

USER'S MANUAL

For

**Motorola 56K/V90 External
Data/Fax/Voice Modem**

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INTRODUCTION

Instructions for installing your Data/Fax/Voice Modem will be found in the Installation Manual, while the information in this manual, deals exclusively with the operation of the modem after it is installed, such as the command set, the internal configuration registers, troubleshooting and testing.

Features

This Data/Fax/Voice Modems combine the features of a 56000 (Receive only) /33600/28800/14400/9600 BPS for data modem and a 14400/9600 BPS for FAX modem. Your new Data Modem gives your personal computer the ability to send and receive FAX messages over the telephone line like a standard FAX machine. Your Data Modem also allows your PC to communicate with other personal computers, terminals or BBS's (Bulletin Board Systems) through the data modem functions.

When used as a data modem, your Modem uses the standard AT command set and is fully compatible with the specification shown in the following table,

Modem Type	Modulation/Function	Control Code	AT Command Set
Data Modem	K56Flex Compatible ITU-T V.90 Compatible ITU-T V.34 1996 – 33.6 Kbps to 2.4 Kbps ITU-T V.32bis – 14.4 Kbps to 4.8 Kbps ITU-T V.32 – 9.6 Kbps to 4.8 Kbps ITU-T V.22bis – 2.4 Kbps ITU-T V.23 – 1.2 Kbps/75 bps ITU-T V22 – 1.2 Kbps ITU-T V.21 – 300 bps Bell 212A – 1.2 Kbps Bell 103 – 300 bps Automatic Mode Selection Automatic Rate Adaption Digital Near – End/Far – End Echo Cancellation ITU-T V.8 Signaling ITU-T V.8bis Signaling ITU-T V.54 Loopback Test support	ITU-T V.42/MNP™ 2-4 Error Correction ITU-T V.42/MNP5 Data Compression Auto-baud DTE Rate 230.4 Kbps Maximum	Hayes AT Commands
Fax Modem	ITU-T V.17 – 14.4 Kbps to 9.6 Kbps ITU-T V.29 – 9.6 Kbps to 4.8 Kbps ITU-T V.27ter – 4.8 Kbps and 2.4 Kbps ITU-T V.21 Channel 2 – 300 bps	TIA/EIA 578 Class 1	AT + Commands per TIA/EIA 578 Class 1
Voice Modem	Full-Duplex Speakerphone with Automatic Gain Control and Room Monitor Answering Machine	Full-Duplex Speakerphone Controller Telephone Answering Machine Controller	AT # Voice Support

Switching between DATA mode, FAX mode and Voice mode operation of your Data/Fax/Voice Modem is done through its firmware, no hardware settings are required.

If you are already familiar with the use of a modem and the Hayes AT command set, this modem will be extremely easy for you to use. Just read the installation procedures in the installation manual and you are ready to begin operation.

If you are new to modem communications, we recommend that you read through this manual first. If you come across terms that you don't understand, consult the glossary.

Words in boldface type are command names, commands, or default settings. Carriage returns (Enter) are noted with <CR> or [ENTER]; this does not mean to enter these characters literally; but instead to press the Enter key.

The communication software which should be used depends on the kind of machine that you are going to communicate with. If you are going to call a FAX machine then you must use the Fax software. If the machine that you are going to communicate with is a modem then you must use a data modem communications software.

Note: This manual is written to be used for several models of Fax/Data Modems. All the description in this manual about Caller ID, V.90 and Fax class 1 apply only to the models which support these function.

Package Contents

The following material would be the bundle of this modem.

- Power Adapter
- Serial RS-232 Cable DB25/DB9
- Phone Cable , Type RJ11
- A CD-ROM with the INF Driver inside and a communication application

System Requirement

A host computer system should with a high speed RS-232 serial port capability of supporting 115200 BPS is a highly recommendation. Fully data/fax/voice functionality is only supported on system using a Intel 368 processor or higher or equivalent.

LED Indicator Specification

There are several LED light show in front of modem while the modem be powered on. And each light would indicate the difference specification or meaning as following.

LED Indicator	Description
PWR	POWER -- Light when the modem has power applied.
AA	Auto Answer --When the light is on, the modem is autoanswering the incoming call
TR	Data Terminal Ready -- Lights when the host computer is ready to send or receive data. Indicates the status of the DTR signal from computer.
OH	Off Hook -- Lights when the modem is using the telephone line.
CD	Data Carrier Detect -- Lights when the modem success in on line and signal to computer.
SD	Transmit Data -- Flashes when the modem are sent from the serial port of computer to modem. At high data speeds this LED may appear always be ON.
RD	Receive Data -- Flashes when data is sent from modem via serial port to computer.
MR	At high data speeds may appear to always ON.

| **Modem Ready** –When the light is on,the modem’s power on

1 - Installation

This chapter describes how to install your Data/fax/Voice modem in your computer and connect it to a telephone and telephone line.

Installation overview

The installation process for Windows 95/98 consists of the following steps. And please refer to the figure 1.1.

Connect the AC power adapter

1. Plug the power cable into the connector labeled AC on the modem.
2. Plug the other side of cable into the wall outlet.

Connect the modem into the computer’ s RS-232 serial port

3. Plug the male of the interface cable into the female connector (labeled Serial Port) on the modem’ s back panel. Then you might tighten the screws.
4. Plug the other side of the cable into the serial port (ie. RS-232) on the back of the computer, the terminal, or other devices. Then you might tighten the screws.

Connecting to the telephone line

To connect your modem to the telephone line:

1. Unplug your telephone from the wall jack by pressing the protruding tab toward the plastic connector and removing the connector from the wall jack.
2. Take the telephone cord that was included in your modem package and plug either end into LINE JACK on the modem .
3. And plug another end of the telephone cord into the LINE jack on your wall, just as you plug telephone set into the wall as usual.

Connecting the telephone set

By connecting a telephone to your modem, you can use the telephone to make voice calls when your modem is turned off or not being used. **To connect a telephone set to your modem.**

Take the cord attached to your telephone and plug it into the fax/modem jack labeled

PHONE. And then lift the telephone handset and listen for a dial tone. If you can hear the dial tone as usually. Mean that the telephone line path setup should be no problem.

Connection your External MIC- PHONE and SPEAKER to Modem

For voice application adapter **Micro-phone** to **MIC** and with one external **SPEAKER** jack for external **Speaker** extension.

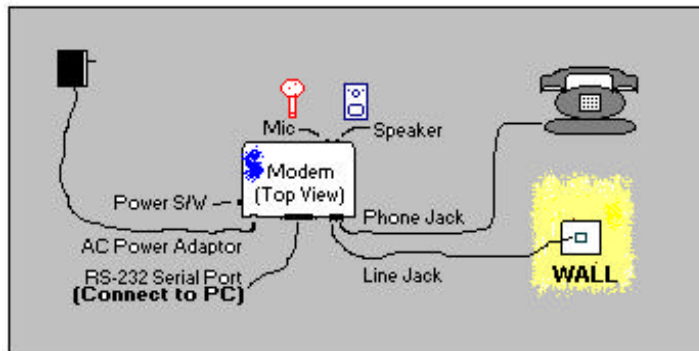


Figure 1.1 Modem Peripheral Setup Diagram

Quick Install Modem Driver on Your PC

We support you two difference way for you for installing your modem on PC. We suggest you to use PNP(Plug and Play) start-up. That would be more easy to you. First of all.

TURN ON the POWER SWITCH in the rear of modem. The PWR LED will lights up.

Start-up Modem with PNP:

A). Power up or reboot your PC.

Waiting for Windows 95/98 boot-up and Windows95/98 would find your new modem by automatically. Then it will stop while the modem was found and a dialog box appears with the title New Hardware Found as shown below Figure 1.1. Click on OK.



Figure 1.2 New Hardware Found Screen

B). Then the screen show as below appears, Figure 1.3, and asking you to insert the media with the drivers for your new hardware. Now insert the software disk with

label INF DRIVER or CD-ROM included with you modem, and tell you PC where to get the DRIVER for the new modem. Then

Click on [Other Locations] to point on your floppy.



Figure 1.3 Update Device Driver Wizard Screen (Modem)

C). Pointing to the disk which we inserted..

Then pick a file named “3450RDK.INF”.

Select “**Motorola MC143450RDK**” for the model of modem.

Now click the [Next]. Then the Windows 95/98 will copy some related data into the system by automatic. And next screen changes to the one shown in following figure 1.4. Click on [Next].



Figure 1.4 Update Device Driver Wizard Screen (Wave Device)

D). After the modem is installed in your computer system, reboot the computer system and waiting for it started.

OK! Let's check up you modem. Skip the next paragraph to the Testing your modem

If you got a failed installation in last Plug-N-Play automatically process. You may try the following process for manual installation. If you still could not accomplish the modem installation. Please contact to your dealer for the service.

With Manual Installation :

A). Get into the SETUP in the Start button

**[CONTROL PANEL] → [SYSTEM] → [DEVICE MANGER]
→ [FLASH]**

, and waiting for new modem detection. We recommend you to use the auto-detection for COM port assigning. Or you must make sure that which COM port you use.

B). When the auto-detection is stop and the modem is found. Windows 95/98 would show a standard modem was found cause of she could not recognize the name of manufacture. So we must [Change] the name for modem.

Click on the [CHANGE.] button.

C). Point to the disk which we have prepared.

Then pick a file named "3450RDK.INF".

Select "Motorola MC143450RDK" for the model of modem. Now click the [Next]. Then Windows 95/98 will copy some related date into the system by automatic.

D). After the modem is installed in your computer system, reboot the computer system and waiting for it started.

Testing your modem with Windows 95

Before you using any communication application to reach the modem, use the following procedure to verify your new installed modem's operation.

Turn on your computer and modem, use the following step to verify your new installed modem.

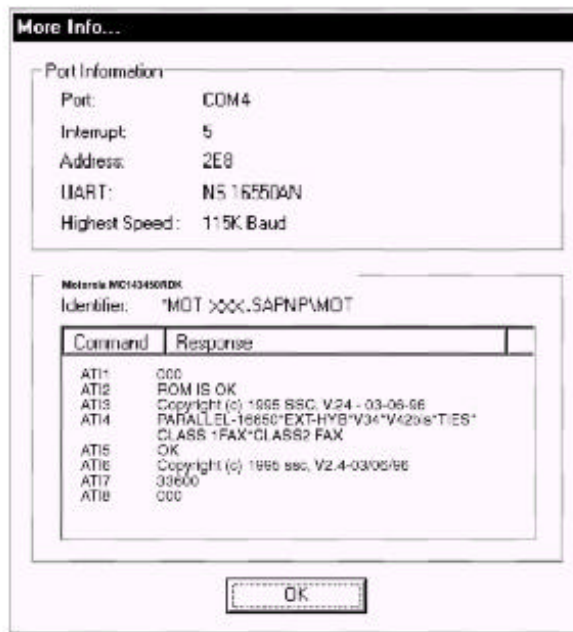
1. Return to CONTROL PANL and double click on your Modems icon. You should see your modem listed as shown in following figure 1.5.



Figure 1.5 Modem Properties Screen

2. To verify the modem is working, click on the tab for Diagnostics
3. Select the COM port icon that is assigned to your modem. (Remember this COM port)
4. Select the More Info button. Windows 95 informs you that this will take a moment as it communicates with the modem. The More Info dialog window appears showing your port information and the AT commands, which verify modem installation, as shown in Figure 1.6 below.
5. Choose OK to leave this window. (Command response is currently preliminary and is always subject to change per upgrade. An ERROR message or other information is acceptable for some of the AT commands.) Be sure to write down the COM port number, so you can enter it in your selected applications software later.

This process verifies that your modem is now operational in Windows 95/98. Go to the communications software package bundled with your modem, or your selected software, and follow the guidelines for marking connections.



Note: This display is for reference only. The actual display is software dependent and varies according to the current software requirements.

Figure 1.6 More Info Dialog Window

Communicating with your modem

After you complete the fax/modem installation, you can install your communication software and use it to communicate with you fax/modem.

There are two ways you can communicate with you modem, indirectly using the features provided in your communication software or directly using AT commands.

The indirect communication methods allows you to use the commands in your communications software to perform operations such as dialing or answering a call, file transfers, and terminal emulation. With this method, communications software acts as a buffer between you and your modem, dictating the amount of direct interaction you will have with your fax/modem. For example, your communications software may have menus and commands that let you dial and answer calls.

If your communication software includes fax capabilities, you can also use it to send faxes to and receive them from fax machines and fax/modem. The manual that came with your communications software should describe how to perform these data and fax activities.

The direct communication method, on the other hand, lets you access your fax/modem directly by sending AT commands from you keyboard and viewing the fax/modem result codes sent to your computer screen. To use this method, use your communication software to place your computer into local terminal or direct-connect mode (the manual that came with you communications software should explain how to do this). The rest of

this User's Guide contains information you can use to communicate directly with your fax/modem:

Note: Your communication software must use the same number of start bits, data bits, parity bit, and stop bit(s) as the remote modem or fax/modem, regardless of whether you are using your software or AT commands to perform your tasks. Otherwise, you will not be able to exchange data.

You may want to talk with the person at the remote device to make sure that the remote modem or modem is using the same number of start bits, data bits, parity bit, and stop bit(s) as your modem. The manual that came with your communication software should describe how to change these settings. Facsimile machines are more forgiving than modems or fax/modems, and do not require you to specify this information.

2 - COMMAND REFERENCE

This chapter provides an alphabetized reference with examples for all commands for the modem. The system of commands is depicted in Figure 2-1.

To use these commands for dialing or configuring the modem, make sure the communications software package you will be using lets you operate the modem through its internal commands. If your software permits use of the modem's internal commands, read this chapter. If not, read your software user's manual and ignore the rest of this manual.

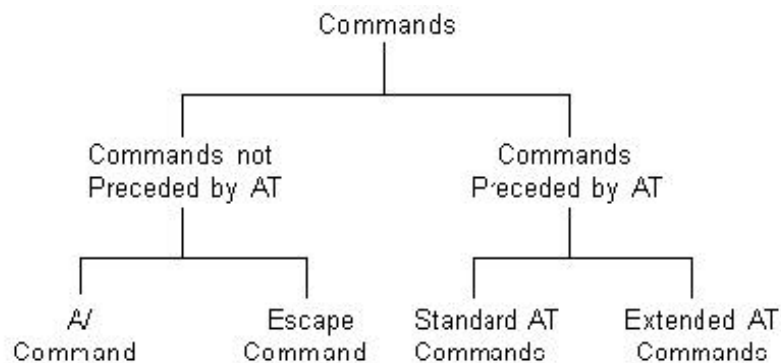


Figure 2-1 System of Commands

2-1 General Command Information

Except for the **A/** command and the **+++** escape command described in Section 2.4, all commands must be prefixed with the attention code **AT**. For instance, the **A** command (below) would be entered as: "**AT A<CR>**". Without the **AT** prefix, the command line cannot be executed. Once entered, **AT** cannot be deleted with the **Backspace** or **Delete** key.

More than one command can be placed on a single line and, if desired, separated with spaces for readability. Once the carriage return (**Enter**) key is pressed, the command line is executed. A line with no carriage return is ignored.

The modem accepts either upper or lower case characters in the command line and ignores any spaces within or between commands. Typing errors can be corrected with the **Backspace** key. Exceptions are noted in the description of specific commands.

Variables (*r* and *x*) are listed in italics. Punctuation symbols (**,** **;** **!** **@**) use as dial modifiers are listed alphabetically according to their English names at the beginning of Section 2.3. Where two commands are separated by a slash, either command will have the same effect. For example, if the command is listed as **B0/B**, issuing either **B0** or **B** will have the same effect.

2-2 AT Commands Description

AT Means “**Attention**”
Each modem’s command should start with “AT” character.

ATA Go On-line in Answer Mode

This command instructs the modem to go off-hook immediately and then make a handshake with the remote modem. Handshaking is not available during leased line operation.

A is usually used to manually answer an incoming call or to switch from voice conversation to data communication.

For others modem command, please refer to the following table from 2.1 ~ 2.26 for detail. Each command would has denoted with an “*” which for means default setting.

Table 2.1 Basic AT Commands

Basic AT Commands	Description
A/ - Re-execute Command	A/ - Re-execute Command
AT=x - Write to Selected S-register	AT=x - Write to Selected S-register
AT? - Read Selected S-register	AT? - Read Selected S-register
A - Answer	A - Answer
Bn - CCITT or Bell	0= Responds with OK but does nothing. 1= Responds with OK but does nothing.
Cn - Carrier Control	1= Responds with OK but does nothing.
Dn - Dial dial modifiers	0 1 2 3 4 5 6 7 8 9 A B C D * # (Dial digits) L (redial last number) - Responds with Error if ATDL is issued but if L is embedded in the dial string, it is considered as a presentation character and hence ignored. P (Pulse) T (Tone) R (Reverse to answer mode) S=n (where n = 0 - 3) ! (Flash) W (Wait for dial tone) @ (Wait for silence) , (Pause) ; (Return to command state) ^ (toggles calling tone enable/disable) - ^ is considered as a presentation character. H (for hangup) - (at end of phone number for linking)
En - Command Echo	0=disable 1=enable*
Fn - Select Line Modulation	0 to 10=Responds with OK but does nothing.
Hn - Disconnect	0=onhook 1=offhook
In - Identification	0=product code showing 56000 ** 1=rom checksum 2=calc rom checksum

	<p>3=firmware version ** 4=oem identifier (LEO 56K External) ** 5=country code 6=responds with Error 7=responds with Error where ** denotes customizable parameter.</p>
Ln - Speaker Volume	<p>0=low 1=low* 2=medium 3=high</p>
Mn - Speaker Control	<p>0=speaker always off 1=speaker on during call establishment, but off when receiving carrier*. 2=speaker always on. 3=Responds with OK but does nothing.</p>
Nn - Automode Enable	<p>0=disable, forcing +MS=56,0,60000,60000,0,0 1=enable, forcing +MS=56,1,300,60000,0,0</p>
On - Return to Online Data Mode	<p>0=return to online without retrain 1=return to online with retrain</p>
P - Set Pulse Dial	
Qn - Quiet Results Codes	<p>0=enable result code returned* 1=disable result code returned 2=returned only in originate mode</p>
Sn - Read/write S-Register n n=v n?	<p>From 0 to 95</p>
T -Set Tone Dial	<p>default tone dial*</p>
Vn - Result Code Form	<p>0=short form 1=long form*</p>
Wn - Connect Message Control	<p>0=upon connection, modem reports only the DTE speed*. 1=upon connection, modem reports error correction protocol and DTE speed. 2=upon connection, modem reports DCE speed.</p> <p>Note that the connect message response is a function of Wn, Xn and \Vn. See Table 3.24 for detail.</p>
Xn - Extended Result Codes	<p>0=blind dial, no busy detect, CONNECT. 1=blind dial, no busy detect, CONNECT XXXX. 2=dial tone detect, no busy detect, CONNECT XXXX. 3=blind dial, busy detect, CONNECT XXXX. 4=full monitor, all messages*, CONNECT XXXX.</p> <p>Where XXXX = DTE rate or DCE rate.</p> <p>Note that the connect message response is a function of Wn, Xn and \Vn. See Table 3.24 for detail.</p>
Yn - Long Space Disconnect	<p>0=Responds with OK but does nothing. 1=Responds with OK but does nothing.</p>
Zn - Soft Reset and Restore Profile	<p>0=soft reset & restore profile 0 1=soft reset & restore profile 1</p>

Table 2.2 AT& commands

AT& Commands	Description
&Cn - DCD option	0=dcd always on 1=dcd normal* 2=dcd on in data and command mode
&Dn - DTR option	Under &M0 (= &Q0): 0=DTR always on 1=escape 2=disconnect* 3=soft reset 4=tail, 108.1 ignore DTR 5=108.1 DTR dial 6=DTR dial 108.2
&Fn - Restore Factory Configuration	0=restore factory Configuration 0 1=restore factory Configuration 1
&Gn - Select Guard Tone	0=disable* 1=550 Hz 2=1800 Hz
&Jn - Telephone Jack Control	0= responds with OK but does nothing 1= responds with OK but does nothing
&Kn - Flow Control	0=disable 3=enable RTS/CTS flow control* 4=enable xon/xoff flow control 5=enable transparent xon/xoff flow control 6=responds with Error
&Ln - Leased Line Operation	0=responds with OK but does nothing 1=responds with OK but does nothing
&Mn - Async/Sync Mode Selection	0=async* Else responds with Error.
&Pn - Select Pulse Dial Make/Break ratio	0 to 9=Responds with OK but does nothing
&Qn - Sync/Async Mode (This is an extension of the &Mn command)	0=Responds with OK. Else responds with Error.

Table 2.2 AT& commands

AT& Commands	Description
&Rn - RTS/CTS Option	Under Async: 0=CTS normal* 1=CTS always on
&Sn - DSR Override	0=DSR always on* 1=DSR normal (on in data mode)
&Tn - Test and Diagnostics	0=end test 1=local analog loopback 3=response with Error 4= response with Error 5=disallow Remote Digital Loopback request from Remote modem* 6= response with Error 7= response with Error 8=local analog loopback with pattern.
&Vn - Display Current Configuration & Stored Profiles; Display Last Connection Statistics	0=display current Configuration and stored profiles. 1=display last connection statistics. 2=displays stored phone numbers. 3=display forbidden numbers (up to 10 numbers) 4=display delayed call numbers (up to 10 numbers)

	See Tables 3.20 and 3.22 for detail.
&Wn - Store Current Configuration	0=store current Configuration as profile 0 1=store current Configuration as profile 1
&Xn - Select Sync Clock Source	0=internal timing* 1=responds with Error. 2=responds with Error.
&Yn - Designate a Default Reset Profile	0=use profile 0 1=use profile 1
&Zn=x - Store Telephone Number	n=0 to 3 x=up to 32 digits

Table 2.3 AT% and AT"? commands

AT% Commands	Description
%En - Enable/Disable Line Quality Monitor and Auto-retrain or Fallback/Fall Forward	0=disable line quality monitor and auto-retrain. 1=enable line quality monitor and auto-retrain. 2=enable line quality monitor and fallback/fall forward*.
%L - Line Signal Level	Responds with OK but does nothing.
%Q - Line Signal Quality	Responds with OK but does nothing.
%7<8 hex numbers><same 8 hex numbers> - Set Plug and Play Serial Number	
%8<3 ascii chars><4 hex numbers><same 3 ascii chars><same 4 hex numbers> - Set Plug and Play Vendor ID and Product Number	
“?”	Display stored PnP serial number e.g. 00000000 (as factory default)

Table 2.4 AT\ commands

AT\ Commands	Description
\Gn DCE-DCE XON/XOFF flow control	0=disable* 1=enable
\Kn - Break Control (controls the response of the modem to a break received from the DTE or the remote modem or the \B command)	0=1=clear data buffers and send break to remote modem. 2=3=send break to remote modem immediately. 4=5*=send break to remote modem in sequence with transmitted data.
\Nn - Operating Mode	0=normal mode 1=responds with Error. 2=reliable mode 3=auto reliable mode* 4=LAPM only (i.e. disconnects if LAPM cannot be established) 5=MNP only (i.e. disconnects if MNP cannot be established)
\Vn - Single Line Connect Message	0=connect messages are controlled* by command X and W 1=connect messages are displayed in single line format

Table 2.5 AT+MS commands

AT+MS Commands	Description
+MS=<mod>,<automode>,<min_rate>,<max_rate>,<x_la w>,<rb_signaling> - Select Modulation	<mod> 0=V.21 1=V.22bis 2=V.22bis 3=V.23 9=V.32bis 10=V.32bis 11=V.34 56=K56flex* 64=B103 69=B212 <automode> 0=disable 1=enable* <min_rate> 300=300 bps* 1200=1200 bps 2400=2400 bps 4800=4800 bps 7200=7200 bps 9600=9600 bps 12000=12000 bps 14400=14400 bps 16800=16800 bps 19200=19200 bps 21600=21600 bps 24000=24000 bps 26400=26400 bps 28800=28800 bps 31200=31200 bps 32000=32000 bps 33600=33600 bps 34000=34000 bps 36000=36000 bps 38000=38000 bps 40000=40000 bps 42000=42000 bps 44000=44000 bps 46000=46000 bps 48000=48000 bps 50000=50000 bps 52000=52000 bps 54000=54000 bps 56000=56000 bps 58000=58000 bps 60000=60000 bps <max_rate> 300=300 bps 1200=1200 bps 2400=2400 bps 4800=4800 bps 7200=7200 bps

	<p>9600=9600 bps 12000=12000 bps 14400=14400 bps 16800=16800 bps 19200=19200 bps 21600=21600 bps 24000=24000 bps 26400=26400 bps 28800=28800 bps 31200=31200 bps 32000=32000 bps 33600=33600 bps 34000=34000 bps 36000=36000 bps 38000=38000 bps 40000=40000 bps 42000=42000 bps 44000=44000 bps 46000=46000 bps 48000=48000 bps 50000=50000 bps 52000=52000 bps 54000=54000 bps 56000=56000 bps 58000=58000 bps 60000=60000 bps*</p> <p><x_law> 0=u-law* 1=A-law</p> <p><rb_signaling> 0=Responds with OK but does nothing*. 1=Responds with OK but does nothing.</p>
--	---

Table 2.5 AT+MS command

AT+MS Commands	Description
+MS?	Query current e.g. +MS: 56,1,300,60000,60000,0,0
+MS=?	Query range shows +MS: (0,1,2,3,9,10,11,56,64,69),(0-1),(300-60000),(300-60000), (0-1),(0-1)

Table 2.6 AT+A8 Commands - V.8bis Requirements

AT+A8 Commands	V.8bis Requirements
+A8E=<v8o>,<v8a>,<v8cf>,<cfrange>,<v8b>,<protrange>	<p><v8o>: 1=enable DCE-controlled V.8 origination negotiation*; other values are not supported</p> <p><v8a>: 1=enable DCE-controlled V.8 answer negotiation*; other values are not supported</p> <p><cfrange>:</p>

	<p>parameter not supported - must be empty</p> <p><v8b>: 0=disable V.8bis negotiation* 1=enable DCE-controlled V.8bis negotiation 2= enable DTE-controlled V.8bis negotiation</p> <p><cfrange>: parameter not supported - must be empty</p> <p><protrange>: parameter not supported - must be empty</p>
+A8E?	<p>Query current e.g. +A8E: 1,1,0,"";"</p>

Table 2.6 AT+A8 Commands - V.8bis Requirements

AT+A8 Commands	V.8bis Requirements
+A8E=?	<p>Query range shows +A8E: (1),(1),(0),(0-2),(),() The 0 in the <v8cf> parameter is the maximum number of octets allowed for this parameter. The () in the <cfrange> and <protrange> parameters indicate that the parameter is not supported.</p>
+A8T=<signal>,<1st message>, <2nd message>,<sig_en>,<msg_en>,<supp_delay>	<p><signal>: (no default value) 0=none 1=Initiate MRe 2=Initiate MRd 3=Initiate CRe, low power 4=Initiate CRe, high power 5=Initiate CRd 6=Initiate ESi 7=Responding MRd, low power 8=Responding MRd, high power 9=Responding CRd 10=Responding ESr This parameter is required. Issue ERROR if missing.</p> <p><1st message> and <2nd message>: These parameters contain octets for the V.8bis message(s) to be sent specified as a string of ASCII hex digits. The default value is an empty message.</p> <p><sig_en>: 0=detect initiating signals* 1=detect responding signals 2=detect both</p> <p><msg_en>: 0=disable message detection 1=enable message detection*</p> <p><supp_delay>: 0=disable 1.5 second delay between V.8bis messages* 1=enable 1.5 second delay between V.8bis messages</p>
+A8T?	<p>Query current e.g. +A8T: , , ,0,1,0</p>

+A8T=?	Query range shows +A8T: (0-10),(32),(32),(0-2),(0-1),(0-1) where 32 is the maximum length of <1st message> and <2nd message>.
+A8R: <signal>, <1st message>	This indication is displayed when V.8bis detects a signal or a signal/message pair. If just a signal is detected, the indication is "+A8R: <signal>", where <signal> and <1st message> are defined in the +A8T command.

Table 2.7 AT~D commands

AT~D Commands	Description
~D0 - Download to Flash Memory	Flash download
~D1 - Download to Flash Memory	Also flash the boot sector during flash download

Table 2.8 AT+VDR commands

AT+VDR Commands	Description
+VDR=<enable>,<report> - Enable/Disable Distinctive Ring	<p><enable>: range is 0 to 1 (default=0).</p> <p><report>: range is 0 to 60 (default=0).</p> <p>If <enable>=0, the ring cadence is not reported; all ring cadences are reported as RING event codes. If <enable>=1 and <report>=0, the ring cadence is reported with DRON and DROF messages, no RING event codes are reported. If <enable>=1 and <report>!=0, the ring cadence is reported with DRON and DROF messages; RING event codes are reported <report>/10 seconds after the falling edge of a ring cycle.</p>
+VDR?	Query current
+VDR=?	Query range shows +VDR: (0-1),(0-60)

Table 2.9 AT commands for Error Correction & Data Compression

Error Detection & Data Compression Commands	Description
%Cn - Enable/Disable Data Compression	0=disable 1=responds with OK but does nothing 2=responds with OK but does nothing 3=enable both V.42bis and MNP5*
\An - Select Maximum MNP Block Size	0 to 3=Responds with OK but does nothing.
\Bn - Transmit Break to Remote (this command works in conjunction with the \Kn command)	1 to 9=Responds with OK but does nothing.

Table 2.10 AT command for Country Select

Country Select Command	Description
Country Select -- Reserved	1=Austria, 2=Belgium, 3=Denmark, 4=Finland, 5=France, 6=Germany, 7=Ireland, 8=Italy, 10=Netherlands, 11=Norway, 12=Portugal, 13=Spain, 14=Sweden, 15=Switzerland, 16=UK, 17=Greece, 18=Israel, 19=Czech Republic, 20=Canada, 21=Mexico, 22=USA*, 23=Hungary, 24=Poland, 25=Russia, 26=Slovak Republic, 27=Bulgaria, 30=India, 40=Australia, 41=China, 42=Hong Kong, 43=Japan, 44=Korea, 46=Taiwan, 47=Singapore, 48=New Zealand, 50=Argentina, 52=Brazil, 54=Croatia, 56=Emea, 58=Indonesia, 60=Malaysia, 62=Philippines, 64=Romania, 66=Slovenia, 68=South Africa, 70=Thailand, 72=Ukraine, 74=Venezuela

Table 2.11 AT commands for Caller ID

Caller ID Commands	Description
#CID=n - Caller ID	0=disable* 1=enable (formatted) 2=enable (unformatted)
#CID?	Query current
#CID=?	Query range shows 0,1,2

Table 2.12 Synchronous Access commands

Synchronous Access Mode	Description
+ES=<orig_rqst>,<orig_fbk>,<ans_fbk> - Synchronous Access Mode	<p><orig_rqst> 1=Initiate call with buffered mode only. 2=Initiate V.42 without detection phase. If V.8 is in use, this is a request to disable V.42 detection phase. 3=Initiate V.42 with detection phase*. 4=Initiate alternative protocol. 6=Initiate Sync Access Mode when connection is completed and data state is entered.</p> <p><orig_fbk> 0=Error control optional* (either LAPM or Alternative acceptable); if error control not established, maintain DTE-DCE data rate and use V.14 buffered mode with flow control during non-error-control operation 2=Error control required (either LAPM or Alternative acceptable); if error control not established, disconnect. 3=Error control required (only LAPM acceptable); if error control not established, disconnect. 4=Error control required (only Alternative mode acceptable); if error control not established, disconnect.</p> <p><ans_fbk> 1=Error control disabled. Use buffered mode. 2=Error control optional*. Either LAPM or Alternative acceptable. If error control not established, maintain DTE-DCE data rate and use local buffering and flow control during non-error-control operation.</p>

	<p>4=Error control required (either LAPM or Alternative); if error control not established, disconnect.</p> <p>5=Error control required (only LAPM acceptable); if error control not established, disconnect.</p> <p>6=Error control required (only Alternative protocol acceptable); if error control not established, disconnect.</p> <p>8=Initiate Sync Access Mode when connection is completed and data state is entered.</p>
+ES?	<p>Query current</p> <p>e.g. +ES: 3,0,2</p>
+ES=?	<p>Query range shows</p> <p>+ES: (1- 4,6),(0,2-4),(1-2,4-6,8)</p>
+ESA=<trans_idle>,<framed_idle>,<framed_un_ov>,<hd_auto>,<crc_type>,<nrzi_en>,<syn1>,<syn2> - Configure Synchronous Access Submode	<p><trans_idle></p> <p>0=in transparent sub-mode, modem transmits 8-bit SYN sequence on idle*.</p> <p><framed_idle></p> <p>0=in framed sub-mode, modem transmits HDLC flags on idle*.</p> <p><framed_un_ov></p> <p>0=in framed sub-mode, modem transmits abort on underrun in middle of frame*.</p> <p>1=in framed sub-mode, DCE transmits a flag on underrun in middle of frame, and notifies DTE of underrun or overrun.</p> <p><hd_auto></p> <p>0=V.34 switching in half duplex operation with no additional procedures*.</p> <p><crc_type></p> <p>0=crc generation and checking disable*.</p> <p>1=enable</p> <p><nrzi_en></p> <p>0=nrzi encoding/decoding disable*.</p> <p><syn1></p> <p>\$ff (255 decimal)*</p> <p><syn2></p> <p>\$ff (255 decimal)*</p>
+ESA?	<p>Query current</p> <p>e.g. +ES: 0,0,0,0,0,255,255</p>
+ESA=?	<p>Query range</p> <p>+ES: (0-2),(0-1),(0),(0-1),(0-1),(0-255),(0-255)</p>
+ITF=<off>,<on>,<report_period> - Transmit Flow Control Thresholds	<p><off> value</p> <p>range 1 to 2048 (default=1984)</p> <p><on> value</p> <p>range 0 to 2047 (default=1024)</p> <p><report_period> value</p> <p>0</p>
+ITF?	<p>Query current</p> <p>e.g. +ITF: 1984,1024,0</p>
+ITF=?	<p>Query range shows</p> <p>+ITF: (1-2048),(0-2047),(0)</p>

Table 2.13 Fax commands

Fax Class 1 Commands	Description
+FCLASS=n - Select Service Class	0=data mode* 1=fax class 1
+FCLASS?	Query current
+FCLASS=?	Query range shows 0,1
+FTS=n - Stop Transmission and Wait	0-255 (x 10 ms)
+FRS=n - Receive Silence	0-255 (x 10 ms)
+FTM=n - Transmit Data	24=V.27ter 2400 bps 48=V.27ter 4800 bps 72=V.29 7200 bps 73=V.17 7200 bps long 74=V.17 7200 bps short 96=V.29 9600 bps 97=V.17 9600 bps long 98=V.17 9600 bps short 121=V.17 12000 bps long 122=V.17 12000 bps short 145=V.17 14400 bps long 146=V.17 14400 bps short
+FTM=?	Query range shows 24,48,72,73,74,96,97,98,121,122,145,146

Table 2.13 Fax commands

Fax Class 1 Commands	Description
+FRM=n - Receive Data	24=V.27ter 2400 bps 48=V.27ter 4800 bps 72=V.29 7200 bps 73=V.17 7200 bps long 74=V.17 7200 bps short 96=V.29 9600 bps 97=V.17 9600 bps long 98=V.17 9600 bps short 121=V.17 12000 bps long 122=V.17 12000 bps short 145=V.17 14400 bps long 146=V.17 14400 bps short
+FRM=?	Query range shows 24,48,72,73,74,96,97,98,121,122,145,146
+FTH=n - Transmit Data with HDLC Framing	3=V.21 300 bps 24=V.27ter 2400 bps 48=V.27ter 4800 bps 72=V.29 7200 bps 73=V.17 7200 bps long 74=V.17 7200 bps short 96=V.29 9600 bps 97=V.17 9600 bps long 98=V.17 9600 bps short 121=V.17 12000 bps long 122=V.17 12000 bps short 145=V.17 14400 bps long 146=V.17 14400 bps short Note: all HDLC modes internally clip to V.21
+FTH=?	Query range shows 3.
+FRH=n - Receive Data with HDLC Framing	3=V.21 300 bps 24=V.27ter 2400 bps

	48=V.27ter 4800 bps 72=V.29 7200 bps 73=V.17 7200 bps long 74=V.17 7200 bps short 96=V.29 9600 bps 97=V.17 9600 bps long 98=V.17 9600 bps short 121=V.17 12000 bps long 122=V.17 12000 bps short 145=V.17 14400 bps long 146=V.17 14400 bps short Note: all HDLC modes internally clip to V.21
+FRH=?	Query range shows 3.

Table 2.15 Voice commands

Voice/Audio Responses	Description
Shielded codes sent to DTE:	
<dle>0 to <dle>9, <dle>*,<dle>#,<dle>A to <dle>D	DTMF digits detected
<dle>a	Answer tone (CCITT 2100 Hz)
<dle>b	Busy
<dle>c	Calling tone (1100 Hz)
<dle>d	Dial tone
<dle>e	Calling tone (1300 Hz)
<dle>f	Answer tone (Bell 2225 Hz)
<dle>h	Hook transition offhook to onhook
<dle>o	Overrun
<dle>q	Quiet
<dle>s	Silence
<dle>t	Hook transition onhook to offhook
<dle>u	Underrun
<dle>T	Timing mark
<dle><etx>	End of stream
Shielded <dle>	
Voice/Audio Commands from DTE	Description
<dle>p	Pause
<dle>r	Resume
<dle>E	Purge DCE buffer
<dle>u	Increment playback volume
<dle>d	Decrement playback volume
<dle><can>	Cancel
<dle><eot>	Voice bytes buffered query
<dle><etx>	Terminate
Voice/Audio commands	Description
A - Answering in Voice/Audio Mode	A - Answering in Voice/Audio Mode
D - Dial Cmd in Voice/Audio Mode	D - Dial Cmd in Voice/Audio Mode
H - Hang up in Voice/Audio Mode	H - Hang up in Voice/Audio Mode
Z - Reset from Voice/Audio Mode	Z - Reset from Voice/Audio Mode
#BDR=n - Select Baud Rate (Turn off Autobaud	0=enable autobaud 1,2,3,4,8,16,24,48,96=new baud rate is n*2400 bps
#BDR?	Query current
#BDR=?	Query range shows 0,1,2,3,4,8,16,24,48,96
#CID=n - Enable Caller ID Detection and Select	0=disable*

Reporting Format	1=enable (formatted) 2=enable (unformatted)
#CID?	Query current
#CID=?	Query range shows 0,1,2
#CLS=n - Select Data, Fax or Voice/Audio	0=data* 1=fax class 1 2=Responds with Error. 8=voice/audio
#CLS?	Query current
#CLS=?	Query range shows 0,1,8
#MDL? - Identify Model	LEO 56K External ** ** customizable parameter.
#MFR? - Identify Manufacturer	Motorola ** ** customizable parameter.
Voice/Audio commands	Description
#REV? - Identify Revision Level	Firmware revision. ** (same response as ATI3) ** customizable parameter.
#TL=n - Audio Output Transmit Level	Responds with OK but does nothing.
#VBQ? - Query Buffer Size	Return the size of modem voice transmit and voice receive buffers. Responds with 2048
#VBS=n - Bits Per Sample	2=2 bits/sample (ADPCM) 3=3 bits/sample 4=4 bits/sample (ADPCM)* 8=8 bits/sample (PCM)
#VBS?	Query current
#VBS=?	Query range shows 2,3,4,8
#VBT=n - Beep Tone Timer	0 to 40 default=10 (x 0.1s)
#VBT?	Query current
#VBT=?	Query range shows 0-40
#VCI? - Identify Compression Method	Return identifier string Responds with MOTOROLA;ADPCM;
#VLS=n - Voice Line Select	0=telephone line with telephone handset*. 1=tx/rx device (other than telephone line, e.g. handset or speakerphone powered by modem). 2=tx only device (e.g. onboard speaker). 3=rx only device (e.g. microphone). 4=telephone line with speaker on and handset. 5=speakerphone 6=speakerphone 7=muting local handset during phone conversation. 8=recording a handset conversation on phone line. 9=recording/playback from handset.
#VLS?	Query current
#VLS=?	Query range shows 0-9
#VRA=n - Ringback Goes Away Timer	0 to 255 default=70 (x 0.1s)
#VRA?	Query current
#VRA=?	Query range shows 0-255
#VRN=n - Ringback Never Came Timer	0 to 255 default=100 (x 0.1s)
#VRN?	Query current
#VRN=?	Query range shows 0-255
#VRX - Voice Receive	
#VSD=n - Enable Silence Deletion	0=do nothing* 1=do nothing

#VSD?	Query current
Voice/Audio commands	Description
#VSD=?	Query range shows 0,1
#VSK=n - Buffer Skid Setting	must be 255 default=255
#VSK?	Query current
#VSK=?	Query range shows 255
#VSP=n - Silence Detection Period	0 to 255 default=55 (x 0.1s)
#VSP?	Query current
#VSP=?	Query range shows 0-255
#VSR=n - Sampling Rate Selection	7200=7200 Hz sampling rate 8000=8000 Hz sampling rate 9600=9600 Hz sampling rate 11025=11025 Hz sampling rate 22050=22050 Hz sampling rate
#VSR?	Query current
#VSR=?	Query range shows 7200,8000,9600,11025,22050
#VSS=n - Silence Detection Tuner	0=disable* 1=least sensitive setting 2=midrange setting 3=most sensitive setting
#VSS?	Query current
#VSS=?	Query range shows 0-3
#VTD=i,j,k - DTMF/Tone Reporting	i,j,k (3 ascii hex bit maps) i=bits associated with in voice tx, j=bits associated with voice rx, k=bits associated with in online voice command. (bit value: 0=disable, 1=enable) bit0=dis/enab DTMF tone bit1=dis/enab 1300 Hz calling tone bit2=dis/enab 1100 Hz calling tone bit3=dis/enab 2100 Hz answer tone bit4=dis/enab 2225 Hz answer tone bit5=dis/enab call progress tone bit6=reserved bit7=reserved
#VTD?	Query current
#VTD=?	Query range shows FF,FF,FF
#VTM=n - Enable Timing Mark Placement	0=disable* 10=1 sec interval
#VTM?	Query current
#VTM=?	Query range shows 0,10
#VTS=[x,y,z],{x,z}, and/or x - Generate Tone Signals	x=first frequency (0 or 200-3000 Hz) y=second frequency (0 or 200-3000 Hz) z=0 to 99=duration (units of 100 ms)
#VTX - Voice Transmit	
#VGT=n - Set Playback Volume	128 to 131 default=129
#VGT?	Query current
#VGT=?	Query range shows 128-131
#SPK=x,y,z	<x=mute parameter>: 0=microphone mute 1=microphone on* 2=room monitor mode <y=speaker output attenuation in 2 dB steps>: 0=0 dB attenuation

	<p>1=2 dB attenuation ... 5=10 dB attenuation* ... 15=30 dB attenuation 16=speaker mute</p> <p><z=microphone gain parameter>: 0=0 dB gain 1=6 dB gain* 2=9.5 dB gain 3=12 dB gain</p>
Voice/Audio Command	Description
#SPK?	Query current
#SPK=?	Query range shows (0-2),(0-16),(0-3)
#VAG=x,y - Automatic Gain Control	<p><x=device parameter>: 0=microphone* 1=telephone</p> <p><y=enable parameter>: 0=off* 1=on</p>
#VAG?	Query current
#VAG=?	Query range shows (0,1),(0,1)
#VEQ=w,x,y,z - Graphical Equalizer	<p>Not implemented. For future use only.</p> <p><w=mute parameter>: 0=mute on 1=mute off*</p> <p><x=device parameter>: 0=speaker 1=microphone*</p> <p><y=band parameter>: 0=band 0* 1=band 1 2=band 2 3=band 3 4=band 4</p> <p><z=level parameter>: 0= -16 dB attenuation 1= -14 dB attenuation 2= -12 dB attenuation ... 8= 0 dB attenuation* ... 15= 14 dB attenuation</p>
#VEQ?	Query current
#VEQ=?	Query range shows (0,1),(0,1),(0-4),(0-15)
#VTH=x,y,z - Time Harmonic Scaling	<p>Not implemented. For future use only.</p> <p><x=enable parameter>: 0=off 1=on*</p> <p><y=compression parameter>: 0=no compression* 1=MNP5 2=V.42bis</p>

	3=both MNP5 and V.42bis <z=scaling parameter>: 0= divided by 2.25 slowest 1= divided by 2.00 slower 2= divided by 1.75 slower 3= divided by 1.5 slower 4= multiplied by 1.5 fast* 5= multiplied by 1.75 faster 6= multiplied by 2.00 faster 7= multiplied by 2.25 fastest
#VTH?	Query current
#VTH=?	Query range (0,1),(0-3),(0-7)

Table 2.16 AT#UI command

AT#UI command	Description
AT#UI	Responds with : <9BCD2D5C 0=07> <9BCD2D5C 1=MOT1511> <9BCD2D5C 2=MOT150F> <9BCD2D5C 3=MOT1510> <9BCD2D5C 4= otorola"> <9BCD2D5C 5= EO 56K External"> <9BCD2D5C 8= otorola; DSP56303; 0"> <9BCD2D5C 9=00000000> OK

Table 2.17 AT*HO Homologation support commands

Command syntax: AT*HO<option 0>,<option 1>,<option 2>,<option 3> <CR>

Strap Settings	Option 0	Option 1	Option2	Option 3
Normal	0			
V.21	1	tx level 0 to 30 (for 0 to -30 dB)	0=ans, 1=orig	0=mark, 1=space, 2=511 pattern
Bell 103	2	tx level 0 to 30 (for 0 to -30 dB)	0=ans, 1=orig	0=mark, 1=space, 2=511 pattern
V.23	3	tx level 0 to 30 (for 0 to -30 dB)	0=ans (tx 1200 bps), 1=ans (tx 600 bps), 2=orig (tx 75 bps)	0=mark, 1=space, 2=511 pattern
B212A	4	tx level 0 to 30 (for 0 to -30 dB)	0=ans, 1=orig	
V.22	5	tx level 0 to 30 (for 0 to -30 dB)	0=ans, 1=orig	0=no guard tone, 1=550 guard tone, 2=1800 guard tone
V.27	6	tx level 0 to 30 (for 0 to -30 dB)		
V.29	7	tx level 0 to 30		

		(for 0 to -30 dB)		
V.17	8	tx level 0 to 30 (for 0 to -30 dB)		
V.33	9	tx level 0 to 30 (for 0 to -30 dB)		
V.32bis	10	tx level 0 to 30 (for 0 to -30 dB)		
V.34	11	tx level 0 to 30 (for 0 to -30 dB)	0=high channel, 1=low channel	0=2400 baud, 1=2743 baud, 2=2800 baud, 3=3000 baud, 4=3200 baud, 5=3429 baud
DTMF	12	0 to 9=digits 0 to 9 10=digit A 11=digit B 12=digit C 13=digit D 14=digit * 15=digit #		
Calling Tone	13	0=1100 Hz 1=1300 Hz		
Answer back tone	14			
Quiet Mode	15			

For example, to set Leo for testing V.34 transmitting at TX level of -12 dbm, low channel at 2743 baud rate the command to issue would be `AT*HO11,12,1,1<CR>`.

2.3 Result Codes

The modem sends a response to the user via the screen after a command is issued. As shown in the figure below, there are two forms for each result code: Modem Response code and digit code.

Response Code	Description	Digital Code
OK	Command executed without errors	0
CONNECT	Connected to an another modem	1
RING	Detected a coming ring	2
NO CARRIER	Carrier lost or without connect	3
ERROR	Invalid command or invalid character	4
CONNECT 1200	Connection established on 1200 bps	5
NO DIALTONE	Do not detect dial tone within timeout	6
BUSY	Detected a busy from line after dialing	7
NO ANSWER	Without detect the answer modem after dialing	8
CONNECT 600	Connection established on 600 bps	9
CONNECT 2400	Connection established on 2400 bps	10
CONNECT 4800	Connection established on 4800 bps	11
CONNECT 9600	Connection established on 9600 bps	12
CONNECT 7200	Connection established on 7200 bps	13
CONNECT 12000	Connection established on 12000 bps	14
CONNECT 14400	Connection established on 14400 bps	15

CONNECT 19200	Connection established on 19200 bps	16
CONNECT 38400	Connection established on 38400 bps	17
CONNECT 57600	Connection established on 57600 bps	18
CONNECT 115200	Connection established on 115200 bps	19
CONNECT 75:TX/1200:RX	Connection established on 75 bps for Transmit/1200bps for Receive	22
CONNECT 1200:TX/75:RX	Connection established on 1200 bps for TX/ 75 bps forRx	23
CONNECT 16800	Connection established on 16800 bps	59
CONNECT 21600	Connection established on 21600 bps	61
CONNECT 24000	Connection established on 24000 bps	62
CONNECT 26400	Connection established on 26400 bps	63
CONNECT 28800	Connection established on 28800 bps	64
PROTOCOL: NONE	Without V.42 protocol compression for transmit & receive	70
PROTOCOL: LAPM	With V.42 protocol compression for transmit & receive	77
PROTOCOL: ALT		80
CONNECT 33600	Connection established on 33600 bps	84
CONNECT 31200	Connection established on 31200 bps	91
CONNECT 32000	Connection established on 32000 bps	165
CONNECT 34000	Connection established on 34000 bps	166
CONNECT 36000	Connection established on 36000 bps	167
CONNECT 38000	Connection established on 38000 bps	168
CONNECT 40000	Connection established on 40000 bps	169
CONNECT 42000	Connection established on 42000 bps	170
CONNECT 44000	Connection established on 44000 bps	171
CONNECT 46000	Connection established on 46000 bps	172
CONNECT 48000	Connection established on 48000 bps	173
CONNECT 50000	Connection established on 50000 bps	174
CONNECT 52000	Connection established on 52000 bps	175
CONNECT 54000	Connection established on 54000 bps	176
CONNECT 56000	Connection established on 56000 bps	177
CONNECT 58000	Connection established on 58000 bps	178
CONNECT 60000	Connection established on 60000 bps	179
CONNECT 230400	Connection established on 23400 bps	20
+FCERROR		+F4

Result code (Voice mode specific)

Result Codes for Voice Operation	Description
VCON	
CONNECT	Connected a Voice line

3 - S REGISTERS REFERENCE

Your modem has status registers. These registers are memory locations inside your modem which control your modem's operation. You usually do not have to worry about setting any register because the default values work for most applications.

The S registers are summarized in Table 3.1, along with their default values.

The factory default values are stored in ROM and are loaded into the active configuration at power-up or by the **Zn** command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by entering the **&Yn** command, where 'n' is one of the two possible user profiles. The factory defaults can be loaded at any time by entering the **&F** command. Please refer to the AT& command list.

3.1 Register Summary

The following chart summarizes of your modem's registers:

Table 3.1 S Registers Summary

S-Registers	Description
S0 - Rings to Auto Answer	Range : 0-255 default=0
S1 - Ring Counter	Range : 0-255 default=0
S2 - Escape Char	Range : 0-255 (value over 127 disables esc) default=43
S3 - Carriage Return Char	Range : 0-127 default=13
S4 - Line Feed Char	Range : 0-127 default=10
S5 - Backspace Char	Range : 0-127 default=8
S6 - Blind Dial Wait	Range : 0-255 default=2
S7 - Wait Time for Carrier	Range : 0-255 default=50 (x 1s)
S8 - Pause time	0-255 default=2 (x 1s)
S-Registers	Description
S9 - Carrier Detect Response Time	Responds with OK but does nothing..
S10 - Carrier Loss Disconnect Time	Range : 1-255 default=14 (x 0.1s)
S11 - DTMF Tone Duration	Range : 50-255 default=80 (x 0.001s)
S12 - Escape Prompt Delay	Range : 0-255 default=50 (x 0.02s)
S13 - Reserved	Responds with OK
S14 - General Bit Mapped Options	Responds with OK
S15 - Reserved	Responds with OK
S16 - Test Mode Bit Mapped Options	Responds with OK
S17 - Reserved	Responds with OK
S18 - Test Timer	Responds with OK
S19 - AutoSync Options	Responds with OK
S20 - AutoSync HDLC Address or BSC Sync Char	Responds with OK
S21 - V.24/General Bit Mapped Options	Responds with OK
S22 - Speaker/Results Bit Mapped Opts	Responds with OK
S23 - General Bit Mapped options	Responds with OK
S24 - Sleep Inactivity Timer	Responds with OK
S25 - Delay to DTR off	Responds with OK
S26 - RTS to CTS Delay	Responds with OK
S27 - General Bit Mapped Options	Responds with OK
S28 - General Bit Mapped Options	Responds with OK
S29 - Flash Dial Modifier Time	Responds with OK
S30 - Disconnect Inactivity Timer	Range : 0-255 default=0 (x 10s)
S31 - General Bit Mapped Options	Responds with OK

S32 - XON Char	Range : 0-127 default=17
S33 - XOFF Char	Range : 0-127 default=19
S34 - Reserved	Responds with OK
S35 - Reserved	Responds with OK
S36 - LAPM Failure Control	Responds with OK
S37 - Line Connection Speed	Responds with OK
S38 - Delay Before Forced Hangup	Responds with OK
S39 - Flow Control Bit Mapped Options	Responds with OK
S40 - General Bit Mapped Options	Responds with OK
S41 - General Bit Mapped Options	Responds with OK
S42 - Reserved	Responds with OK
S43 - Reserved	Responds with OK
S45 - Reserved	Responds with OK
S46 - Data Compression Control	Responds with OK
S48 - V.42 Negotiation Control	Responds with OK
S82 - LAPM Break Control	Responds with OK
S86 - Call Failure Reason Code	Responds with OK
S91 - PSTN Transmit Attenuation Level	Range : 9-30 default=10 (x -1 dBm)
S92 - Fax Transmit Attenuation Level	Responds with OK
S95 - Result Code Messages Control	Responds with OK

S Registers (Voice mode specific)

S-Register for Voice Operation	Motorola
S30 - Disconnect Inactivity Timer	Range : 0-255 default=0 (x 1s)

3.2 Glossary of S Registers

S0 Number of Rings Before Auto Answer

S0 determines the number of rings that must be received before the modem automatically answers an incoming call. For example, when **S0=3**, the modem automatically answers after the third ring. When **S0=0**, the modem does not automatically answer an incoming call; it stays on-hook until the **A** command is issued manually to answer the incoming call.

Range: 0 - 255 rings

Default: 0

S1 Ring Count

S1 automatically increments its value by one each time the modem receives a ring while in the command state. **S1** is reset to zero if no ring is detected within **8** seconds.

Range: 0 - 255 rings
Default: 0

S2 ASCII Value of Escape Character

S2 stores the ASCII value of the escape character. Setting register **S2** to a value greater than 127 disables the escape command and you cannot return to the command state. With escape disabled, in the on-line state the modem cannot hang up until the power is turned off or the remote modem hangs up.

Range: 0 - 255, ASCII decimal.
Default: 43 (+)

S3 ASCII Value of Carriage Return

S3 stores the ASCII value of the carriage return character. (Pertains to asynchronous operation only.)

Range: 0 - 127, ASCII decimal.
Default: 13

S4 ASCII Value of Line Feed Character

S4 stores the ASCII value of the line feed character, if your computer does not recognize the default as a line feed, change the value. A value greater than 127 disables the line feed. When disabled, the line feed character that precedes or follows a result code is canceled. (Pertains to asynchronous operation only.)

Range: 0 - 127, ASCII decimal.
Default: 10 (Line Feed)

S5 ASCII Value of Backspace Character

S5 stores the ASCII value of the backspace character. The backspace is used to edit a command line. If your computer does not recognize the default as a backspace, change the value. (Pertains to asynchronous operation only.)

Set **S5** to any value from 0 to 31 or 127. Do not set it to any value from 32 through 126 because these values correspond to printable ASCII characters. A value greater than 127 disables the backspace and makes it impossible to edit a command line.

Range: 0 - 32, ASCII decimal.
Default: 8 (Backspace)

S6 Wait Time before Blind Dialing

S6 controls how long the modem waits after it goes off-hook before it dials the first digit of the telephone number. The modem always pauses for at least 2 seconds, even if **S6** is set to less than two seconds.

Range: 2 - 255 seconds.
Default: 2

S7 Wait for Carrier after Dial

S7 controls how long the modem waits for a carrier signal from a remote modem after originating a call or from the calling modem after going off-hook when answering a call.

S7 also controls how long the modem waits for a one-second continuous dialtone after dialing a number followed by the **W** dial modifier. If the modem detects a one-second continuous dialtone within the specified wait time, it proceeds to dial.

Range: 1 - 255 seconds.
Default: 50

S8 Pause Time for Comma

S8 controls how long the modem pauses when a comma ", " is encountered in a dial string while executing a dial command.

Range: 0 - 255 seconds.
Default: 2

S9 Carrier Detect Response Time

S9 determines how long a carrier signal must be present for the modem to confirm it. The longer the response time, the easier it is for the modem to correctly recognize a carrier without mistaking other signals or transient noise on the line as a carrier.

Range: 1 - 255 tenths of a second.
Default: 6 (0.6 second)

S10 Delay between Loss of Carrier and Hang-Up

S10 determines the delay time between the loss of a carrier from the remote modem and hang-up. This allows for a temporary loss of carrier without causing the local modem to disconnect. When **S10** is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnecting is the value in **S10** minus the value in **S9**. Therefore, the value in **S10** must be greater than that in **S9**, or else the modem disconnects before it recognizes the carrier.

Range: 1 - 255 tenths of a second.
Default: 14 (1.4 seconds)

S11 DTMF (Touch-tone) Tone Duration

S11 determines the duration and spacing of tones for Dual Tone Multifrequency (DTMF) dialing. This value has no effect on pulse dialing.

Range: 50 - 255 milliseconds.
Default: 95

S12 Escape Guard Time

S12 determines the escape guard time. The escape guard time is the minimum waiting time required before and after entered the escape code (three consecutive escape characters) in the on-line state. It is also the maximum waiting time allowed between any two consecutive escape characters. If the waiting time before or after the escape code is shorter than the guard time, or if the waiting time between consecutive escape characters is longer than the guard time, then the modem does not recognize the escape command and stays on-line.

If the escape guard time is set at 0 second, it is impossible to return the modem to command state.

Range: 0 - 255 1/50 of a second.
Default: 50 (1 second)

S13 Reserved
S14 Bit Mapped Options (Reserved)
S15 Reserved
S17 Reserved

S18 Test Timer

The test timer determines how long tests are performed. The modem automatically ends the test when the test time is expired. The default value of 000 disables the test timer. When the timer is thus disabled, all tests must be ended with the &T0 command.

Range: 0 - 255 seconds.
Default: 0

S21 V.24/General Bit Mapped Options

S22 SPEAKER/Results Bit Mapped Options

Default: 117 (75h) (01110101b)

S23 Bit Mapped Options

Default: 55 (37h) (00110111b)

S24 Sleep Inactivity Timer

Set the length of time, in units of 10 seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode.

Range: 0 - 255 (seconds)
Default: 0

S25 Delay to DTR

S25 serves two purposes. When the modem is operating in synchronous mode 1, the value assigned to **S25** specifies the length of time the modem waits after a connection has been made before examining DTR. This allows the modem to ignore an ON-to-OFF transition of DTR, giving the user 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 mode. During this time, the value for **S25** is read in whole seconds.

In all other modes, and after call establishment in synchronous modes 1 and 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 in data mode.

Range: 0 - 255 (1 second for synchronous mode 1;
0.01 second otherwise)

Default: 5

S26 RTS to CTS Delay Interval

Pertains to synchronous operation only. When CTS tracks RTS (**&R0**) and the modem detects an ON-to-OFF transition on RTS, this register sets the time delay before the modem turns CTS to ON.

Range: 0 - 255 hundredths of a second

Default: 1

S28 Bit Mapped Option Status

Default: 0

S29 Flash Dial Modifier Time

Range: 0 - 255 10ms intervals

Default: 70 (700ms)

S30 Inactivity Disconnect Timer

This register determines the length of time, in seconds, the modem waits before disconnecting when no data is sent or received. This only operates in **&Q5** and **&Q6** modes, a value of 0 in this register disables the timer.

Range: 0 - 255 tenths of a second (X 10s)

Default: 0 (disable)

S31 Bit Mapped Options (Reserved)**S32 XON Character**

Range: 0 - 255, ASCII decimal

Default: 17

S33 XOFF Character

Range: 0 - 255, ASCII decimal
Default: 19

S36 LAPM Failure Control

This register is read when the **S48** register contains the value 128 or if an attempted Error-Correction link fails.

S37 Desired Line Connection Speed

Default: 0

S38 Delay Before Forced-Disconnect

This register controls how long the modem waits, after receiving the **ATH** command or loss of DTR, before it disconnects from the telephone line. When connected in an error-corrected mode, you can use this register to ensure that all data is transmitted from the modem's buffer before the modem disconnects.

If you set **S38** between 0 and 254, the modem waits that number of seconds for the remote modem to acknowledge all data before it disconnects. If you set **S38** to 255, the modem waits indefinitely for the remote modem to acknowledge all data.

Range: 0 - 255 seconds
Default: 20

S39 Flow Control

Default: 3 (00000011b)

S40 General Bit Mapped Options

Default: 104 (68h) (01101000b)

S41 Bit-Mapped Options (Reserved)

S46 Protocol Selection

This register controls whether the modem tries to use data compression when the modem establishes an error corrected link. The default is for the modem to use data compression (138).

S48 V.42 Negotiation Action (Reserved)

S82 Break Handling Option

S82 is for compatibility purposes only, changing this register will not any affect.

S86 Call Failure Reason Code

When the modem issues a NO CARRIER result code, a value is written to this S-Register to help determine the reason for the failed connection. **S86** records the first event that contributes to a NO CARRIER message. The cause codes are:

S91 PSTN Transmit Attenuation Level

Sets the transmit attenuation level from 0 to 15 dBm for the PSTN mode resulting in a transmit level from 0 to -15 dBm.

Range: 9 to 30 dBm (x -2, Corresponding to 0 to -15 dBm transmit level).

Default: 10 (-10 dBm transmit level).

S92 Fax Transmit Attenuation Level

Sets the transmit attenuation level from 0 to 15 dBm for the fax mode resulting in a transmit level from 0 to -15 dBm.

Range: 0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level).

Default: 10 (-10dBm transmit level).

S95 Extended Result Codes

This register can override some of the **W** command options. Set the appropriate bit to 1 to enable the corresponding result code, regardless of the **W** command setting Set the bit to 0 to disable the result code.

4 - TESTING

The modem provides five testing features to identify fault location when transmission quality is not good: local digital loopback, local analog loop back, local analog loopback with self-test, remote digital loopback, and remote digital loopback with self-test. These tests are initiated with the **&Tn** command described in Chapter 2.

4.1 Local Analog Loopback

The local analog loopback test checks the integrity of the local computer or terminal and the local modem. During the test, the local modem internally loops data sent from the local computer or terminal back to the same computer or terminal as shown in Figure 4-1. During the test, data is not transmitted to the remote modem.

If characters are looped correctly during this test, both the modem and the local computer or terminal are functioning correctly. If incorrect characters appear on the screen, either the local computer or terminal or the local modem is in error.

To perform a local analog loopback, put the local modem in the command state. If it is on-line, issue the escape command + + +, to return to the command state.

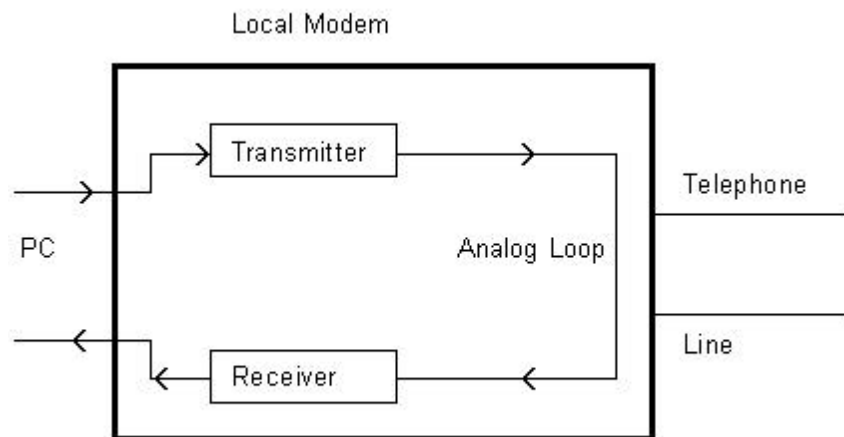


Fig. 4-1 Data Path for Local Analog Loopback

Example 1 - test timer disabled

Command:	AT&Q0<CR> ATS18=0&TI <CR>
Result:	CONNECT 56000
Test message:	THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 1234567890
Escape:	+ + + (return to the on-line command state)
Result code:	OK

Command: **AT&T0 <CR>** (end the test)

Result code: **OK**

Here, the test timer is disabled and the modem sets up an internal analog loop as shown in Figure 4-1. When the loopback is established, the modem goes on-line and the test message (any character you type) is looped back on the screen for verification. Finally, +++ returns the modem to the command state and **&T0** ends the test and breaks the internal analog loop.

The following command sequence is the same as the previous one except that the test timer is set to 60 seconds. At the end of the test time, the timer expires, the test ends, and the test result is reported.

Example 2 - test timer enabled

Command: **AT&Q0<CR>**
ATS18=60&T1<CR>

Result: **CONNECT 56000**

Test message: **THE QUICK BROWN FOX JUMPS OVER**
THE LAZY DOG 1234567890

Escape: **+++**

Result code: **OK**

4.2 Local Analog Loopback with Self-Test

The local analog loopback with self-test checks the integrity of the local modem. In this test, an internally generated data pattern of alternate binary ones and zeros (reversals) at the selected bit rate is looped through the internal analog loop inside the local modem to an internal error counter as shown in Figure 4-2. An error count of 255 indicates that 255 or more errors were detected.

Example-the test timer is disabled and 12 errors are found during the test

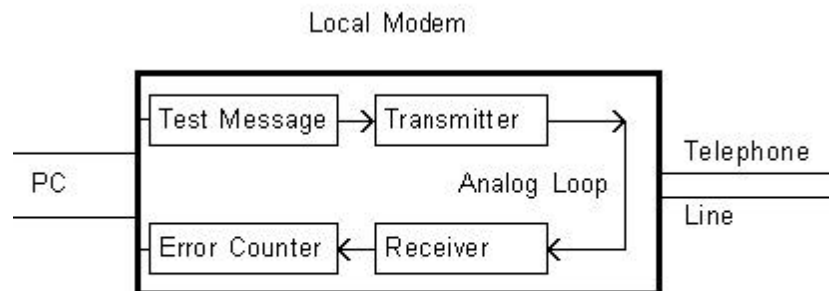


Fig. 4-2 Local Analog Loopback with Self-test

Command: **AT&Q0<CR>**
ATS18=0&T8<CR>

Result: **OK**

Command: **AT&T0<CR>** (ends the test)

Test result: **000**

Result code: **OK**

5 - TROUBLESHOOTING GUIDE

This chapter describes common problems in the installation, configuration and regular usage of your Modem. To test the Fax/Data Modem, a communication software package is needed and the package must include a mode that allows you to operate your Modem by directly issuing internal commands to the modem.

Follow the procedures in the following sections to resolve these common problems:

! **No Response From Your Modem**

1. To make sure that the modem's power was already up.
2. There are such kind of situation would appears the message like “ **Could not communicate with modem!**” or “ **The modem do not respond !**”. **We recommend you to double check the setting or installation of the modem on the control panel.**
3. Issue the **ATZ** command to reset your modem. The returned result code should be "0" or "OK" depending on what communications program you are using. Your modem is OK if you get one of these responses. If there is no response after issuing the **ATZ<CR>**, continue to the next step.
4. Issue the command: **AT&F&W <CR>**, if a "0" or "OK" result code is displayed on the screen, your modem is OK. Otherwise, contact your dealer for assistance.

! **»Your Modem Does Not Dial Out**

To make sure that your modem responds normally as described in section 4.1. If you can communicate through the keyboard, check whether the modem is properly connected to the phone line. Or a situation be similar to the following case,

Software respond “No Dialtone !!” mean that the modem do not detect line dial tone.

Sol : So first of all, to make sure the LINE has been plug into the LINE JACK of the right position on modem. If yes, then use a telephone set and plug the line into the telephone set. To hear the tone in handset. If you can hear the right dial tone as usual. Probably you modem has some damage in DAA circuit.

! **»Your Modem Does Not Connect After It Has Dialed a Phone Number**

The problem may have several causes.

1. The phone line may be too noisy or the telephone cord may be poor.
2. Try the line with a regular phone.
3. Also the remote modem may not recognize your modem's baud rate.
4. The Modem could dial out but can not hear the negotiation and respond “No CARRIER” or respond “BUSY”.

Sol : Could be possible with incorrect setting in modem's configuration, such like country code or DTMF tone duration.

! **»Your Can't Transmit After You Have Connected to the Remote Modem**

In this case, check the communication parameters of the remote modem, then configure your software to the same number of data bits, stop bit, and parity.

6 - APPLICATION EXAMPLES

6.1 Dialing a Remote Modem

Command line: `ATDP9WT002, (886)-7128423<CR>`

This command line instruct the modem to dial a remote modem through a PBX. The modem first use pulse dialing to dial 9 (the access code of the PBX), wait for outside dial tone, and then use touch tone dialing to dial 002 once a one-second continuous dial tone is detected within 30 seconds, pause for 2 seconds (if S8=2) and then dial 8867128423.

6.2 Dialing a Stored Number

Command line: `AT&Z2=T03,709394<CR>`

Command line: `ATDS=2<CR>`

The first command line store the dial string T03, 709394 to the 3rd location in NVRAM. Afterwards you can use the second command line to dial this stored number. The dial string T03, 709394 will appear on the screen to indicate the number being dialed.

6.3 Manual Answer an Incoming Call

Command line: `ATA <CR>`

The factory setting of the S-register S0 is S0=0. This condition disables the auto answer capability so that you must issue an ATA command to answer a call. At power up, your modem always monitors if there are incoming rings. If incoming rings are detected, your modem will display result codes on the screen as :

```
RING
:
:
RING
```

Seeing that, you may issue the ATA command to answer the call. This command must be entered within the quiet interval between any two rings.

6.4 Auto Answer an Incoming Call

Command line: `AT S0=2 &W &Y <CR>`

Auto answer can be enabled by changing the setting of the S-register S0 to a value between 1 and 255. In the above command line, S0=2 instructs the modem to answer an incoming call automatically after the 2nd ring. The &W command writes this configuration to profile 0 in NVRAM. &Y command instruct the modem to load profile 0 as the active configuration on power-up. The last two commands make S0=2 the default value at power-up or reset.

This example also shows the insertion of space between two neighboring commands to make the command line more readable.

6.5 Voice to Data Switch

Command line: **ATA <CR>** or **ATX1D <CR>**

If you are talking with a remote modem user through the telephone set and want to initiate data communication with the remote modem, follow the procedures below:

1. You or the remote user issue an ATA command first to switch to data communication.
2. When the person on the other end hears an answer tone from the phone, issues an ATX1D command (X1 to disable the dial tone monitor) to instruct the modem to go off-hook and wait for a carrier. If connection is successful, the CONNECT XXXX result code will be displayed on the screen. Now you can hang up your phone and begin data communication with the remote modem.

6.6 Display Format

When command AT&V is issued, the modem responds with Active profile, Stored profile 0 and Stored profile 1 as follows :

(Columns Line-up)

```
0   1   2   3   4   5   6   7
012345678901234567890123456789012345678901234567890123456789
```

```
Active profile
...
Stored profile 0
...
Stored profile 1
...
OK
```

When command AT&V1 is issued, the modem responds with the last connection statistics as follows:

```
TERMINATION REASON..... .LOCAL REQUEST
TX data rate..... 33600 BPS
RX data rate..... 33600 BPS
Error correction PROTOCOL.. LAPM
Data COMPRESSION..... V42BIS
Line QUALITY..... 000
```

```
OK
```

(Note: Possible TERMINATION Reasons are: LOCAL REQUEST, KEY ABORT, INACTIVITY TIMEOUT, CARRIER LOSS, DTR LOSS and LINK DISCONNECT.)

When command AT&V2 is issued, the modem responds with the list of stored Telephone numbers as follows :

```
TELEPHONE NUMBERS:
0= 9055077402
```

1= 90550774004
2= 9055077200
3= 4169671111

OK

Example of an active profile

ACTIVE PROFILE: DTE SPEED = 115200 BPS 8N1
E1 L1 M1 N1 Q0 T V1 W0 X4 &C0 &D0 &G2 &K3 &Q5 &R1 &S0 &T4 &X0 &Y0
\K5 \N3 \V0 %C3
S00:002 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S10:014
S12:050 S30:000 S32:017 S33:019

Factory Default 0

STORED PROFILE 0: DTE SPEED = 115200 BPS 8N1
E1 L1 M1 N1 Q0 T V1 W0 X4 &C0 &D0 &G2 &K3 &Q5 &R1 &S0 &T4 &X0
\K5 \N3 \V0 %C3
S00:000 S02:043 S06:002 S07:050 S08:002 S10:014 S12:050 S30:000 S32:017 S33:019

Factory Default 1

STORED PROFILE 1: DTE SPEED = 115200 BPS 8N1
E1 L1 M1 N1 Q0 T V1 W0 X4 &C0 &D0 &G2 &K3 &Q5 &R1 &S0 &T4 &X0
\K5 \N0 \V0 %C3
S00:000 S02:043 S06:002 S07:050 S08:002 S10:014 S12:050 S30:000 S32:017 S33:019

Forbidden & Delayed numbers display

Display Forbidden Numbers:

&V3
FORBIDDEN NUMBERS:
0; 0123456789
1; 123456789012345
2; 234567890123
3; 3456789012
4; 4567

OK

Display Delayed Numbers:

&V4
DELAYED NUMBERS:
0; 0123456789 02:00:00
1; 12345678901234567890123456789012 02:00:00
2; 2345678901 00:02:00
3; 345678901234 00:03:25
4; 4567 00:01:45

OK

Connect message displays

\V0 = Connect message are controlled by commands X and W only (note: S95 is not supported); (Default)

\V1 = Connect messages are displayed in single line format which captures all the information associated with the call established. Connect, DTE speed, Modulation etc. are all displayed if applicable. See examples listed below.

W0 = Reports DTE speed only; (Default)

W1 = Reports Protocol and DTE speed in 2 separate lines;

W2 = Reports DCE speed only.

Regarding the DTE or DCE speed 'portion' of the connect message in both \V0 and \V1 cases:

For X0, no matter what DTE or DCE speed, a simple CONNECT message is displayed.

For X1, X2, X3 and X4, if DTE or DCE speed is 300 bps, a simple CONNECT is displayed, otherwise a CONNECT together with a speed is displayed.

Notes :

(a) x = Don't care

(b) Default is \V0, W0 and X4.

\V	W	X	CON- NECT	DTE- speed	Modulat ion	Pro- tocol	Com- Pression	DCE speed
\V0	W0	X4	√	√				
\V0	W1	X4	√	√		√		
\V0	W2	X4	√					√
\V1	x	x	√	√	√	√	√	√
\V1	x	x	√	√	√	√	√	√
\V1	x	x	√	√	√	√	√	√
\V0	W0	X0	√					
\V0	W1	X0	√			√		
\V0	W2	X0	√					
\V0	W0	X1	√	√				
\V0	W1	X1	√	√		√		
\V0	W2	X1	√					√
\V0	W0	X2	√	√				
\V0	W1	X2	√	√		√		
\V0	W2	X2	√					√
\V0	W0	X3	√	√				
\V0	W1	X3	√	√		√		
\V0	W2	X3	√					√

- Assuming result code return is enabled (ATQ0).

- Assuming long form result code (ATV1).

- Modulation** = K56FLEX, V.34, V.32 or omitted for all other modulation modes.

- Protocol** = NONE, ALT or LAPM.

- Compression** = CLASS5 or V42BIS or omitted when protocol is NONE.

- For K56FLEX, V.34 and V.23 where asymmetric rates are possible, DCE speed = DCE speed:TX/DCE speed:RX (note: both :TX and :RX are always shown even though the two rates may be the same);

For all other modulation modes, DCE speed = single DCE speed (i.e. with no :TX or :RX attached to the rate).

Examples :

(DTE rate = 115.2 Kbps)

(1a) ATV1X4 (regardless of W), K56Flex connection with LAPM protocol and V.42bis data compression established.

CONNECT 115200/K56FLEX/LAPM/V42BIS/31200:TX/56000:RX

(1b) ATV1X4 (regardless of W), V.34 connection with LAPM protocol and V.42bis data compression established.

CONNECT 115200/V34/LAPM/V42BIS/33600:TX/33600:RX

(1c) ATV1X4 (regardless of W), V.32 connection with LAPM protocol and V.42bis data compression established.

CONNECT 115200/V32/LAPM/V42BIS/14400

(1d) ATV1X4 (regardless of W), V.22bis connection with MNP4 protocol and MNP5 data compression established.

CONNECT 115200/ALT/CLASS5/2400

(1e) ATV1X4 (regardless of W), V.23 connection with no protocol established.

CONNECT 115200/NONE/75:TX/1200:RX

(2a) ATV0W0X4, V.34 connection with LAPM protocol and V.42bis data compression established.

CONNECT 115200

(2b) ATV0W0X0, V.34 connection with LAPM protocol and V.42bis data compression established.

CONNECT

(3a) ATV0W1X4, K56Flex connection with LAPM protocol and V.42bis data compression established.

PROTOCOL: LAPM

CONNECT 115200

(3b) ATV0W1X4, V.34 connection with LAPM protocol and V.42bis data compression established.

PROTOCOL: LAPM

CONNECT 115200

(3c) ATV0W1X4, V.32 connection with LAPM protocol and V.42bis data compression established.

PROTOCOL: LAPM

CONNECT 115200

(3d) ATV0W1X4, V22bis connection with MNP4 protocol and MNP5 data compression established.

PROTOCOL: ALT

CONNECT 115200

(3e) ATV0W1X4, B103 connection with no protocol established.

PROTOCOL: NONE

CONNECT 115200

(4a) AT\V0W2X4, K56Flex connection with LAPM protocol and V.42bis data compression established.

CONNECT 31200:TX/56000:RX

(4b) AT\V0W2X4, V.34 connection with LAPM protocol and V.42bis data compression established.

CONNECT 33600:TX/33600:RX

(4c) AT\V0W2X4, V.32 connection with LAPM protocol and V.42bis data compression established.

CONNECT 14400

(4d) AT\V0W2X4, V.22bis connection with MNP4 protocol and MNP5 data compression established.

CONNECT 2400

(4e) AT\V0W2X4, B103 connection with no protocol established.

CONNECT

Reporting selected options

“?” usually refers to a query of current setting.

e.g.

+MS?

+MS: 11,1,300,33600,0,0

“=?” Usually refers to a query of range of setting

e.g.

+MS=?

+MS:(0,1,2,3,9,10,11,56,64,69),(0-1),(300-60000),(300-60000),(0-1),(0-1)

APPENDIX

A - CALLER ID COMMANDS

#CIDn - Caller ID (Enables or disables Caller ID.)(for U.S.A)

This command only apply to models which support the Caller ID function.

- #CID=0** Disables Caller ID.(Default.)
- #CID=1** Enables 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=2** Enables 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.

Result Codes:

OK n=0 or 2.

ERROR Otherwise.

Inquiries :

#CID? Retrieves the current Caller ID mode from the modem.

#CID=? Returns the mode capabilities of the modem in a list with each element separated by commas.

Formatted Form Reporting

The modem presents the data in the <tag>=<value> pair format as described in the table below. Spaces are present on both sides of the equal sign.

TAG	Description
DATE	DATE=MMDD where MM is the month number(01 to 12) and DD is the day number (01..31).
TIME	TIME=HHMM where HH is the hour number (00 to 23) and MM is the minute number (00 to 59).
NMBR	NMBR=<number> or P or O where <number> is the telephone number of the caller, where P indicates that the calling number information is not available since the originating caller has requested private service, and where O indicates that the calling number information is not available or out of service at the calling location.
NAME	NAME=<listing name> where <listing name> is the subscription name.
MESG	MESG=<data tag><length of message><data><checksum> in printable ASCII hex numbers. This tag indicates a data item not listed above. The message is only possible for Multiple Message Format.

Notes:

1. The modem does not present any Caller ID information if the DCE detects a checksum error in the Caller ID packet.
2. In the event of an unrecognized data tag, the modem will present the data in ASCII hex numbers following the MESG tag.

Example of Formatted Form Reporting

1. The following example illustrates the standard Caller ID message packet.

```
RING
DATE = 0321
TIME = 1405
NMBR = 504551234
NAME = A N OTHER
RING
RING
```

2. The following example illustrates the case where the tag of the packet is not recognized by the modem.

```
RING
```

MESG = 06034242431

RING

RING

Unformatted Form Reporting

The modem presents all information and packet control information found in the message. The modem, however, excludes the leading U's (channel seizure information) from the presentation. The packet is presented in ASCII printable hex numbers, the modem does not insert spaces, or line feeds, for formatting between bytes or words of the packet. The modem does not detect the checksum of the packet.

Example of Unformatted From Reporting

RING

MESG=801F010831303135313232300203313031070E414E444552534F4E20414C4C454E3A

RING

C - TECHNICAL SPECIFICATIONS

C.1 Other Features

Data Rates(bps)

K56flex 300, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 19200, 21600, 24000, 26400, 28800, 31200, 32000, 33600, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, 56000

V.90 56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
(Receive only)

Flow Control Xon/Xoff, Hardware RTS/CTS

Operation Full-or Half-duplex 28800 bps with 26400, 24000, 21600, 19200, 14400, 9600, 4800, 2400 and 1200 bps auto fallback

Test Modes Analog loopback, local digital loopback, and remote digital loopback

Audio Monitor Built-in speaker, with software-controllable volume control

Guard Tone 550/1800 Hz

Compliance FCC Part 15 & Part 68

Transmit Level -11(+/-1) dBm

Receive Sensitivity -43 dBm

Pulse Dialing Specifications

	USA	International
Make/Break Ratio	39/61	33/67
Break Length	61ms	67ms
Dial Pulse Length	100m	100ms
Dial Pulse Rate	10pps	10pps
Interdigit Time	800ms	800ms

B - QUICK REFERENCE

A	Go On-line in Answer Mode
Bn	Select Protocol to 300 bps or 1200 bps
Cn	Carrier Transmit Control
D	Go On-line in Originate Mode
En	Command Echo
Hn	Hang Up
In	Identification
Ln	Control Speaker Volume
Mn	Monitor Speaker On/Off
Nn	Automode Enable
On	Return to On-line Data Mode
P	Set Pulse Dial as Default
Q	Result Code Display
Sn	Reading and Writing to S Registers
T	Set Tone Dial as Default
Vn	Select Word or Digit Result Codes
Wn	Negotiation Progress Reporting
Xn	Extended Result Codes
Yn	Enables or Disables Long Space Disconnect
Zn	Reset
&Cn	Select DCD Options
&Dn	DTR Option
&F	Fetch Factory Configuration
&Gn	Set Guard Tone
&Kn	DTE/Modem Flow Control
&Mn	Communication Mode

&Pn	Select Pulse Dialing Make/Break Ratio
&Qn	Asynchronous Mode Selection
&Sn	DSR Option
&Tn	Testing and Diagnostics (See Chapter 4)
&V	View Configuration Profiles
&Wn	Store the Current Configuration to Nonvolatile RAM
&Yn	Select the Default Profile
&Zn	Store Telephone Numbers (n=0 to 3)
\An	Select Maximum MNP Block Size
\Bn	Transmit Break to Remote
\Gn	Modem to Modem Flow Control (XON/XOFF)
\Kn	Break Control
\Nn	Operating Mode Control
\Vn	Single Line Connect Message Enable
%Cn	Enable/Disable Data Compression
%En	Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward
%L	Report Received Signal Level
%Q	Line Signal Quality
+MS	Select Modulation
**	Download to Flash Memory(For models with flash Memory only)
@	Answer
,	Pause
!	Initiate a Hookflash
;	Return to Command State after Dialing
^	Tone Control
J	Perform MNP
K	Enable Power Level

L	Re-dial Last Number
P	Pulse Dialing
S	Dial a Stored Number
T	Touchtone Dialing
W	Wait for Dialtone
A/	Repeat Command
+++	Escape

E - GLOSSARY

ASCII	An acronym for American Standard Code for Information Exchange. ASCII is a seven-bit code which defines 128 standard characters, including control characters, letters, numbers, and symbols. An extra 128 characters comprise the extended ASCII set.
Baud Rate	The transmission rate between two serial devices, e.g., modems, fax machines, etc. Measured in Bits Per Second.
Blind Dialing	n blind dialing, the modem continues to dial, regardless of the existence of a dialtone, ring, or busy signal.
BPS	Bits Per Second; the number of bits that can be transmitted in one second.
Carrier Signal	The analog data signal that a modem sends over telephone wires.
COMx	Where (x = 1, 2, 3, or 4), COMx is the name(address) of serial communications ports on personal computers. Each serial port in a personal computer has a different number.
CTS	Clear To Send.
Default	The assumed value that is used for a command parameter when no other value is explicitly provided.
DCD	Data Carrier Detect.
DCE	Data Communication Equipment.
DTE	Data Terminal Equipment.
DTMF	Dual Tone Multifrequency(for touchtone dialing).
DTR	Data Terminal Ready.
FSK	Frequency Shift Keying.

Make/Break Ratio	The ratio of the off-hook (make) to on-hook (break) interval is the make/break ratio in pulse dialing.
Modem	A combination of the words MODulator and DEModulator. Modems transform digital data into analog signals and back again.
Nonvolatile Memory	An area of memory inside the modem where the default configuration profile is stored. Values recorded in this memory will not be lost when the power is turned off.
Off-Hook	The condition when the modem has picked up the telephone line.
Off-Line Command State -	A modem state in which the modem accepts, interprets and executes commands from an asynchronous computer or terminal.
On-Hook	The condition when the modem has not picked up the telephone line; the telephone is hung up.
On-Line	A carrier signal link with a remote modem has been established; communication is in progress.
On-Line State -	A modem state in which the modem is connected with a remote modem. Data can be sent or received from the remote modem in this state. No commands will be accepted from the modem except the escape command which will bring the modem into the on-line command state.
On-Line Command State -	A modem state in which the modem can accept or execute commands from an asynchronous computer or terminal while remaining connected with the remote modem. The user can return the modem to the on-line state by issuing the ATOn command or put it into the off-line command state by issuing command such as ATZ or ATH .
Parity	An error-checking method by which the modem verifies that the data just sent is correct.
PPS	Pulse per second.
Profile	A list of default settings.
Protocol	A technical specification for serial communications; the protocols supported by the modem are listed in Appendix B.
PSK	Phase Shift Keying.
Pulse Dialing	A dialing form in which each digit is represented by a series of pulses. Rotary telephones all use pulse dialing.
QAM	Quadrature Amplitude Modulation.
Result Codes	The response the modem returns to the screen upon executing a command.
RAM	Random Access Memory.

ROM	Read-Only Memory. A chip inside the modem which stores the factory default settings. This memory cannot be changed.
RTS	Request To Send.
RX	Reception.
S Register	RAM locations in the modem which store the active configuration.
TCM	Trellis-Coded Modulation.
Touchtone Dialing	A dialing format in which each digit is represented by a musical frequency.
TX	Transmission.

F - ASCII CODE TABLE

Decimal	Hex Value	Decimal	Hex Value	Decimal	Hex Value	Decimal	Hex Value				
000	00	NUL	032	20	(space)	064	40	@	096	60	'
001	01	SOH	033	21	!	065	41	A	097	61	a
002	02	STX	034	22	"	066	42	B	098	62	b
003	03	ETX	035	23	#	067	43	C	099	63	c
004	04	EOT	036	24	\$	068	44	D	100	64	d
005	05	ENQ	037	25	%	069	45	E	101	65	e
006	06	ACK	038	26	&	070	46	F	102	66	f
007	07	BEL	039	27	'	071	47	G	103	67	g
008	08	BS	040	28	(	072	48	H	104	68	h
009	09	HT	041	29	)	073	49	I	105	69	i
010	0A	LF	042	2A	*	074	4A	J	106	6A	j
011	0B	VT	043	2B	+	075	4B	K	107	6B	k
012	0C	FF	044	2C	,	076	4C	L	108	6C	l
013	0D	CR	045	2D	-	077	4D	M	109	6D	m
014	0E	SO	046	2E	.	078	4E	N	110	6E	n
015	0F	SI	047	2F	/	079	4F	O	111	6F	o
016	10	DLE	048	30	0	080	50	P	112	70	p
017	11	DC1	049	31	1	081	51	Q	113	71	q
018	12	DC2	050	32	2	082	52	R	114	72	r
019	13	DC3	051	33	3	083	53	S	115	73	s
020	14	DC4	052	34	4	084	54	T	116	74	t
021	15	NAK	053	35	5	085	55	U	117	75	u
022	16	SYN	054	36	6	086	56	V	118	76	v
023	17	ETB	055	37	7	087	57	W	119	77	w
024	18	CAN	056	38	8	088	58	X	120	78	x
025	19	EM	057	39	9	089	59	Y	121	79	y
026	1A	SUB	058	3A	:	090	5A	Z	122	7A	z
027	1B	ESC	059	3B	;	091	5B	[	123	7B	{
028	1C	FS	060	3C	<	092	5C	\	124	7C	|
029	1D	GS	061	3D	=	093	5D	]	125	7D	}
030	1E	RS	062	3E	>	094	5E	^	126	7E	~
031	1F	US	063	3F	?	095	5F	_	127	7F	DEL

Approximately Power Consumption

This Motorola external 56K/V.90 modem requires an external adapter to provide power for the modem. The external adapter should be a AC type source, a 9VAC w/1Amp or 12VAC w/ 830m Amp is typically used. **The total of power consumption is approximately at 450m Amp.** According to the difference model for difference country should have 20m Amp range for higher or lower.

"This equipment has been approved to [Council Decision 98/482/EC - "CTR 21"] for pan-European single terminal connection to the Public Switched telephone Network (PSTN). However, due to differences between the individual PSTNs provided in different countries, the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN termination point.

In the event of problems, you should contact your equipment supplier in the first instance"