A program that allows a person to use a modem. It is generally very limited. A communications program is a more advanced version of a terminal program. Usually a terminal program will simulate a specific brand of terminal. It generally does not support file transfers. [Also called term program].

terminate - To disconnect with another computer. This is sometimes listed as a command in menus on BBS's.

text file - Any information that can be read, and is stored in a computer file. A text file can be any kind of information, such as a description of a computer program.

thread - A group of related messages on a BBS, within the same message base. If a user posts a reply to a message, some BBS's will start a thread. If a message is part of a thread, the BBS will have a command so that you can see the original message, which started the thread.

throughput - See effective transfer rate.

tilde - The character ~.

time limit - Most BBS's have a time limit, where you can only be on the BBS for a certain amount of time. On some BBS's you can only be on for a certain amount of time each time you call, on others there is a limit of time that you can be on the BBS per day.

time out - BBS programs often will disconnect a user if he doesn't type anything for a certain amount of time. Time out occurs when the time limit is reached and the BBS program hangs up on the user. This is done so that users do not tie up the BBS. If a user is connected to the BBS but is not using it, other callers might not be able to use the BBS.

timing signal - A signal sometimes sent by modems over the phone line that lets the receiving modem know when a byte of information starts. It is required in synchronous communication.

title - See subject.

tone dialing - This is a method that a phone or modem can use to dial a phone number. It uses one audible tone per digit to be dialed. [See also pulse dialing].

top of screen display - Some BBS's have this display on the top of the screen of the computer running the BBS. This will show the SysOp certain information about the user who is on-line, such as his phone number, how many programs he has downloaded, etc. [Similar to SysOp window].

topology - How a network is organized. In other words, which computers (or BBS's) are connected to each other.

touchtone dialing speed - The length of time that your modem sends each touchtone digit over the phone lines. It is the equivalent to the length of time that you hold down the buttons on a phone when you make a call.

training sequence - A way of detecting the quality of the phone lines. Two compatible modems can do this by sending out the "training sequence," which tests the phone line at various frequencies. When one of the modems receives this information, it compares it to what it should be (if the phone lines were perfect). The modem then can adjust various frequencies (using equalization) to accomodate the problems in the phone line.

transfer - To send a computer program from one computer to another. [See also download, upload, protocol].

transfer protocol - See protocol.

transmission control protocol - See TCP.

transmission rate - See data transmission rate.

transmission speed - See data transmission rate.

transmit data LED - This is an LED on an external modem that will light when the modem is transmitting data over the phone line. [See also LED indicators].

transmit level - The "loudness" level of the sound leaving a modem to go over the phone lines. It is measured in -dBm's. It should be different at different frequencies, since certain frequencies have more loss over the phone line than others. [See also equalization].

trapdoor - This usually refers to a BBS program (or a mainframe that you call up) that has a special code that can be entered to give you high access. Usually, it is entered as a user name and password when logging on. These are undocumented by the program, and usually were created by the programmers so that they could gain access to any computer running their BBS program. Hackers try to find trapdoors, but they are usually not created by hackers. (Some other kinds of software have trapdoors, such as video games, which might have trapdoors to give you extra lives).

Trellis-coded modulation - See TCM.

trigger character - This is a character that, when pressed, starts a macro. [See also macro].

trojan horse - A trojan horse is a program within another program, usually on a mainframe or a computer running a BBS. The original program looks innocent, but when run it will trigger the trojan horse, which will usually try to gain access to the mainframe computer system or BBS.

TTY - A TeleTYpe machine. It is a keyboard and a printer combined in one unit. It is hooked up to another computer.

TTY mode - This is when a communications program emulates a TTY machine, which only involves printing characters and recognizing the linefeed, carriage return and backspace characters. [See also TTY].

two-wire leased line - See leased line.

Tymnet - A packet-switched network.

type-ahead buffer - Some BBS programs let you type characters to the BBS, even while it is sending information to you. When it is finished sending the information to you, it will then act on the information you sent. The type-ahead buffer refers to the process, and the space in the BBS computer's memory where the characters are held.

---U---

UA - User Agent. It is the program that people use to create and read messages under the X.400 system. [See also X.400].

UART - Universal Asynchronous Receiver/Transmitter. This is a device in a computer or modem that will change serial data (the way data comes in over the phone line) to parallel, and vice versa. [See also serial, parallel, 16550 UART, 8250 UART, 16450 UART].

un-arc - See unarchive.

unarchive - To take out the files from an archive. [Same as unarc]. [See also archive, extract, ARJ, ZIP, ARC, PAK, LZH].

unattended mode - This mode is available on some communications programs. It will let your computer wait for a telephone call from another computer, and will let the person using that computer access your computer (usually to download or upload programs). It is called unattended because you don't have to wait for the person to call, the program will automatically answer when someone calls. [See also attended mode]. [Similar to host program].

underline character - The character _.

underscore character - Any character (although almost always the underline character) that is used for underlining. When this method is used, the text to be underlined will be sent (usually to a printer), and then backspaces will be sent, and then the underscore character will be printed over the text, so it looks like it is underlined.

upload - To send a program from your computer to a BBS. [See also download, protocol].

uppercase - Letters that are used for emphasis, as opposed to regular lowercase letters. CAPITAL letters are the same as uppercase letters. The first word in a sentence is in uppercase. Some older computers were only capable of displaying uppercase characters.

user - A person who uses a BBS. For example, a BBS might claim that it has 500 users, which means that there are 500 different people who have called the BBS.

user level - The level of security which a user has. This usually is in the form of word(s), usually progressing from: New User, Registered User, Privileged User, SysOp Level. [See also security level].

user list - Most BBS programs will allow you to see a list of all its users. It will show the user's name, and often city and state. This is called the user list. Rarely will it show any phone numbers or more detailed information.

user log - A file on a computer running a BBS that lists which users called, what time they called, and sometimes information as to what they did while they were on the BBS.

user name - This is the name that a person uses on a computer system. Sometimes an alias is used, but it is more often the user's real name or a variation of it. [See also alias].

user number - A number that is used by some older BBS programs to keep track of users. On these BBS's, a user would have to remember a specific number as well as his password. Most BBS's now just use the person's user name instead, which is much easier for a user to remember. [Same as account number, ID number].

userfile - A file that a BBS program has that keeps track of all users of the BBS and their statistics.

---V---

V.17 - The CCITT standard for fax transmission at 14,400bps.

V.21 - The international standard, created by CCITT, that controls transmission at 300bps. [See also 103].

V.22 - The international standard for transmission at 1200bps, created by CCITT. [See also 212A].

V.22bis - The international standard, created by CCITT, that controls data transmission at 2400bps.

V.23 - The CCITT protocol for transmission of 1200bps one way, 75bps the other way.

V.24 - This, combined with V.28 is the CCITT standard equivalent to EIA's RS-232C standard. V.24/V.28 has 25 pins, just like the original RS-232C standard. [See also RS-232C].

V.28 - Part of V.24. [See also V.24].

V.29 - The CCITT standard for 9600bps half-duplex communications.

V.32 - The international standard controlling transmission at 9600bps. It was created by CCITT. It has provisions for fallback, if the line is too noisy.

V.32bis - The international standard for 14,400 bps modems, created by CCITT.

V.42 - A standard error control system created by CCITT that is in use on many 9600bps modems and some 2400bps modems. It includes LAPM, as well as MNP 2-4. [See also error control, V.42 compatible, V.42 compliant].

V.42 compatible - This is a modem that follows all the V.42 specifications, except for LAPM error control (instead it uses MNP). [See also V.42].

V.42 compliant - This is a modem which follows all the V.42 specifications, and uses LAPM error control if possible. Otherwise, it will go to MNP error control. [See also V.42].

V.42bis - A CCITT standard for data compression. It can compress data with about a 3:1 compression ratio, although it can compress up to 4:1 given the right conditions. Any modem with V.42bis also has V.42 error control. [See also data compression].

V.Fast - At this time, the proposed CCITT standard for communications at up to 28,800bps. It will most likely be the new standard for high-speed data communications. It probably will use adaptive line probing and symbol rates to determine the fastest acceptable speed, given the condition of the phone line. Most people will not be able to achieve 28.8Kbps rates originally, until phone line conditions improve.

verbal result codes - These are result codes which are printed as words, rather than numbers. [See also result codes, numeric result codes].

verify - This is when a SysOp makes sure that a new user is who he or she claims to be. The normal procedure is for the SysOp to call up a new user, just to make sure that the phone number he listed is real. This is a way to make sure that the users are less likely to abuse the system. However, most SysOps do not call new users, since it is time consuming. Some SysOps will look at the information the new user left just to make sure it "looks" right (if the new user says his phone number is 555-1212, the SysOp knows it is not real). After verifying the user, the SysOp will usually raise the user's user level.

verified user - Any user who has been verified by the SysOp. It is also used to refer to users who have access better than that of new users.

video width - See screen width.

videotex - The idea of getting information by computer, over the phone lines, and paying for it. It is the computer version of audiotex (900 numbers, voice mail, having computers call you).

virus - Any program which spreads itself secretly. It reproduces within a computer, and also will go to other computers if possible (through file transfers). At a certain point in time, the virus will do something (anything from saying "Boo" to something destructive, such as erasing all files on a hard disk drive). They are often hidden inside legitimate programs that seem to run normally, but contain the virus. It will usually spread to every program you run. Viruses became widespread because BBS's can inadvertently spread virus all across the country. Whenever you download a program, it might have a virus in it. However, there are several programs available which find many viruses and can destroy them.

voice detection - The ability of a modem to detect whether a computer answers the phone, or whether it is a human voice.

voice grade - A telephone line that is designed to transfer human voice. This is the way most phone lines are set up. However, the phone company also has data grade lines, which are supposed to make data communications better. [See also data grade].

voice mail - An addition to some modems. This allows the modem to also answer incoming voice calls, send recorded (voice) messages to the caller, and let them leave a message. [Same as answering machine].

voice mode - Some older modems require the user to manually dial phone numbers through a telephone. When this is done, the modem is in voice mode. When the remote computer picks up the phone, the user must switch his modem from voice mode to data mode. [Same as talk mode]. [See also data mode].

vote - Some BBS's have this feature, which allows the SysOp to find out user's preferences about things ranging from operation of the BBS to political positions. It is similar to a survey in the non-computer world. [Same as poll].

VT100 - A smart terminal, which is emulated by many communications programs. It uses ANSI codes. [See also ANSI].

VT52 - Another smart terminal, which is emulated by some communications programs.

---W---

WHOIS - A way of finding out biographical information about a user on internet, if the user has provided such information.

window - A distinct area of a computer screen that contains information different than the rest of the screen. Sometimes it covers other information 'underneath' the window (in which case it is temporary), or it is permanent and does not contain other information. [See also SysOp window].

word wrap - A function of editors on BBS's (just like that found in most word processors) which will move a word that won't fit at the very right hand of the screen down to the next line.

worm - A program which embeds itself within another program. Either it tries to find a space in which it won't be noticed, or it will just stick itself anywhere within the main program (which will ruin that program). A worm is almost always destructive. [See also virus].

---X---

X.25 - This is a packet-switching protocol developed by CCITT. It is used to carry large amounts of data at fast speeds over leased phone lines. [See also X.32].

X.25 dialup - See X.32.

X.32 - This is CCITT's 1984 update of X.25, also known as X.25 dialup. [See also X.25].

X.400 - This is the CCITT standard protocol for a global system for the exchange of electronic mail.

X.500 - The CCITT standard for a directory of the users of the X.400 system. [See also X.400].

xfer - Short for transfer. It usually refers to file transfers. [See also upload, download].

Xmodem - A file transfer protocol developed by Ward Christensen around 1977. It is fairly slow by today’s standards, but was the first widespread file transfer protocol. It uses blocks of 128 bytes, and after each block is sent, it sends a 1 byte checksum to check for errors. If an error is encountered, the block will be re-sent. Almost every communications program offers this protocol. [Same as Christensen protocol]. [See also protocol].

Xmodem/CRC - The same as Xmodem, but it has a 16-bit CRC instead of the checksum, which makes it more reliable (it catches more errors). [See also protocol].

Xmodem-1K - This is similar to Xmodem/CRC, except it uses blocks of 1024 bytes, rather than 128. It is faster than Xmodem, since it needs to stop less often to check for errors. This is sometimes incorrectly called Ymodem. [See also protocol, Xmodem, Ymodem].

Xoff - The CTRL-S character. This is often used to pause information that is being sent. The information will be continued when an CTRL-Q is received. [See also flow control, Xon].

Xon - The CTRL-Q character. This will sometimes continue paused information. [See also flow control, Xoff].

Xon/Xoff - The flow control method using the Xon and Xoff characters. It is built into the software, not the hardware. [See also Xon, Xoff, flow control].

---Y---

yell - See page (verb).

Ymodem - A file transfer protocol which can transfer more than one file at a time. It transfers both a file and some information about the file (including its length, and the name of the file). It is similar to Xmodem/CRC, except that Ymodem can transfer more than one file at a time. It will use CRC-16 if possible, or else it will use a 1 byte checksum. It will use both 1024 byte blocks and 128 byte blocks. [See also protocol].

Ymodem-g - This is Ymodem changed to provide best results with error-correcting modems. Errors can be discovered by the protocol, since Ymodem-g uses CRC, but if there are any errors in the transmission, the transmission will be aborted. [See also Ymodem, protocol, streaming]. [Same as streaming Ymodem].

---Z---

ZIP - The file extension which refers to archives that were created by the program PKZIP. You need the program PKUNZIP to get the files out of the archive. [See also archive, unarchive, PKZIP, PKUNZIP].

Zmodem - A file transfer protocol which is known for its speed, as well as the ability to transfer information about the files which it sends. It has crash recovery and auto-download features, and can use a 32 bit CRC, which makes it almost error-free. [See also protocol].

*** APPENDIX A ***

A List of Acronyms used in Telecommunications
(Words in [brackets] are to be exchanged with other words)

AAMOF	As A Matter Of Fact
ADN	Any Day Now
AFAIK	As Far As I Know
AMF	Goodbye! (Adios [My Friend])
AS	(On) Another Subject
ATSL	Along The Same Line
AWGTHTGTTA?	Are We Going To Have To Go Through This Again?
B4N	Bye For Now
BAD	Broken As Designed
BAMF	Bad [A] [My Friend]
BBR	Burnt Beyond Recognition
BBS	Bulletin Board System
BCNU	Be seeing you
BNF	Big Name Fan
BRB	(I'll) Be Right Back
BRS	Big Red Switch
BTA	But Then Again
BTW	By The Way
BWQ	BuzzWord Quotient
CU	See You
CUL	See You Later
CUL8R	See You Later
CYA	Cover Your [A]
DIIK	Damned If I know
DTRT	Do The Right Thing
DWIMC	Do What I Mean Correctly
ESAD	Eat [Sugar] And Die

```
ETLA           Extended Three Letter Acronym

FAQ            Frequently Asked Questions
FISH           First In, Still Here
FITB           Fill In The Blank
FOAF           Friend Of A Friend
FRED           [Frigging] Ridiculous Electronic Device
FUBAR          [Fouled] Up Beyond All Recognition (or repair)
FURTB          Full Up Ready To Burst (regarding a hard drive)
FWIW           For What It’s Worth
FYBITS         [Fool] You, Buddy, I’m The Sysop.
FYI            For Your Information

<G>            Grin
GA             Go Ahead (or, ’I’m done, it’s your turn to talk’)
<GD&R>         Grinning, Ducking & Running (placed at the end
               of a nasty message)
GDW            Grin, Duck, and Weave
GFR            Grim File Reaper
GIGO           Garbage In, Garbage Out
GIGO           Garbage In, Gospel Out (believing everything from computers)
GIWIST         Gee I Wish I’d Said That
GLAGH          Good Luck And Good Hunting
GMTA           Great Minds Think Alike (when two people say the
               same thing at the same time)

HHTYAY         Happy Holidays to You and Yours

IAE            In Any Event
IANAL          I Am Not A Lawyer
IC             I See
IITYWISWYBMAD  If I Tell You What It Says, Will You Buy Me A
               drink
IMAO           In My Arrogant Opinion
IMCO           In My Considered Opinion
IMHO           In My Humble (or Honest) Opinion
IMNSHO         In My Not So Humble Opinion
IMO            In My Opinion
IOW            In Other Words
ISBAB          I Should’ve Bought A Book
ITSFWI         If The Shoe Fits, Wear It
IWBNI          It Would Be Nice If

JIC            Just In Case
JITNOT         Just In The Nick Of Time

KHYF           (I) Know How You Feel

L8R            Later...
LAB&TYD        Life’s A Bitch & Then You Die
LTNT           Long Time, No Type

MLA            Multi Letter Acronym
MOTAS          Member Of The Appropriate Sex
MOTOS          Member Of The Opposite Sex
MOTSS          Member Of The Same Sex
```

NBFD	No Big [Frigging] Deal
NFW	No [FrigginG] Way
NTYMI	Now that you mention it
OFTPATHIRIO	Oh [Fool] This Place And The Horse It Rode In On
OIC	Oh, I See
OTOH	On The Other Hand
PFM	Pure [Frigging] Magic
PITA	Pain In The [A]
PLOKTA	Press Lots Of Keys To Abort
PMFBI	Pardon Me For Butting In
POSSLQ	Person of Opposite Sex Sharing Living Quarters
POV	Point Of View
PPTSPAHS	Please Pass The Salt, Pepper And Hot Sauce
<ROTF>	Rolling On The Floor
<ROTFL>	Rolling On The Floor Laughing
<ROTFLMAO>	Rolling On The Floor Laughing My [A] Off
RPG	Role Playing Game
RSN	Real Soon Now
RTFM	Read The [Fine] Manual (or message)
<SG>	Sheepish Grin
SFLA	Stupid Four Letter Acronym
SMOP	Small Matter Of Programming
SNAFU	Situation Normal, All Fouled Up
SO	Significant Other
SOW	Speaking Of Which
SWMBO	She Who Must Be Obeyed
SYSOP	System Operator
TAFN	That’s All For Now
TANJ	There Ain’t No Justice
TANSTAAFL	There Ain’t No Such Thing As A Free Lunch
TDM	Too Damn Many
TFTHAOT	Thanx For The Help Ahead Of Time
TGIF	Thank God It’s Friday
TIA	Thanks In Advance
TLA	Three Letter Acronym
TOBAL	There Oughta Be A Law
TOBG	This Oughta Be Good
TPTB	The Powers That Be
TTBOMK	To The Best Of My Knowledge
TTFN	Ta Ta For Now
TTL4N	That’s The Lot For Now
TTUL	Talk To You Later
TTYL	Talk To You Later
WIMP	Windows, Icons, Mice, and Pointing
WOFTAM	Waste Of [Frigging] Time And Money
WTF	What The [F]
WYGIWYPF	What You Get Is What You Pay For
WYSBYGI	What You See Before You Get It
WYSIWYG	What You See Is What You Get
YABA	Yet Another Bloody Acronym

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YGLT           You're Gonna Love This
```

*** APPENDIX B ***

A List of many Emoticons
(note that any of these can be interpreted in several ways)

```
:)       The original smiley face, "I'm Happy".
:(       The original frown
:-)      Smiling, happy face; don't take me too seriously
B-)      Above, but poster wears glasses or sunglasses
8-)      Same as previous; also used to denote wide-eyed look
#:-)     :-) done by someone with sort of matted hair
:-(      Sad or angry face
>:-(     Even angrier face
;-)      Winking happy face (something said tongue-in-cheek)
:-P      Tongue stuck out
:-b      Same as previous
:-B      Buck-toothed smile
:-D      Wider happy face (or mouth open too much)
:-o      "Oh, nooooooo!" (a la Mr. Bill)
#:-o     Same as previous
:-)##    Person with a beard
(:-)     Messages dealing with bicycle helmets
<:-)     Dumb questions
oo       "Somebody's head-lights are on" messages
O>-<|=   Messages of interest to women
;-)      Wink ( take this message with a grain of salt)
|-(      Late night messages
:^)      Messages teasing people about their noses
:-{#}    Messages teasing people about their braces
(:-#     Message concerning something that shouldn't have been said
(:-$     Message indicating person is ill
(:-&     Message indicating person is angry
(:-*     Kiss
(:-(     Message indicating person is VERY sad
(:^(     Message concerning people with broken noses
(:<)     Message concerning blabber mouths
:-(=)    Message about people with big teeth.
&:-)     Message from a person with curly hair
?-(      Message about people with a black eye
b-)      Message about a pirate
*:*      Message about fuzzy things
*:**     Message about fuzzy people with a fuzzy mustache
%-)      Message about people with broken glasses
+<:-|    Message from a monk/nun
{0-)     Message from cyclops
(:-D     Message concerning another blabber mouth
(:-|K-   Formal message
B-)      Message from Batman
||*(     Handshake offered
||*)     Handshake accepted
```

```
>< ><   Message about/to someone wearing argyle socks
:-)<><////> Message about someone wearing a striped tie
2B|^2B  Message about Shakespeare
=|:-)## Message about Uncle Sam
>:-{    Message about Dracula
\:-)    Message about Gumby
(-_-)   Secret smile
<{:-)}  Message in a bottle
<:-)<<| Message from a space rocket
(:-...  Heart-breaking message
<<<(:-) Message from a hat sales-man
(O--<   A fishy message
(8-)    Message from a four-eye
(:>-<   Message from a thief: hands up!
<I==I)  A message on four wheels
:^{     User wears a mustache
:*)     Another person wearing a mustache
{       User is Alfred Hitchcock
*** STUFF TO END THE FILE WITH ***
```

TRADEMARKS

CompuServe is a trademark of CompuServe.
GEnie is a servicemark of GE Information Services.
Hayes is a trademark of Hayes Microcomputer Products, Inc.
MNP is a trademark of MicroCom, Inc.
SendFax is a trademark of Sierra Semiconductor.

HISTORY

Telecommunications Dictionary version 0.99:

This was the first version available. It was incomplete, with about 150 words, only covering A-K. But it was nice for people not to have to wait another year to see part of it. It was released in 1989. It was usually in a file called "MODEMDIC".

Telecommunications Dictionary version 1.00:

This was the first real version. It had somewhere around 430 words defined in it. It was released on August 15, 1991. It was sent out originally as "TDIC100" in a ZIP compressed format.

Telecommunications Dictionary version 1.10:

This version had more than 530 words listed. Many words were added, some extra information was added to some old words, and several minor errors were corrected. It was released on August 22, 1991 (I was very busy that week!). It should be called TDIC110.TXT, or if archived, TDIC110.ZIP (or whatever extension).

Telecommunications Dictionary version 1.20:

This version was not officially released. It was an interim version. It updated about half the definitions existing in version 1.10, and minor inconsistencies were fixed. Also, a few words were added.

Telecommunications Dictionary version 1.21:

Another interim version, not officially released. Last modification in August, 1992.

The Modem Dictionary version 1.25:

An interim version, just before 1.30. The name was changed, since the dictionary is specific to modems, just a small portion of telecommunications.

The Modem Dictionary, version 1.30:

This version was widely distributed, and contains all of the improvements found in the previous, unreleased versions. It was marketed as shareware on a trial basis. This version is on file at the United States Copyright Office, in Washington. Released in November 1992.

The Modem Dictionary, version 1.50:

The current version. The main change is that is was changed back to freeware. It will remain that way. Released 1/93.

The Modem Dictionary, version 2.00:

This version. It has been improved quite a bit, mostly due to the appendixes and the new definitions relating to the Internet and offline readers. Released 9/93.

*** END ***