

GDC 060R126-000  
Issue 4, April 2002

## Technical Reference Guide

**Quester™ II**

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### **Antistatic Precautions**

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment may contain static-sensitive devices that are easily damaged and proper handling and grounding is essential. Use ESD precautionary measures when installing parts or cards and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floorpads and workbench pads.

When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, like a screwdriver or a paper clip, to set switches.

### **Safety Guidelines**

The following symbols are used when unsafe conditions exist or when potentially hazardous voltages are present:



*Warning statements identify conditions or practices that can result in personal injury or loss of life.*



*Caution statements identify conditions or practices that can cause damage to the equipment or loss of data.*

Always use caution and common sense. *To reduce the risk of electrical shock, do not operate equipment with the cover removed.* Repairs must be performed by qualified service personnel only.

- Never install telephone jacks in a wet location unless the jack is designed for that location.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- Use caution when installing telephone lines and never install telephone wiring during an electrical storm.

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### Warning

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to FCC Part 15, which is designed to provide reasonable protection against such interference when operated in a residential environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. The user is cautioned that any changes or modifications not expressly approved by General DataComm void the user's authority to operate the equipment.

### FCC Part 68 Compliance

Connection of data communications equipment to the public telephone network is regulated by FCC Rules and Regulations. This equipment complies with Part 68 of these regulations which require all of the following: All connections to the telephone network must be made using standard plugs and telephone company - provided jacks or equivalent. Connection of this equipment to party lines and coin telephones is prohibited. A label on the underside of the equipment provides the FCC Registration number and the Ringer Equivalence Number (REN) for the unit. If requested, give this information to the telephone company.

If the unit causes harm to the telephone network, the telephone company may discontinue your service temporarily and if possible, you will be notified in advance. If advance notice is not practical, you will be notified as soon as possible and will be advised of your right to file a complaint with the FCC. The telephone company may change its communication facilities, equipment, operations and procedures where reasonably required for operation. If so, the telephone company will notify you in writing. All repairs or modifications to the equipment must be performed by General DataComm. Any other repair or modification by a user voids the FCC registration and the warranty.

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device to send any message via telephone fax machine unless such 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 or other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity, or individual.

In order to ensure that this information is included in your fax transmission you must follow the instructions in your fax driver software for generating fax cover pages (i.e., in Quick Link II, select "Cover Page Setup" under "Setup" and fill in the requested information. You must then select to send the cover page with your transmissions by selecting "Setup", then "Send Fax Setup", and in the control options menu, set "Include Cover Page").

### Canada DOC Notification

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also

be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. *Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.*

**NOTICE:** The **Load Number (LN)** assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the sum of the Load Numbers of all the devices does not exceed 100.

This digital apparatus does not exceed Class B limits for radio noise emissions from digital apparatus described in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

### Service and Support

General DataComm is committed to providing the service and support needed to install, manage and maintain your equipment. For information about service programs or for assistance with your Quester II modem, call General DataComm Service at:

**Phone: 1-203-729-0271**

**Fax: 1-203-729-7964**

Provide the dispatcher with the site name and phone number and a description of the problem and the next available support representative will promptly return your call.

Hands-on training courses are provided by Vital Network Services. Courses range from basic data communications, modems and multiplexers, to complex network and ATM systems and are taught in Connecticut or at a customer location. Call 1-800-243-1030 and follow the menu instructions to discuss educational services or to receive a course schedule.

### Warranty

General DataComm warrants that its equipment is free from defects in materials and workmanship. The warranty period is five years from the date of shipment. GDC's sole obligation under its warranty is limited to the repair or replacement of the defective equipment provided it is returned to GDC, transportation prepaid, within a reasonable period. This warranty will not extend to equipment subjected to accident, misuse, or alterations or repair not made by GDC or authorized by GDC in writing. *The foregoing warranty is exclusive and in lieu of all other warranties, express or implied, including but not limited to, warranties of merchantability and fitness for purpose.*

# Quester<sup>TM</sup> II

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## **V.34 Data / Fax PC External Modem**

The compact and value packed Quester II from General DataComm (GDC) complies with the latest standards-based V.34 technology. It offers both the highest speed and full interoperability with other V.34 modems. In addition to the V.34 standard, Quester II is compliant with existing dial-up standards. Quester II connects at the fastest possible line rate and continuously checks to ensure that the selected rate is valid. No more drop-outs or disconnects. Quester II automatically makes the connection... and stays connected.

The Quester II provides fast and efficient protection from unauthorized callers with GDC's patented Steadfast Security. A second level of protection is also available with the callback security mode. Callback security can also save in connect charges by concentrating the telephone billing in one location.

Using state of the art VLSI technology and custom chip design, Quester II shatters the limits on throughput. With V.42 bis compression, file transfers are faster, you can be more productive, and you save more money on connect times. In fact, your savings could well pay for Quester II within the first year!

Quester II supports facsimile transmission (FAX) at all speeds up to 14.4 Kbps (V.17).

Whether you want to surf the Internet, connect to your favorite bulletin board, e-mail a colleague, or FAX a friend, Quester II makes it all simple to do.

Proven in the lab as well as in the office, Quester II is designed for your connections.



# 1 System Description

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The GDC Quester II modem is a multi-speed switched network modem providing 33.6 kbps to 300 bps asynchronous operation. It has integral error correction and data compression capabilities, and provides compatibility with the most popular switched network modems. The Quester II provides automatic dialing and configuration using the **AT** (ATtention) command set.

## Features

- 2-wire, full-duplex, switched network operation.
- Manual or automatic answer.
- Flash ROM for easy upgrading via download.
- Audible Call Progress.
- Asynchronous DTE rates to 128K bps.
- Automatic rate negotiation in auto modes.
- Data compression.
- Memory for permanent storage of modem configurations, phone numbers, and passwords.
- Asynchronous character lengths of 8, 9, 10, and 11 bits.
- AT command set for configuration and dialing.
- Stores up to ten telephone numbers for easy dialing.
- Pulse or tone dialing.
- Tests through the Extended &Tn commands.
- Supports FAX Class 1 operations at 2400, 4800, 9600, or 14,400 bps.
- On-line security

With GDC modems at both ends:

- Remote configuration of user defaults.
- SteadFast Security<sup>®</sup>.
- Security callback.

## Equipment

When unpacking the box, check that all components are included.

Each box includes:

- V.34 Modem
- Technical Reference Guide
- Phone line cable
- Power supply
- 25-pin to 25-pin / 9-pin terminal cable

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***NOTE:** All the special accessories provided by the party responsible for the equipment (GDC), such as the terminal cable and the power supply are required to enable the *Quester II* modem to comply with the emission limits of FCC Part 15. These special accessories must be used with the *Quester II* modem.*

*It is the responsibility of the user to use the needed special accessories supplied with the equipment.*

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**Table 1-1** Technical Characteristics

Item	Specification
VF Data Rate	
33.6 kbps (ITU-T V.34)	Asynchronous
31.2 kbps (ITU-T V.34)	Asynchronous
28.8 kbps (ITU-T V.34)	Asynchronous
26.4 kbps (ITU-T V.34)	Asynchronous
24.0 kbps (ITU-T V.34)	Asynchronous
21.6 kbps (ITU-T V.34)	Asynchronous
19.2 kbps (ITU-T V.34)	Asynchronous
16.8 kbps (ITU-T V.34)	Asynchronous
14.4 kbps (ITU-T V.34 or ITU-T V.32 <i>bis</i> )	Asynchronous
12.0 kbps (ITU-T V.34 or ITU-T V.32 <i>bis</i> )	Asynchronous
9600 bps (ITU-T V.34 or ITU-T V.32)	Asynchronous
7200 bps (ITU-T V.34 or ITU-T V.32 <i>bis</i> )	Asynchronous
4800 bps (ITU-T V.34 or ITU-T V.32)	Asynchronous
2400 bps (ITU-T V.34 or ITU-T V.22 <i>bis</i> )	Asynchronous
1200 bps (ITU-T V.22 or Bell 212A)	Asynchronous
300 bps (ITU-T V.21)	Asynchronous
300 bps (Bell 103)	Asynchronous

**Table 1-1** Technical Characteristics (Cont.)

Item	Specification
Data Format Bit asynchronous	Selectable 8, 9, 10, or 11 bits per character
Compatibility	ITU-T V.34, V.32 <i>bis</i> , V.32, V.22 <i>bis</i> , V.22, V.21, Bell 212A, and Bell 103
Operating Mode Switched network	Two-wire full duplex
Modulation	
Above 14.4 kbps	V.34 As specified by ITU-T
14.4 kbps	128-level TCM/2400 Baud $\pm 0.01\%$
12.0 kbps	64-level TCM/2400 Baud $\pm 0.01\%$
9600 bps	32-level TCM/2400 Baud $\pm 0.01\%$
9600 bps	16-level QAM/2400 Baud $\pm 0.01\%$
7200 bps	16-level TCM/2400 Baud $\pm 0.01\%$
4800 bps	4-level QAM/2400 Baud $\pm 0.01\%$
2400 bps	16-level QAM/600 Baud $\pm 0.01\%$
1200 bps	4-level PSK/600 Baud $\pm 0.01\%$
0-300 bps	FSK 0-300 Baud $\pm 0.01\%$
Answer Tone	
ITU-T V.32 <i>bis</i> , V.32, V.22 <i>bis</i> , V.22 and V.21 modes	2100 Hz $\pm 3$ Hz
Bell 212A and 103 modes	2225 Hz $\pm 3$ H

**Table 1-1** Technical Characteristics (Cont.)

Item	Specification				
Transmit Carrier					
V.34	As specified by ITU-T				
ITU-T V.32 <i>bis</i>	1800 Hz $\pm$ 0.01%				
ITU-T V.32	1800 Hz $\pm$ 0.01%				
ITU-T V.22, V.22 <i>bis</i> /Bell 212A					
Originate Mode	1200 Hz $\pm$ 0.5 Hz				
Answer Mode	2400 Hz $\pm$ 1 Hz				
ITU-T V.21					
Originate Mode	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Mark</td> <td style="text-align: center;">Space</td> </tr> <tr> <td style="text-align: center;">1180 Hz <math>\pm</math>12 Hz</td> <td style="text-align: center;">980 Hz <math>\pm</math>12 Hz</td> </tr> </table>	Mark	Space	1180 Hz $\pm$ 12 Hz	980 Hz $\pm$ 12 Hz
Mark	Space				
1180 Hz $\pm$ 12 Hz	980 Hz $\pm$ 12 Hz				
Answer Mode	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Mark</td> <td style="text-align: center;">Space</td> </tr> <tr> <td style="text-align: center;">1850 <math>\pm</math>12 Hz</td> <td style="text-align: center;">1650 <math>\pm</math>12 Hz</td> </tr> </table>	Mark	Space	1850 $\pm$ 12 Hz	1650 $\pm$ 12 Hz
Mark	Space				
1850 $\pm$ 12 Hz	1650 $\pm$ 12 Hz				
Bell 103					
Originate Mode	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Mark</td> <td style="text-align: center;">Space</td> </tr> <tr> <td style="text-align: center;">1270 Hz <math>\pm</math>12 Hz</td> <td style="text-align: center;">1070 <math>\pm</math>12 Hz</td> </tr> </table>	Mark	Space	1270 Hz $\pm$ 12 Hz	1070 $\pm$ 12 Hz
Mark	Space				
1270 Hz $\pm$ 12 Hz	1070 $\pm$ 12 Hz				
Answer Mode	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Mark</td> <td style="text-align: center;">Space</td> </tr> <tr> <td style="text-align: center;">2225 Hz <math>\pm</math>12 Hz</td> <td style="text-align: center;">2025 <math>\pm</math>12 Hz</td> </tr> </table>	Mark	Space	2225 Hz $\pm$ 12 Hz	2025 $\pm$ 12 Hz
Mark	Space				
2225 Hz $\pm$ 12 Hz	2025 $\pm$ 12 Hz				
Output Level					
Permissive - Switched network	-9 dBm maximum				
Receive Carrier					
ITU-T V.34	As specified by ITU-T				
ITU-T V.32 <i>bis</i>	1800 Hz $\pm$ 7 Hz				
ITU-T V.32	1800 Hz $\pm$ 7 Hz				
ITU-T V.22 <i>bis</i> /Bell 212A					
Originate Mode	2400 Hz $\pm$ 7 Hz				
Answer Mode	1200 Hz $\pm$ 7 Hz				

**Table 1-1** Technical Characteristics (Cont.)

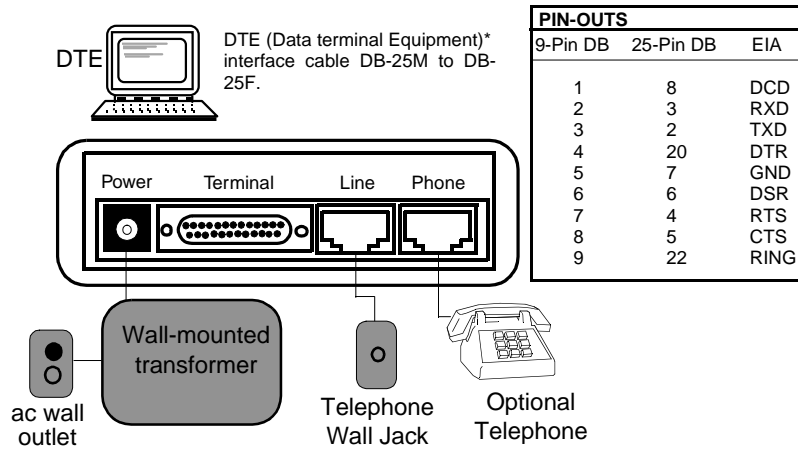
Item	Specification
Receive Carrier (Cont.)	
ITU-T V.21	
Originate Mode	Mark           Space 1850 Hz $\pm$ 12 Hz   1650 $\pm$ 12 Hz
Answer Mode	Mark           Space 1850 Hz $\pm$ 12 Hz   1650 $\pm$ 12 Hz
Bell 103	
Originate Mode	Mark           Space 2225 Hz $\pm$ 12 Hz   2025 $\pm$ 12 Hz
Answer Mode	Mark           Space 1270 Hz $\pm$ 12 Hz   1070 $\pm$ 12 Hz
Carrier Detect (Level for ITU-T V.22 <i>bis</i> , V.22, V.21, 212, 103) in Switched Network	Acquisition   Release -43 dBm       -48 dBm
Hysteresis	2 dBm minimum
NOTE: ITU-T V.34, V.32/V.32 <i>bis</i> /V.34 being echo canceling protocols, use signal quality as criteria for maintaining connection. They also provide for self-training detection to force disconnect.	
DTE Interface	EIA/TIA-232-E (ITU-T V.24/V.28/ISO 2110)
Line Connection	
Switched Network	6-position modular jack (US RJ11)
Phone	6-position modular jack (US RJ11)
Line Equalization	Automatic Adaptive
Connection Options	Loss of Carrier in ITU-T V.22 <i>bis</i> and lower.
Phone Types	500 (rotary dial), 2500 (DTMF dial)

**Table 1-1** Technical Characteristics (Cont.)

Item	Specification
Dialing	Pulse and Tone
DTMF Output Level	Per Part 68
Ringer Equivalent	0.6B
Pulse Dial Ratio	Make/Break: 39/61%
Ring Cadence	On 2 seconds; Off 4 seconds
DC Loop Current	20-80 milliamps
Call Progress Monitor	BUSY CONNECT (rate) (see ITU-T V.42 options for delay) CONNECT (see ITU-T V.42 options for delay) NO ANSWER NO Carrier NO DIALTONE OK (character abort) RING RINGING UNOBTAINABLE NUMBER
Power Requirements	
Voltage	99 to 129 V ac
Frequency	50 to 60 Hz
Dissipation	8 W ac maximum (line cord)
Temperature	
Operating	0 to 40°C (32° to 104°F)
Non-operating	-40 to 70°C (-40° to 158°F)
Humidity, operating	Up to 95 % humidity (non-condensing)
Altitude, operating	0 m to 3,047 m (0 to 10,000 ft)



## 2 Installation



1. Turn Off the modem and the equipment connected to it.
  2. Connect the modem as shown. (See the Quick Start Guide for a more detailed procedure).
  3. Turn On the modem and the equipment.
- \* Macintosh users - use a standard Mac hardware-controlled modem shielded cable (not included). If you are using a Mac Hayes Compatible cable, you must choose Xon/Xoff flow control for the software selection and add the **\Q1** command to the software modem initialization string. To access the Internet, call the phone number found on ON-Line services Windows diskettes and request software for the Mac computer.

**Figure 2-1** Rear Panel





# 3 Operation

## Controls and Indicators

Figure 3-1 illustrates and describes the front panel of the unit

LEDs	ON	OFF
CS	Modem has turned On DTE interface signal, indicating it is ready to transmit data.	Modem is not ready to transmit data.
RS	DTE has turned On interface signal, indicating it is ready to receive data transmission.	Indicates modem is not ready to receive if \Q3 option is selected.*
CD	Carrier On lights when the modem receives acceptable carrier signal level, or when EIA carrier is forced On by the &C0 command.	Carrier is off.
OH	The modem is off-hook.	The modem is on-hook.
RD	Indicates received data.	Indicates no data received.
SD	Indicates data is the transmitted data.	No data received.
TR	DTE has turned On interface signal, indicating it is ready for data communications.	DTR is off.*
MR	Indicates modem is ready to operate.	Indicates modem is not ready to operate.
*Note	Forcing an option will not turn on the indicator - only the real signal state will be displayed on the LEDs.	

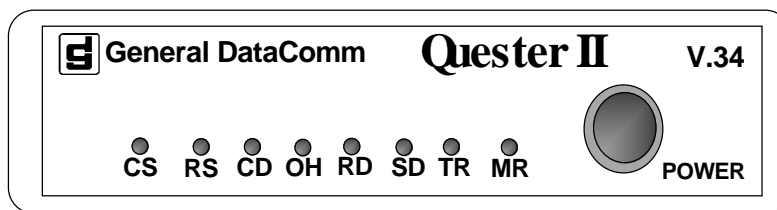


Figure 3-1 Front Panel

## Communications Software

To operate a Quester II modem, you need to have a computer or a terminal (called the DTE) with an EIA/TIA-232-E serial port. This port enables communication between the DTE and the modem. If a computer is being used as the DTE, it will also require a communications software package. If you plan on using error correction or data compression, the software package must support flow control.

## Software Selection

There are two types of modem software: data communications software and terminal emulation software. Terminal emulation software allows you to type at the keyboard and see responses on the video display or printer. Often these programs are used to communicate with mainframe or mini-computers and will not support disk management or file transfers. Essentially this type of software will "downgrade" your computer to a dumb terminal.

A full-featured communications software package will not only allow file transfers, but will also provide a dial directory, a script language for automated sessions, and a host of other features. Of course, the more powerful and flexible the software package, the more difficult it may be to master.

To take full advantage of the features of the Quester II modem, your selected program should allow turning off the auto baud feature. You should also be able to toggle both XON/XOFF and hardware flow control. In addition, it should support several file transfer protocols designed to be used with an error-correcting modem.

Although your modem will work with most standard communications programs and file protocols such as XMODEM, there may be a throughput penalty when using a software error-detecting protocol due to the redundant error-checking overhead. File transfer protocols that are recommended for use with error-correcting modems are YMODEM-G and ZMODEM.

## FAX

The modem can support FAX Class 1 transmissions and can be used with fax software programs that support Class 1 fax commands. The Quester II fax is compatible with all Group 3 fax machines, running at 2400, 9600, 9800, and 14,4000 bps.

## Setting Up Data Communications and Fax Software

Factory defaults (AT&F) are adequate for most fax packages and data communications, such as Quick Link II, America On-Line, Prodigy, Procomm Plus, WinFax, and so on. But, refer to the software package manual if you want or need to change a modem setting. Typical areas requiring changes are:

- DTR - normal operation (&D2)
- RTS/CTS - controls flow control with hardware (\Q3)
- Computer-to-Modem - message rate (\V1 or \V3)

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***NOTE:** The use of XON and XOFF or software to control flow may be required for packages such as Faxtalk Plus. This is selected by entering AT&F\Q1. If you select hardware flow control, your cable must have the RTS/CTS signal connections.*

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## Commanding the Modem

The AT (ATtention) command protocol permits you to:

- Obtain information from the modem
- Configure the modem
- Establish data communications
- Test the modem and data communications system

When you turn the power on, the Quester II is in the AT command mode and accepts commands from the terminal. Each command string (except A/) must be preceded by the letters AT and followed by a carriage return or Enter. Multiple commands can be assembled together into a command string. The AT command buffer can hold up to 50 characters.

The A/ command, which doesn't require the AT-prefix and (enter)-suffix, instructs the modem to repeat the last command string it received.

When the AT-prefix is entered, the modem detects the data rate and parity used by the terminal and begins operating at that same data rate and parity until changed.

New commands cannot be issued until a response to the previous command is received. In the case of no response, wait a minimum of 5 seconds before you enter another command.

*Tables 3-1 through 3-6 describe each command. Tables are grouped as follows:*

- The basic AT commands.
- The S-register commands.
- The extended AT& commands.
- The extended AT% commands.
- The extended AT\ commands.
- The extended AT\* commands.

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**NOTE:** *AT commands and S-Registers, shown in Help Menu Screens and not listed in this manual, are not applicable to this product.*

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*AT command defaults are shown in bordered lines:*

<b>Default</b>
----------------

**Table 3-1** Basic AT Command Set

Command	Action
\$	AT command set Help Display help menu for the basic AT command set
A/	Repeat command Repeat last command
A	Answer call Answer incoming call
Dn	Dial The dial command, followed by one or more dial command modifiers, manually dials a phone number: ! or & Flash hook switch for 1/2 second , or < Pause before continuing. Time is in S-Register 8 (default: 2 seconds). :n Redial up to n times to achieve data mode ; Return to AT command mode @ Wait for quiet answer before continuing. Time is in S-Register 7 (default: 60 seconds). Ln Link to cell n if modem cannot achieve data mode \n Remote modem uses cell n for Security Callback when <b>only</b> SteadFast Security is enabled
	P Pulse (rotary) dialing
	R Reverse to answer mode. Must be the last character entered.
	Sn Dial number stored in cell n (n = 0-9)
	T Tone (DTMF) dialing
	W Wait for dial tone before continuing. Time is in S-Register 6 (default: 2 seconds).
	*,#,A,B,C,D,0,1,2,3,4,5,6,7,8,9 (DTMF digits)
	0,1,2,3,4,5,6,7,8,9 (pulse digits)

**Table 3-1** Basic AT Command Set (Cont.)

Command	Action
En	Local DTE echo
E0	Disable
E1	Enable
Hn	Hook switch
H0	Go on-hook (hang up modem)
H1	Go off-hook
In	Identification and checksum
I0	Display product code
I1	Display calculated checksum
I3	Display firmware revision level
I4	Display listing of modem feature information
I5	Display serial number
Mn	Speaker operation
M0	Speaker is always Off
M1	Speaker is On while dialing and handshaking, Off in data mode
M2	Speaker is always On
M3	Speaker is Off while dialing, On during handshaking and retraining
On	On-line
O0	Go on-line (enter data mode)
O1	Go on-line and retrain (at any speed except 300 bps)
O2	Go on-line and perform rate re-negotiation
P	Dialing type, Pulse (rotary) dial
Qn	Response mode
Q0	Enable
Q1	Disable (enable quiet mode)
Sn	S-Registers
S\$	Display help menu for S-Registers
Sn?	Display contents of S-Register n
Sn=x	Set S-Register n to value x
T	Dialing type, Tone (DTMF) dial

**Table 3-1** Basic AT Command Set (Cont.)

Command	Action
Vn	Result code type
V0	Numeric result codes; connect message = VF line speed
V1	Alphanumeric (verbal) result codes; connect and protocol messages after link; connect message = DTE speed, except for ITU-T V.14 mode
V2	Same as V1 except connect message = VF speed
Xn	Call Progress Monitor (CPM)
X0	Basic results; disable CPM
X1	Extended results; disable CPM
X2	Extended results and detect dial tone only
X3	Extended results and detect busy only
X4	Extended results, full CPM
X5	Extended results, full CPM and detect ringback
Yn	Long space disconnect
Y0	Disable
Y1	Enable
Zn	Load user configuration profile
Zn	Recall (load) user-defined configuration profile n (n = 0 to 3). Storable S-Registers are stored with user-defined settings.

## S-Registers/Commands

The S command allows you to view (Sn?) or change (Sn=x) the S-Registers. The S-Registers store values for functions that typically are rarely changed, such as timers or counters, and the ASCII values of control characters, such as Carriage Return. *Table 3-2* summarizes the S-Register set.

**Table 3-2** S- Register Commands

Definition					
S-Reg.	Function	Decimal (default)	ASCII	Units	Storable
0	Automatic answer	1			Yes
1	Ring counter	0			No
2	Escape code character	43	+		No
3	Carriage return character	13	CR		No
4	Line feed character	10	LF		No
5	Backspace character	08	BS		No
6	Dial tone wait timer	02		seconds	Yes
7	Carrier wait timer; W and @ dial command modifier wait timer; ringback wait timer	60		seconds	Yes
8	Dial pause timer for , and < dial command modifiers	02		seconds	Yes



**Table 3-2** S- Register Commands (Cont.)

<b>Definition</b>					
<b>S-Reg.</b>	<b>Function</b>	<b>Decimal (default)</b>	<b>ASCII</b>	<b>Units</b>	<b>Storable</b>
9	Carrier presence timer	06		0.1 second	Yes
10	Carrier loss timer	14		0.1 second	Yes
12	Escape code guard timer	50		0.02 second	No
18	Test mode timer	00		10 seconds	Yes
25	DTR delay timer	05		.01 seconds (&M0)	Yes
26	RTS-to-CTS delay timer	00		millisec-onds	Yes
38	Hang-up delay timer	20		seconds	Yes
42	Call failed-times to make busy	03			Yes
70	Retransmission counter	100			Yes
100	Adjustable transmit level	09			Yes

**Table 3-3** Extended AT& Command Set

Command	Action
&\$	AT& command set help. Display help menu for the extended AT& command set
&An	Automatic fast forward/fallback mode
&A0	Disable
&A1	Enable
&Cn	Carrier operation
&C0	Force Carrier On
&C1	Carrier On after link established
&C2	Force Carrier On; toggle Carrier On disconnect
&C3	Real mode (follows modem energy detection)
&Dn	DTR On-to-Off transition (Data Terminal Ready)
&D0	Ignore (force DTR On)
&D1	Enter AT command mode
&D2	Go on-hook (hang up)
&D3	Same as &D2, but perform the Zn command on a loss of DTR greater than S-25 timer
&En	V.13 Mode
&E0	Bidirectional V.13
&E1	TX V.13 only
&E2	RX V.13 only
&Fn	Load fixed configuration profile
&F0	Switched network, V.34 Auto asynchronous, ITU-T V.42 error correction, V.42 <i>bis</i> data compression
&Gn	Maximum Line Connection Rate
&G5	Maximum DCE data rate is 4.8 Kbps
&G6	Maximum DCE data rate is 7.2 Kbps
&G7	Maximum DCE data rate is 9.6 Kbps
&G8	Maximum DCE data rate is 12 Kbps
&G9	Maximum DCE data rate is 14.4 Kbps
&G10	Maximum DCE data rate is 16.8 Kbps
&G11	Maximum DCE data rate is 19.2 Kbps
&G12	Maximum DCE data rate is 21.6 Kbps
&G13	Maximum DCE data rate is 24 Kbps
&G14	Maximum DCE data rate is 26.8 Kbps

**Table 3-3** Extended AT& Command Set (Cont.)

Command	Action
&G15	Maximum DCE data rate is 28.8 Kbps
&G16	Maximum DCE data rate is 31.2 Kbps
&G17	Maximum DCE data rate is 33.6 Kbps
&Hn	Switched network handshake mode
&H0	V.34 auto (33.6 kbps to 300 bps)
&H1	V.34 only (33.6 kbps to 2400 bps)
&H2	ITU-T V.32 <i>bis</i> automatic (14.4 kbps to 300 bps)
&H3	ITU-T V.32 <i>bis</i> only (14.4 kbps to 4800 bps)
&H4	ITU-T V.32 automatic (9600 bps to 300 bps)
&H5	ITU-T V.32 only (9600 bps to 4800 bps)
&H6	ITU-T V.22 <i>bis</i> only (2400 bps to 1200 bps)
&H7	ITU-T V.22 only (1200 bps)
&H8	Bell 212 only (1200 bps)
&H9	Bell 103 only (300 bps)
&H10	ITU-T V.21 only (300 bps)
&L0	Switched network operation
&M0	Asynchronous data mode
&Rn	CTS operation (Clear to Send)
&R0	Asynchronous mode:On AT command mode:Force CTS On
&R1	Asynchronous mode:Real AT command mode:Force CTS On
&R2	Asynchronous mode:Real AT command mode:Real
&R3	Asynchronous mode:Force CTS On AT command mode:Force CTS On
NOTE: Flow control (\Qn) options override the &Rn settings for CTS in data mode.	
&Sn	DSR operation (Data Set Ready)
&S0	Force DSR On; toggle Off on disconnect
&S1	Normal DSR operation

**Table 3-3** Extended AT& Command Set (Cont.)

Command	Action
&S2	DSR follows carrier detect
&S3	Force DSR On
&Tn	Test mode
&T0	Cancel (terminate) test mode (after you have done +++ and wait for OK)
&T1	Initiate ITU-T V.54 Loop 3 test (ANALOOOP)
&T3	Initiate ITU-T V.54 Loop 2 test (Digital Loopback) <i>- In order to characterize the line, Digital Loopback should be performed in direct mode only)</i>
&T4	Enable ITU-T V.54 Loop 2 test (Remote Digital Loopback)
&T5	Disable ITU-T V.54 Loop 2 test (Remote Digital Loopback)
&T6	Initiate ITU-T V.54 Loop 2 test (Remote Digital Loopback)
&T7	Initiate ITU-T V.54 Loop 2 with self-test (Remote Digital Loopback Self-Test)
&T8	Initiate ITU-T V.54 Loop 3 with self-test (ANALOOOP Self-Test)
&T9	End-to-End Self-Test
&Un	Trellis
&U0	Enabled
&U1	Disable
&V	View stored phone numbers. Display all 10 stored phone numbers, in sequence
&Wn	Save settings as a user configuration profile Save option settings as user configuration profile in non-volatile RAM (n = 0 to 3)
&Yn	Power-up user configuration profile
&Yn	Load user configuration profile at power up (n = 0 to 3)
&Zn=nnn	Store phone number nnn (up to 42 digits, including dial command modifiers) in cell n (n = 0 to 9)

**Table 3-4** Extended AT% Command Set

Command	Action
%%\$	AT% command set help. Display help menu for the extended AT% command set
%An	Auto-reliable fallback character Set auto-reliable fallback character to n (n = ASCII 0 to 127) - <i>default = 013</i>
%Bn	Make busy
%B0	Disable
%B1	Enable on loss of DTR
%B2	Enable in ITU-T V.54 Loop 3 test (ANALOOP)
%B3	Enable in ITU-T V.54 Loop 3 test (ANALOOP), or on loss of RTS or DTR
%B4	Enable on loss of RTS
%Cn	Data compression
%C0	Disable
%C1	Enable in transmit and receive paths
%C2	Enable in transmit path only in V.42 <i>bis</i>
%C3	Enable in receive path only in V.42 <i>bis</i>
%Dn	DSR operation in test mode
%D0	Force DSR On during ITU-T V.54 Loop 3 test (ANALOOP)
%D1	Force DSR Off during this test
%Fn	On-Line Security Options <b>Note - These commands have no effect when Steadfast security (%S1 or %S4) is the only enabled security.</b>
%Fn=0	Disables the use of callback extensions with the password stored in cell n. The modem will terminate any call in which it receives that password with a callback extension attached.

**Table 3-4** Extended AT% Command Set (Cont.)

Command	Action
%Fn=1	Permits the roving callback extension (,R) to be used with the password stored in cell n. When the modem receives the ,R extension attached to the password it will prompt the remote user for a callback phone number and then perform the callback procedure. The password can be used without the ,R extension to make a pass-thru connection, but the use of any extension other than ,R will cause the modem to terminate the connection.
%Fn=2	Permits the phone cell callback extension (,C) to be used with the password stored in cell n. When the modem receives the ,C extension attached to the password it will prompt the remote user for the number of a phone number memory cell in the answering modem. The answering modem will then use the phone number stored in that memory cell to perform the callback procedure. The password can be used without the ,C extension to make a pass-thru connection, but the use of any extension other than ,C will cause the modem to terminate the connection.
%Fn=3	Permits the use of either the roving (,R) or phone cell (,C) callback extension with the password stored in cell n. When the modem receives an extension attached to the password it will issue the appropriate prompt to the remote user and perform the specified callback procedure. The password can be used without an extension to make a pass-thru connection.
%Kn	Character abort
%K0	2-second delay to character abort
%K1	Disable
%On	Answer mode
%O0	Answer mode if ringing
%O1	Force to answer mode
%O2	Automatic answer in originate mode

**Table 3-4** Extended AT% Command Set (Cont.)

Command	Action
%Pn=xxx	Security password for cell n (n = 0-9); SteadFast Security, cell 0 only; on-line security, any cell. Password (xxx) can be 1 to 10 characters, alphanumeric and/or punctuation (comma is not allowed).
%Pn	Disable or clear the password in cell n
%Qn	Retrain on poor signal quality
%Q0	Disable
%Q1	Attempt up to 3 consecutive retrains; disconnect if not successful
%Q2	Retrain until signal quality is good
%Rn	Call Progress Monitor (CPM) message response speed
%R0	Auto baud
%R1	Send at last connect speed
%R2	300 bps
%R3	1200 bps
%R4	2400 bps
%R5	4800 bps
%R6	7200 bps
%R7	9600 bps
%R8	12.0 kbps
%R9	14.4 kbps
%R10	16.8 kbps
%R11	19.2 kbps
%R12	21.6 kbps
%R13	24.0 kbps
%R14	26.4 kbps
%R15	28.8 kbps
%R16	31.2 kbps
%R17	33.6 kbps
%R18	38.4 kbps
%R19	57.6 kbps
%R20	76.8 kbps

**Table 3-4** Extended AT% Command Set (Cont.)

Command	Action
%R21	115.2 kbps
%R22	128.0 kbps
%Sn	Password Operation
%S0	All password security disabled
%S1	SteadFast Security password using cell 0 enabled
%S2	On-line password enabled--remote user prompted on connection
%S3	SteadFast Security and on-line passwords both enabled
%S4	SteadFast Security password with mandatory callback
%S6	On-line with mandatory call-back
%S7	SteadFast Security password and on-line password with mandatory call-back
%Tn	Idle Switched Network timer in <i>n</i> minutes
%Vn	Command format
%V0	AT command set
%V1	V.25 <i>bis</i> asynchronous command set
%Zn	DTR dialing
%Z0	Ignore
%Z1=x	Dial cell x on DTR active transition
%Z2	Go off-hook and attempt to handshake on DTR active transition
%Z3=x	Dial cell x on DTR active transition; while DTR remains On redial if needed



**Table 3-5** Extended AT\ Command Set

Command	Action
\\$	AT\ command set help. Display help menu for the extended AT\ command set
\An	Overspeed correction
\A0	1.25% (nominal) asynchronous overspeed correction
\A1	2.5% (extended) overspeed correction
\Bn	Character length (data bits/parity/stop bits)
\B0	6N1
\B1	7N1
\B2	7P1 (\Pn command sets parity type)
\B3	8N1
\B4	7P2 (\Pn command sets parity type)
\B5	8P1 (\Pn command sets parity type)
\Cn	Fallback selection and pre-link data buffer
\C0	Timeout and fallback; speed buffer; no data buffer
\C1	Timeout and fallback; speed buffer; buffer receive data
\C2	Auto-reliable; fallback with fallback character speed buffer; no receive data buffer
\C3	Timeout and fallback; ITU-T V.14; buffer receive data
\C4	Timeout or fallback with fallback character; ITU-T V.14; no data buffer
\Gn	Modem-to-modem flow control (Only in Speed Buffer Mode)
\G0	Disable
\G1	Enable XON/XOFF in transmit and receive paths
\G2	Enable in transmit path only
\G3	Enable in transmit and receive paths, with pass-through
\Kn	Break character handling
\K0	Expedite break; destroy buffers
\K1	Expedite break; save buffers

**Table 3-5** Extended AT\ Command Set (Cont.)

Command	Action
\K2	Timed break; save buffers
\K3	Ignore break
\K4	Timed break until no break character; save buffers
\K5	Timed break until no break character; save buffers
\Nn	Asynchronous protocol
\N0	Wire mode ( <i>Only in Speed Buffer Mode</i> )
\N1	Direct ITU-T V.14 asynchronous mode
\N2	MNP reliable mode (or drop call)
\N3	V.42/MNP auto-reliable
\N4	V.42 (LAPM) reliable mode (or drop call)
\N5	V.42 (LAPM)/MNP reliable or MNP mode (or drop call)
\N6	Simulated controlled carrier (ITU-T V.13)
\Pn	Parity type
\P0	Even
\P1	Space
\P2	Odd
\P3	Mark
\P4	Automatic (from last AT command)
\Qn	Modem-to-DTE flow control
\Q0	Disable in both directions
\Q1	Use XON/XOFF in both directions
\Q2	Use CTS
\Q3	Use RTS/CTS
\Q4	Use XON/XOFF from modem to DTE only
\Rn	Asymmetrical mode
\R0	Disable
\\R1	Enable
\Tn	DTE speed
\T0	Autobaud; %R sets CPM message response speed
\T1	Last AT speed

**Table 3-5** Extended AT\ Command Set (Cont.)

Command	Action
\T2	300 bps
\T3	1200 bps
\T4	2400 bps
\T5	4800 bps
\T6	7200 bps
\T7	9600 bps
\T8	12.0 kbps
\T9	14.4 kbps
\T10	16.8 kbps
\T11	19.2 kbps
\T12	21.6 kbps
\T13	24.0 kbps
\T14	26.4 kbps
\T15	28.8 kbps
\T16	31.2 kbps
\T17	33.6 kbps
\T18	38.4 kbps
\T18	57.6 kbps
\T20	76.8 kbps
\T21	115.2 kbps
\T22	128.0 kbps
\Vn	Connect message type
\V0	Connect message reports VF rate upon data mode, link message after link negotiation (GDC format)
\W1	Connect and protocol message sent after link negotiation, connect reported as DTE rate
\W2	Connect and protocol message after link negotiation and Microcom compatible, connect reported as VF rate
\W3	Connect message only after protocol negotiation, connect reported as DTE rate
\W4	Connect message reports asymmetrical connect speeds.

**Table 3-6** Extended AT\* Command Set

Command	Action
*Pn	Remote Configuration Security Password
*P0	Enable
*P1	Disable
*Rn	Remote Configuration Write Access
*R0	Enable
*R1	Disable (read only)
*Wn	Remote Configuration Control
*W0	Disable
*W1	Enable
*Xn	Remote Configuration Exit
*X0	End Session Without Saving Changes
*X1	End Session, Save Changes

**Table 3-7** Extended AT: Command Set

Command	Action
:P0	Permissive transmit level

## Password Security

The GDC Quester II modem provides a variety of configurable password security arrangements in two principle categories:

**SteadFast Security** and **on-line password security**. In each form of password security the answering modem terminates the call if it does not receive a required password. The modem can be configured for one of two responses when it receives a correct password: **pass-thru**, meaning that it connects the incoming call to its DTE; or **callback**, meaning that it disconnects the incoming call and then places a new call back to the modem that initiated the connection.

The %Sn command selects password functions. It permits you to enable steadfast password security, on-line password security, or both.

## SteadFast Security Password

In **SteadFast Security** the modem that initiates the call sends the password as part of its handshake sequence. In order to use a SteadFast Security password, both modems must be GDC modems optioned for SteadFast Security (%S1). Both modems must have the same password saved in password memory cell 0 (%P0=XXX). The remote user does not have to type in any additional passwords.

When only the SteadFast Security password is enabled, and pass-thru operation is selected, the password procedure is completed during the handshake and no further user intervention is required.

A remote user initiating a call can invoke the SteadFast Security callback feature by including the AT dial command modifier \n (where n represents a phone number cell in the answering modem). The dial command modifier, when combined with the valid SteadFast Security password, causes the modem to disconnect the incoming call and dial the number from the specified memory cell. The callback phone number must be saved in a phone number cell of the answering modem by means of the &Zn=nnn command. Up to 10 phone numbers can be stored in cells 0 – 9 using the &Z command.

For example, to call a modem at 555-1212 and have it call back the phone number stored in cell 1, enter:

```
ADT5551212\1
```

After handshaking and a short delay, the remote modem terminates the call, and places a new call, using the phone number stored in cell 1, back to the modem that initiated the process. If the dial command modifier had not been included, the SteadFast Security password would have resulted in a pass-thru connection.

The central site, or answering, modem can be configured (using the %S4 command) for **mandatory callback with SteadFast Security password**. In this arrangement the calling modem must be optioned for %S1. A callback phone number must be saved in the answering modem by means of the &Zn=nnn command. When using SteadFast Security password with mandatory callback, the caller must include a valid callback cell number with the phone number that is dialed to

initiate the connection (Example ATDT5551212\1). If the callback cell number is not supplied with the phone number, the answering modem will disconnect the call.

---

**NOTE:** *To use SteadFast Security password, the handshake modes of the modems must be V.34 (&H1), V.32 bis (&H3) or V.32 (&H5).*

**NOTE:** *Telephone numbers stored for security callback should always include the :n (retry) modifier to compensate for any delay in receiving the dial tone from the Central Office after the initial connection is terminated. Configure the modem to make at least three additional attempts to dial the number. If calls abort during handshake, try disabling character abort feature (%K1).*

---

## On-line Password Security

**On-line password security** with pass-thru requires that the answering modem be a GDC modem optioned for on-line password security using the %S0 command. The modem has ten memory cells for storing passwords. The command for storing a password is %Pn=xxx, where *n* is the password cell number and *xxx* is the password. The memory cell can be any digit, 0-9. The password can be any string of up to ten alphanumeric and punctuation characters (exception: comma “,” may not be used). The modem compares received on-line passwords to the contents of all ten memory cells in search of a match.

When the remote caller initiates a call to a modem that has on-line password security enabled, the modems handshake then the caller receives the prompt:

ENTER PASSWORD

The operator has 15 seconds to respond with a valid password.

If the remote user initiating the call wants to use the **callback with online password security** option, a callback phone number must have previously been saved in the answering modem by means of the &Zn=nnn command. Up to 10 phone numbers can be stored in cells 0 through 9 by means of the &Z command. You can view the stored phone numbers by using the &V command.

Callback with online password also requires that an online password

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be configured with a callback extension. A callback extension causes the answering modem to disconnect and then call back to the modem that placed the original call. When you configure an on-line password memory cell, you must enable or disable its callback extension capability with the %Fn=x command. In this command, n is the online password cell number and x defines if and how the password in that cell can be used for callback. ( Use a phone number that is stored in cell# to call back, ask user for call back phone number, or not allow any callback.) Refer to *Table 3-4* further details on the %F command.

The comma, which cannot be used as a character in a password, functions as a special character to identify the callback request extensions.

There are two callback request extensions that a remote operator may be permitted to add to an on-line password: R or C. A password stored with password cell qualifier %Fn=0 will not accept any callback extension attached.

The roving callback extension (,R) causes the answering modem to prompt the caller for a telephone number to use for the callback. Once the number is supplied, the answering modem disconnects the original call and places a return call using the number it has just been given. The password to which the roving callback extension is attached must have been stored in the answering modem with the appropriate password cell qualifier, %Fn=1 or %Fn=3.

The memory cell callback extension (,C) causes the answering modem to prompt the caller for the number (0-9) of a phone number memory cell in the answering modem. Once the cell number is supplied, the answering modem disconnects the original call and places a return call using the telephone number stored in the specified memory cell. The password to which the memory cell callback extension is attached must have been stored in the answering modem with the appropriate password cell qualifier, %Fn=2 or %Fn=3.

The following two examples illustrate what the remote caller sees on-screen when placing a call to a modem that has on-line password security enabled and requesting a call back. First, the sequence of events when using a callback number stored in a memory cell.

The modems handshake, then the caller's screen displays the prompt:

ENTER PASSWORD

Within 15 seconds the caller has to respond with:

*password,C* <ENTER> using a valid password configured in the answering modem

The caller's screen displays the prompt:

ENTER CELL NUMBER

The caller has to respond with:

*cell #* <ENTER> specifying the number of the memory cell in the answering modem that is configured with the calling modem's number

The caller's screen displays:

NO CARRIER to indicate the disconnect  
RING to indicate the incoming call  
CONNECT followed by the appropriate connect message, indicating the modems are in data mode

The next example illustrates the sequence of events when using a roving callback number.

The modems handshake, then the caller's screen displays the prompt:

ENTER PASSWORD

Within 15 seconds the caller has to respond with:

*password,R* <ENTER> using a valid password configured in the answering modem

The caller's screen displays the prompt:

ENTER PHONE NUMBER

The caller has to respond with:

*nnnnnnnn* <ENTER> specifying the number that the answering modem needs to dial to establish the callback

The caller's screen displays:

NO CARRIER to indicate the disconnect  
RING to indicate the incoming call  
CONNECT followed by the appropriate connect message, indicating the modems are in data mode



If both the SteadFast Security password and online password security are enabled, the SteadFast Security procedure takes place first, during the handshake sequence. After the SteadFast Security password has been confirmed the caller is prompted first for the online password, then for the online callback cell number or the phone number for a roving callback.

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***NOTE:** When both SteadFast Security and online password security are enabled, only online callback can take place. SteadFast Security callback is blocked when online password security is enabled.*

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*Table 3-8 details the combinations of available password and callback features, and the configuration they require.*

**Table 3-8** GDC V.34 Modem Password/Callback Security

Security Feature	Originate Modem Configuration	Answer Modem Configuration
Passwords disabled	%S0 ATDT (phone number)	%S0
SteadFast Security (Pass-thru)	%S1 %P0=(SF password) ATDT(phone number)	%S1 %P0=(SF password)
Online Password (Pass-thru)	%S0 ATDT (phone number)	%S2 %P1=(O/L password) %F1=0
Online Password & SteadFast Security - no callback	%S1 %P0=(SF password) ATDT (phone number)	%S3 %P0=(SF password) %P1=(O/L password)
SteadFast Security - callback w/ number in Cell #1	%S1 %P0=(SF password) ATDT (phone number)\1	%S1 %P0=(SF password) &Z1=(C/B phone number)
Online Password - callback w/ password in Cell 1 (C) (Not mandatory)	%S0 ATDT (phone number)	%S2 %P1=(O/L password) %F1=2 &Z1=(C/B phone number)
<p><i>Notes: Factory default command &amp;F does not affect the %P, %F, or &amp;Z commands.</i></p> <p><i>Use of SteadFast Security requires that both modems be GDC V.34 modems configured to handshake at V.34, V.32 bis, or V.32 .</i></p> <p><i>Use of online passwords requires that the answer modem be a GDC V.34 modem.</i></p> <p><i>Passwords can be any string of up to ten alphanumeric and punctuation characters (except a comma ",").</i></p> <p><i>The SF (SteadFast) password used during the handshake sequence is stored in the %P0 memory cell and must be the same on both modems.</i></p> <p><i>O/L (online) passwords are stored in memory cells %P0 through %P9.</i></p> <p><i>Callback numbers for SteadFast Security and on-line password security can be stored in memory cells &amp;Z0 through &amp;Z9.</i></p>		

Security Feature	Originate Modem Configuration	Answer Modem Configuration
Online Password & SteadFast Security - callback w/ Password in Cell 1 (,C) (not mandatory)	%S1 %P0=(SF password) ATDT (phone number)	%S3 %P0=(SF password) %F1=2 &Z1=(C/B phone number)
SteadFast Security w/ mandatory callback w/number in cell #1	%S1 %P0=(SF password) ATDT (phone number)\1	%S4 %P0=(SF password) &Z1=(C/B phone number)
Online Password w/ mandatory callback w/number in cell #1 (,C)	%S0 ATDT (phone number)	%S6 %P1=(O/L password) %F1=2 &Z1=(C/B phone number)
Online Password & SteadFast Security w/ mandatory callback	%S1 %P0=(SF password) ATDT (phone number)	%S7 %P0=(SF password) %P1=(O/L password) %F1=2 &Z1=(C/B phone number)
<p><i>Notes: Factory default command &amp;F does not affect the %P, %F, or &amp;Z commands.</i></p> <p><i>Use of SteadFast Security requires that both modems be GDC V.34 modems configured to handshake at V.34, V.32 bis, or V.32 .</i></p> <p><i>Use of online passwords requires that the answer modem be a GDC V.34 modem.</i></p> <p><i>Passwords can be any string of up to ten alphanumeric and punctuation characters (except a comma “,”).</i></p> <p><i>The SF (SteadFast) password used during the handshake sequence is stored in the %P0 memory cell and must be the same on both modems.</i></p> <p><i>O/L (online) passwords are stored in memory cells %P0 through %P9.</i></p> <p><i>Callback numbers for SteadFast Security and on-line password security can be stored in memory cells &amp;Z0 through &amp;Z9.</i></p>		

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## Remote Configuration Using the AT Commands

Remote Configuration lets you use a local V.F 28.8 modem to connect to a remote V.F 28.8 modem and view or change the current user configuration profile of the remote modem. You must ensure the following:

- The local modem must be in AT command mode (%V0) or PRS AT (Turn off V.25 bis command mode). The remote modem will be forced into AT command mode when the connection is established.
- Both modems must have the same remote configuration security password (\*Pn command). If the remote modem does not have a remote configuration security password, you may configure one during the Remote Configuration session.
- The handshake of the remote modem must be V.34 (&H or &H1 command), V.32 *bis* (&H2 or &H3 command), or V.32 (&H4 or &H5 command).
- If you intend to save changes, you must enable remote configuration write access (\*R0 command) at the remote modem before initiating the session.

---

**NOTES:** *The DTE interface on the remote modem is disabled during the Remote Configuration session to prevent the remote DTE from inadvertently terminating the session.*

*Responses and echoes from the remote to the local modem are enabled regardless of the optioning of the remote modem. If quiet mode is selected on the remote modem, it will still send echo back to the local modem.*

---

To initiate a Remote Configuration session, enter \*W1 (AT\*W1 valid for only one call) at the local modem. (To resume normal operation, enter \*W0.) Place a call to the remote modem. Upon connection, the local modem displays

OK REMOTE CONFIG SESSION VIEW

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If Remote Configuration write access is disabled, or

OK REMOTE CONFIG SESSION EDIT

If Remote Configuration write access is enabled.

After you establish a Remote Configuration session, you may view or edit (change) the current user configuration profile of the remote modem in the same way you would that of the local modem. The changes that you make do not affect the modem as you make them. Instead, they become part of a configuration profile. Once you have made all the changes, you have the following options:

- To terminate the session without saving or using the new configuration profile, enter \*X0.
- To terminate the session and put the new configuration profile into use temporarily (i.e., modem uses the new configuration only until it is reset or power is cycled), enter \*X1.
- To save the new configuration as a user defined profile that can be recalled and loaded in the future, use the &W*n* command before entering \*X1 to terminate the session and put the new configuration into use.
- The following commands are invalid during a Remote configuration session and cause an error response:
  - A (answer call)
  - D*n* (dial)
  - H*n* (hook switch)
  - O*n* (on-line)
  - &T*n* (test mode), except &T4 and &T5

**Connect Message Type**

\V0 options the modem to send the standard GDC Connect message upon reaching data mode plus V.42 messages after the link negotiation. The connect message displays VF line speed:

**Table 3-9** \V0 Connect Messages

<b>Numeric</b>	<b>Meaning</b>	<b>Verbal Response</b>
0	Command was successful	Ok
4	Command failed	Error
1	Link established	Connect
2	Incoming ring detected	Ring
23	Ringback detected	Ringing
24	Exchange cannot dial number	Un-obtainable number
3	Link dropped	No carrier
6	Dial tone not present	No dialtone
8	Remote not answering	No answer
7	Line busy	Busy
1	Link establish at 300	Connect
5	Link establish at 1200	Connect 1200
10	Link establish at 2400	Connect 2400
11	Link establish at 4800	Connect 4800
15	Link establish at 7200	Connect 7200
12	Link establish at 9600	Connect 9600
16	Link establish at 12000	Connect 12000
17	Link establish at 14400	Connect 14400
18	Link establish at 16800	Connect 16800
14	Link establish at 19200	Connect 19200
19	Link establish at 21600	Connect 21600
20	Link establish at 24000	Connect 24000
21	Link establish at 26400	Connect 26400
22	Link establish at 28800	Connect 28800
23	Link establish at 31200	Connect 31200
24	Link establish at 33600	Connect 33600

With \V0 and \V1, the following connect messages are sent when link negotiation is complete:

**Table 3-10** \V0 and \V1 Connect Messages

<b>Numeric</b>	<b>Meaning</b>	<b>Verbal Response</b>
70	No Protocol	Protocol:none
77	V.42 Protocol	Protocol:v.42
79	V.42 Bis Protocol	Protocol:v.42bis
80	MNP Protocol	Protocol:alternate
82	MNP Class 2	Protocol:alternate, Class 2
24	MNP Class 2+4	Protocol:alternate, Class 2 + Class 4
245	MNP Class 2+4+5	Protocol:alternate, Class 2 Class 4 Class 5
83	MNP Class 3	Protocol:alternate, Class 3
34	MNP Class 3+4	Protocol:alternate, Class 3 Class 4
345	MNP Class 3+4+5	Protocol:alternate, Class 3 Class 4 Class 5

\V1 options the modem to delay sending the Connect message until an error corrected link has been established. The Connect message indicates DTE speed unless a V.14 connection was established, in which case it will indicate the VF speed:

**Table 3-11** \V1 Connect Messages

<b>Numeric</b>	<b>Meaning</b>	<b>Verbal Response</b>
1	DTE link at 300	Connect
5	DTE link at 1200	Connect 1200
10	DTE link at 2400	Connect 2400
11	DTE link at 4800	Connect 4800
15	DTE link at 7200	Connect 7200
12	DTE link at 9600	Connect 9600
16	DTE link at 12000	Connect 12000
17	DTE link at 14400	Connect 14400
18	DTE link at 16800	Connect 16800
14	DTE link at 19200	Connect 19200
19	DTE link at 21600	Connect 21600
20	DTE link at 24000	Connect 24000
21	DTE link at 26400	Connect 26400
22	DTE link at 28800	Connect 28800
23	DTE link at 31200	Connect 31200
24	DTE link at 33600	Connect 33600
25	DTE link at 38400	Connect 38400
26	DTE link at 57600	Connect 57600
27	DTE link at 76800	Connect 76800
28	DTE link at 115200	Connect 115200
29	DTE link at 128000	Connect 128000



\V2 is similar to the \V1 function except that /REL is included at the end of the message when a V.42 error corrected link has been established. The message numbers 0 through 10 are the same as for \V0:

**Table 3-12** \V2 Connect Messages

<b>Numeric</b>	<b>Meaning</b>	<b>Verbal Response</b>
30	Reliable DTE link at 300	Connect Rel
31	Reliable DTE link at 1200	Connect 1200/Rel
32	Reliable DTE link at 2400	Connect 2400/Rel
33	Reliable DTE link at 4800	Connect 4800/Rel
34	Reliable DTE link at 7200	Connect 7200/Rel
35	Reliable DTE link at 9600	Connect 9600/Rel
36	Reliable DTE link at 12000	Connect 1200/Rel
37	Reliable DTE link at 14400	Connect 14400/Rel
38	Reliable DTE link at 16800	Connect 16800/Rel
39	Reliable DTE link at 19200	Connect 19200/Rel
40	Reliable DTE link at 21600	Connect 21600/Rel
41	Reliable DTE link at 24000	Connect 24000/Rel
42	Reliable DTE link at 26400	Connect 26400/Rel
43	Reliable DTE link at 28800	Connect 28800/Rel
44	Reliable DTE link at 31200	Connect 31200/Rel
45	Reliable DTE link at 33600	Connect 33600/Rel
46	Reliable DTE link at 38400	Connect 38400/Rel
47	Reliable DTE link at 57600	Connect 57600/Rel
48	Reliable DTE link at 76800	Connect 76800/Rel
49	Reliable DTE link at 115200	Connect 115200/Rel
50	Reliable DTE link at 128000	Connect 128000/Rel

## V.25 bis Command Set Operation

The following section describes the operating procedures for the Quester II modem when using the ITU-T (formerly CCITT) V.25 bis compatible command protocol.

### 108 Modes

The ITU-T V.25 bis protocol operates in one of two modes: 108.2 or 108.1. The modes are named for the two ITU-T designations for circuit 108 of the terminal interface:

- In 108.2 mode, the circuit is the “Data Terminal Ready” signal.
- In 108.1 mode, the circuit is the “Connect Data Set to Line” signal.

Circuit 108 is pin 20 in a DB25 connector.

### 108.2 Mode

The 108.2 operating mode supports convenient outbound calling to multiple locations. When the DTE instructs the modem to originate a call in 108.2 mode, it also specifies the number to be dialed. The DTE can either supply the number itself along with the command to dial, or identify which of the modem's memory cells contains the number to be dialed.

In 108.2 mode the modem supports an ITU-T V.25 bis compatible command set you can use from the DTE to interrogate and configure the modem, and to control communication and test functions.

Configuration by means of the command set can include operating parameters such as data rate and handshake mode; as well as storage of phone numbers in the modem's memory cells.

In order for the V.25 bis command set to function, the modem must be operating in 108.2 mode and terminal interface circuit 108.2 (Data Terminal Ready) must be On. When circuit 108.2 is Off, the modem ignores the commands. Circuit 108.2 can be forced On with the &D0 AT command.

## 108.1 Mode

The 108.1 operating mode supports automatic outbound calling directed primarily to a single location. The DTE instructs the modem to originate a call by turning On circuit 108.1, Connect Data Set to Line. The modem then goes off-hook, dials the number stored in its memory cell 0, and attempts to establish communication.

The modem will disconnect from the line if it does not successfully handshake in the time specified in the abort timer selected by the S7=x AT command (default is 30 seconds). If you turn Off 108.1 while the modem is in the data mode, the modem will hang up and disconnect.

The ITU-T V.25 bis compatible command set is not available when the modem is operating in 108.1 mode. Storage of a telephone number in memory cell 0 must be performed either in 108.2 mode (using the PRN command), or by means of AT commands.

Any number can be called in 108.1 mode by dialing manually and then turning On circuit 108.1 when answer tone is heard from the remote modem.

Refer to the following *ITU-T V.25 bis Command Set Communication Operating Procedures* for a full description of the communication procedures for the 108.2 and 108.1 modes.

Although the AT command set is the primary command set for configuring the modem, the modem provides an enhanced ITU-T V.25 bis command protocol that permits you to configure modem dial parameters and establish data communications. After configuring the modem using the AT command set, use the %Vn command to switch to the V.25 bis command set.

*Table 3-13* summarizes the V.25 bis compatible command set. When entering commands, terminate each one with a line feed <LF> control character. The modem sends a response back to the terminal for each command. *Table 3-14* explains responses to valid commands. *Table 3-15* explains responses to invalid commands. Most terminals display the responses to indicate each entered command's result, but responses are ignored by some communications software that enables a computer to emulate a terminal.

Descriptions of each V.25 bis 108.2 mode command appear on the following pages.

Operating procedures for establishing and terminating data communications are explained following the command descriptions.

**Table 3-13** V.25 bis Command Set Summary

<b>Configuration Commands</b>		
<b>Name</b>	<b>Cmd.</b>	<b>Page</b>
AT Command Set	PRS AT	3-34
Automatic Answering	PRS AA	3-34
Connect Message Inhibit	PRS CM	3-35
DTE Data Rate	PRS DR	3-35
Handshake Mode	PRS HM	3-37
Store Phone Number to Cell	PRN	3-34
Termination Character	PRS TR	3-37
Write Option Settings to User Configuration Profile	NVW	3-33
<b>Communication Commands</b>		
Call Requested Number	CRN	3-38
Call Requested Stored Telephone Number	CRS	3-39
Connect Incoming Call	CIC	3-38
Disconnect Incoming Call	DIC	3-39

**Table 3-14** Explanation of Valid Responses

<b>Response</b>	<b>Description</b>
CFI AB	Call failure indication: no carrier, call was aborted (time-out occurred or character was entered at keyboard).
CFI BF	Call failure indication: telephone number black list (which uses the 10 memory cells) is full. You cannot place any more calls until: a) after a timeout. b) the memory cell is modified. c) the modem is reset.
CFI DT	Call failure indication: dial tone was not detected (dial tone time-out occurred).
CFI DF	Call failure indication: telephone number delayed list (which uses the 10 memory cells) is full. Numbers which are redialled continuously without making a connection are added to the delayed list. They are removed from the list: a) after a timeout. b) when a connection is made. c) when the memory cell is modified; or d) when the modem is reset.
CFI ET	Call failure indication: remote modem is busy.
CFI UT	Call failure indication: unobtainable number tone was detected.
CNX	300 bps connection is established.
CNX 1200	1200 bps connection is established.
CNX 2400	2400 bps connection is established.
CNX 4800	4800 bps connection is established.
CNX 7200	7200 bps connection is established.
CNX 9600	9600 bps connection is established.
CNX 12000	12,000 bps connection is established.
CNX 14400	14,400 bps connection is established.
CNX 16800	16,800 bps connection is established.
CNX 19200	19,200 bps connection is established.

**Table 3-14** Explanation of Valid Responses (Cont.)

Response	Description
CNX 21600	21,600 bps connection is established.
CNX 24000	24,000 bps connection is established.
CNX 26400	26,400 bps connection is established.
CNX 28800	28,800 bps connection is established.
CNX 31200	31,200 bps connection is established.
CNX 33600	33,600 bps connection is established.
INC	Incoming call was detected. This response is generated only once for each incoming call.
INV	See <i>Table 3-3</i> for responses to commands that the modem does not recognize.
RNGBK	Ringback was detected by the originating modem.
VAL	Valid command was invoked.

**Table 3-15** Explanation of Invalid Responses

Command Invoked	Description of INV Response
DIC	INC not received.
PRS	Non-selectable option in user's country.

V.25 *bis* configuration commands allow you to configure the modem.

### **NVW Write Option Settings to User Configuration Profile**

NVW saves the current settings to a user configuration profile in the modem's non-volatile memory, with the exception of the Terminator Character option (which is set to its factory default, the line feed control-character). This command saves a set of option values that is activated when the modem is powered up.

To invoke this command, type:

```
NVW ; n <LF>
```

where n is the user configuration profile (0 to 3).

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**PRN Store Phone Number to Cell**

PRN stores a telephone number in one of the modem's ten memory cells. Numbers stored by means of this command can be automatically dialed either by invoking the CRS command in 108.2 mode, or by turning On circuit 108.1 in 108.1 mode (108.1 dialing uses only the number stored in memory cell 0).

To store a number, type:

```
PRN n1 ; n2 <LF>
```

where n1 is the memory cell (from 0 to 9) in which the number is to be stored, and n2 is the phone number to be stored. n2 may contain any legal dialing characters (0-9 A-D P T # \* , < ! & @).

**PRS AA Automatic Answering**

PRS AA controls the automatic answering function. When you enable automatic answering, you can specify the number of rings the modem will wait before it performs automatic answering. Default is 4 rings.

To enable automatic answering, type:

```
PRS AA ; n <LF>
```

where n is the number of rings (from 1 to 255) that the modem waits before automatically answering an incoming call.

To disable automatic answering, type:

```
PRS AA ; 0 <LF>
```

**PRS AT AT Command Set**

PRS AT switches the modem from V.25 bis command set mode to AT command set mode.

To return to V.25 bis command set mode, use the AT%Vn command.

To invoke this command, type:

```
PRS AT <LF>
```

**PRS CM Connect Message Inhibit**

PRS CM controls the CNX yy connect message responses. The Quester II supports both the 1989 and the 1984 recommendations for V.25 bis connection procedures. The 1989 CCITT Blue Book

recommends that when the modem transfers from command mode to data mode it should send a connect message of the form CNX yy, where yy identifies the connect speed (96 = 9600 bps, 48 = 4800 bps, 24 = 2400 bps, and 12 = 1200 bps; omitted for 300 bps). The 1984 CCITT Red Book does not include these connect messages. Default is 0 (connect message disabled).

To disable the CNX yy connect message responses, type:

```
PRS CM ; 0 <LF>
```

To enable responses, type:

```
PRS CM ; 1 <LF>
```

After modifying this option you should save the setting by using the NVW command.

### **PRS DR      DTE Data Rate**

PRS DR, in conjunction with the handshake mode command (PRS HM), controls the DTE speed. There are several configurations to consider:

- a. An automatic handshake mode, e.g., V.32 *bis* auto [PRS HM ; 2], V.32 auto [PRS HM ; 4], V.22 *bis* only [PRS HM ; 6], takes precedence over the PRS DR selection, and the modem tries for the highest VF speed common to the two commands.
- b. For 1200 bps V.22 operation, select PRS HM ; 7. PRS HM ; 6 is an auto mode, so setting the DTE to 1200 bps (PRS DR ; 3) will not force the connection to 1200 bps.
- c. When the modem is optioned for an automatic handshake mode and direct V.14 asynchronous mode (AT command \N1), it sends a connect message to the DTE at the selected PRS DR speed. In order to pass data, the user must change the DTE's speed to match the displayed connect speed.
- d. When the modem is optioned for speed buffering (AT command \N0) or an error correcting protocol (AT commands \N2 through \N5), the PRS DR command alone selects the DTE speed, and the PRS HM command selects the handshake mode.
- e. When the modem is optioned for a fixed handshake mode and direct mode (AT command \N1), the PRS DR command not only selects the DTE speed, but also forces the VF speed to match it. If the required VF speed is not available the modem drops the call.



(This does not apply to V.22 *bis* only, which handshakes at the highest VF speed.)

- f. When using the modem in direct mode (AT command \N1), if the desired connect speed is known, set the speed to match using the PRS DR command. Set the DTE to the same speed and "AT" the modem so that it will know at what speed to send messages.

The modem must be in the AT command set mode in order to configure the \Nn AT command.

To invoke this command, type:

```
PRS DR ; n <LF>
```

where n is the DTE rate, as follows:

<b>n</b>	<b>rate</b>	<b>n</b>	<b>rate</b>
0	Autobaud	12	21,600 bps
1	Last connect speed	13	24,000 bps
2	300 bps	14	26,400 bps
3	1200 bps	15	28,800 bps
4	2400 bps	16	31,200 bps
5	4800 bps	17	33,600 bps
6	7200 bps	18	38,400 bps
7	9600 bps	19	57,600 bps
8	12,000 bps	20	76,800 bps
9	14,400 bps	21	115,200 bps
10	16,800 bps	22	128,000 bps
11	19,200 bps		

**PRS HM Handshake Mode**

PRS HM selects the handshake mode.

For 1200 bps V.22 operation, select PRS HM ; 7. PRS HM ; 6 is an auto mode, so setting the DTE to 1200 bps (PRS DR ; 3) will not force the connection to 1200 bps.

To invoke this command, type:

```
PRS HM ; n <LF>
```

where n is the handshake mode, as follows:

<b>n</b>	<b>mode</b>
0	V.34 auto (33.6 kbps to 300 bps)
1	V.34 only (33.6 kbps to 2400 bps)
2	V.32 <i>bis</i> automatic (14.4 kbps to 300 bps)
3	V.32 <i>bis</i> only (14.4 kbps to 4800 bps)
4	V.32 automatic (9600 bps to 300 bps)
5	V.32 only (9600 bps to 4800 bps)
6	V.22 <i>bis</i> only (2400 bps to 1200 bps)
7	V.22 only (1200 bps)
8	Bell 212 only (1200 bps)
9	Bell 103 only (300 bps)
10	V.21 only (300 bps)

**PRS TR Termination Character**

PRS TR selects the ASCII character that represents the command termination character in the asynchronous mode. The command termination character is the character used to enter a command for interpretation by the modem. Select the command termination character that is compatible with your preference and your terminal. Default is 10 or <LF> (line feed).

To select the line feed control-character as the command termination character, type:

```
PRS TR ; 10 <LF>
```

To select the vertical tabulation control-character, type:

```
PRS TR ; 11 <LF>
```

To select the form feed control-character, type:

```
PRS TR ; 12 <LF>
```

V.25 *bis* communication commands allow you to establish and terminate data communications.

### **CIC Connect Incoming Call**

CIC causes the modem to automatically answer the current incoming call. It temporarily modifies the automatic answering function so that the modem immediately answers the call, ignoring the number of automatic answering rings selected with the PRS AA command. Ten seconds after one incoming call is completed, normal automatic answering is restored.

To invoke this command, type:

```
CIC <LF>
```

### **CRN Call Requested Number**

CRN causes the modem to dial a telephone number, supplied with the command, to initiate data communication with another modem. If the handshake abort timer (AT command S7=x) times out before the modem detects answer tone, the modem will return on-hook.

To invoke this command, type:

```
CRN n <LF>
```

where n is the telephone number to be dialed. (The modem recognizes only the characters contained in n that are listed in *Table 3-16*.) To dial 555-1234, for example, type:

```
CRN 5551234 <LF>
```

**CRS     Call Requested Stored Telephone Number**

CRS causes the modem to dial the telephone number stored in a specified modem memory cell. The number to be dialed must have been stored in a memory cell previously by means of the PRN command.

To invoke this command, type:

```
CRS n <LF>
```

where n is the number (from 0 to 9) of the memory cell that contains the telephone number to be dialed. For example, to dial the number stored in memory cell 5, type:

```
CRS 5 <LF>
```

**DIC     Disconnect Incoming Call**

DIC causes the modem to temporarily disable the automatic answering function and ignore an incoming call. Ten seconds after one incoming call is completed, normal automatic answering is restored.

To invoke this command, type:

```
DIC <LF>
```

**Table 3-16** Legal Dialing Characters

Character	Description
0 1 2 3 4 5 6 7 8 or 9	Pulse and tone dial digits
#	Tone dial character
*	Tone dial character
P	Causes dialed numerals following P to be dialed using pulses. Used to select pulse dialing for compatibility with your telephone system. Pulse dialing is blocked by some country code configurations.
T	Causes dialed alphanumeric characters following T to be dialed using tones. Used to select tone dialing for compatibility with the telephone system you intend to use.
, or <	Causes the modem to pause a specified length of time before dialing the next digit of a telephone number (the pause is 2 seconds in length by default and may be changed with the AT\$8=x command). Used when the telephone system requires a pause before it can accept the next digit of the telephone number being dialed.
! or &	Causes the modem to go on-hook (flash) momentarily. Used to command certain internal telephone systems (PBXs).
@	Causes the modem to wait <i>n</i> seconds for one or more rings followed by five seconds of silence before dialing the next digit of a telephone number (if <i>n</i> seconds expire before a ring is detected, the modem will abort dialing and return to the command mode). Used to dial a telephone system that does not provide dial tone. Silence, rather than dial tone, indicates that the telephone system is ready to accept telephone number dialing. ( <i>n</i> = the value selected in the abort timer.)
Ln	On dial failure, link to the telephone number stored in cell <i>n</i> ( <i>n</i> = 0 to 9).
W or :	Causes the modem to wait a specified length of time for dial tone before dialing the next digit of the telephone number. The length of time is specified by the AT\$7=x command. If this time expires before dial tone is detected, the modem will abort dialing and return to the command line.

The following paragraphs describe communication operating procedures for the Quester II using the ITU-T V.25 bis command set. The descriptions include procedures for originating, answering, and terminating a call in the 108.2 and 108.1 modes.

### **108.2 Mode Operating Procedures**

#### **Originating a Call**

To establish communication by originating a call in the 108.2 mode:

1. From the DTE, use the CRN or CRS command to dial the desired telephone number.
2. When communication is established, your terminal displays the CNX response (if enabled with the PRS CM ; 1 command) and you may transfer data.

#### **Automatic Call Answering**

To have the modem automatically answer calls and establish communication:

1. Enable automatic answering by typing:

```
PRS AA ; n <LF>
```

where  $n$  is the number of rings (from 1 to 255) that the modem will wait before it performs automatic answering. The default is 4.

2. The modem will answer any incoming call automatically after the specified number of rings.
3. When communication is established, your terminal will display the CNX response and data transfer can take place. If communication is not established, your terminal will display the appropriate response and the modem will return to the command mode.

#### **Manual Call Answering**

The command PRS AA ; 0 <LF> disables automatic call answering. When automatic answering is disabled, use the following procedure to establish communication by manually answering calls:

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1. When your terminal displays the INC result code to indicate an incoming call, type:

CIC <LF>

2. When communication is established, your terminal will display the CNX response and data transfer can take place. If communication is not established, your terminal will display the appropriate response and the modem will return to the command mode.

### **Automatic Call Termination**

The modem will automatically terminate a call if:

- Terminal interface signal 108.2 (DTR) is turned Off while the modem is in data mode. This mode of automatic termination functions only when DTR is optioned for normal operation; it is disabled if 108.2 is optioned for forced On operation.
- The handshaking sequence is not completed within the abort time period (selected by the S7=*x* AT command; default is 30 seconds) after originating or answering a call.
- A long space is received and long space disconnect has been enabled by the Y*n* AT command. This mode of automatic termination functions only when the modem is operating at 300, 1200, or 2400 bps.

### 108.2 Call Establishment Procedure

The general principle for establishing a call between the DTE and DCE complies with the V.25 bis 108.2 mode of operation and is outlined below:

#### Originating a Call

DTE	DCE
Turn On DTR.	Turn On CTS.
Send Command: CRN or CRS.	Send VAL response. Dial phone number.
Wait for the connection (or abort the call by turning Off DTR).	Turn Off CTS when answer tone is detected or send CFI response in cases where the call has failed. Turn On DSR and DCD when handshake is successful.
Recognize successful connection when DSR comes On. Recognize connected data rate from the CNX message.	Send connect CNX message. Enter data transfer mode.
Turn On RTS to send data.	Turn On CTS in response to RTS.
Turn Off DTR to terminate call.	Disconnect from line. Turn Off CTS, DSR, and DCD. Send CFI call abort message.

#### Answering a Call

DTE	DCE
Turn On DTR.	After detection of an incoming ring, send INC message. When Auto Answer is enabled, modem will answer call after preset number of rings if DTR is On. The CIC command is not required.
Send CIC command to permit answering, or send DIC command to disregard the incoming ring.	Disregard incoming ring if DIC is received. Answer call after the next ring if CIC is received. At next ring, go off-hook. Turn Off CTS. Turn On DSR and DCD when going through handshake successfully.



The following sequence of events takes place when the modem senses an incoming call:

1. After the specified number of rings, the modem turns On circuit 125 (Call Indicator) to alert the DTE that an incoming call is trying to make a connection.
2. If the DTE is prepared to accept the connection it responds by turning On circuit 108.1. While Call Indicator is On, circuit 108.1 acts as the command to perform automatic answering.
3. The modem then goes off-hook, performs handshaking, and when that is successfully completed begins data transfer with the remote modem.

### **Manual Call Answering**

When automatic answering is disabled, use the following procedure to establish communication by manually answering calls:

1. When the telephone rings, lift the handset.
2. When the remote site attendant asks you to place the modem in data mode, turn On terminal interface 108.1.
3. Hang up the handset. You may now commence data communications.

### **Terminating a Call**

To terminate communication, turn Off terminal interface circuit 108.1.

### **V.25 bis 108.2 Mode Interface Specifications**

Physical connections between a DTE and a DCE must be asynchronous. The ITU-T V.25 bis 108.2 mode recommendations describe the exchange of commands and responses between the units using both types of operation. The Quester II supports command/response exchange in either mode.

The following paragraphs describe the functional characteristics of the V.25 bis asynchronous interfaces, as used in the Quester II modem.

**Interface Connections**

From DCE to DTE:

104	RXD
106	CTS
107	DSR
125	Call Indicator/Ring Detector

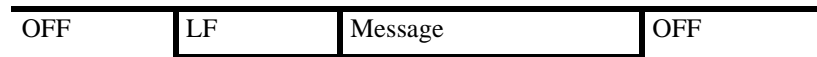
From DTE to DCE:

103	TXD
105	RTS
108.2	DTR

**Asynchronous Format**

The structure of each message in the asynchronous mode (%V1 AT command) format is shown below:

← Time



OFF = Interface idle

Message = Command/Response (10-bit characters: 1 start, 7-bit ASCII data, 1 even parity, 1 stop)

LF = ASCII Line Feed Character (00001010)

# 4 Troubleshooting

---

Updated information and files can be obtained by accessing GDC at [http:// www.gdc.com](http://www.gdc.com)

We recommend the following procedure to troubleshoot your modem:

- Set the modem to the factory configuration (AT&F).
- Make sure that the modem is completely installed and computer and modem power is On.
- Check that the cables are not loose or defective and are hooked up correctly.
- Use the Troubleshooting Guide that appears below.

<b>Difficulty</b>	<b>Check-Out</b>	<b>Solve</b>
Commands have no effect on the modem.	Make sure that the COM port designated by the communications software to the modem is correct.  Verify that as AT commands are typed, the LEDs blink.  Verify that the data rate for the communications software package is set to a computer-to-modem supported auto baud speed.	Set proper COM port in software communications.  Correct cabling or modem power.  Set supported rate in software package. If you are experiencing problems, set speed to 9600 bps until problem is defined or resolved.

Difficulty	Check-Out	Solve
Typed characters produce a double echo when the modem is operating.	Check setting of the echo on the modem. Determine the echo or duplex setting of the communications software.	Turn one of the echo settings Off, if both are On.
No answer from modem.	Verify the configuration of the modems and DTR setting.	See that the modem is set to auto answer (S0=1). If the TR light is not On, make sure &D0 is set (use AT&\$command).
Modem doesn't dial.	Make sure that there is a dial tone. And if you use DTR dialing (AT%Z1=n), check out the phone number at the location where it is stored (&V command).	Phone cabling or storing a number in Cell n. Set DTR option AT&D0.
Modem doesn't connect.	Check the handshake option; or the mode for error correction and data compression	Set AT&H0, or AT\N3, or both
Software communications package shows on-line connection status before calling or answering.	Check Carrier On option	Set Carrier=normal (AT&C1).

Difficulty	Check-Out	Solve
Modem connects but cannot pass data.	<p>Verify the computer-to-modem speed of the communications package.</p> <p>Observe the control method of the computer flow control and that the flow is identical to the setting of the modem, such as XON-XOFF or RTS/CTS (recommended).</p> <p>Check for modem-to-modem flow control.</p>	<p>Set the flow control of the modem to RTS/CTS (AT\Q3) if you are using a communications software package that is supporting RTS/CTS flow control (recommended).</p> <p>Or if XON/OFF is used, set the modem for (AT\Q1).</p> <p>Or if no flow control is used, set the modem flow control Off (AT\Q0).</p>
Premature modem disconnection.	See that the error correction is supported by the remote modem.	Set the modem for normal mode (AT\N) and retry the call, if the remote modem is not supporting error correction.
Garbled or lost data	Check the control settings of the modem flow.	<p>Set the flow control of the modem to RTS/CTS (AT\Q3) if you are using a communications software package that is supporting RTS/CTS flow control.</p> <p>Or if XON/OFF is used, set the modem for (AT\Q1).</p> <p>Or if no flow control is used, set the modem flow control OFF (AT\Q0).</p>

Difficulty	Check-Out	Solve
Data stops passing.	Check to see if the modem is set for XON\XOFF flow control (AT\\$). If the modem is set for XON\XOFF flow control (\Q1), set to \Q3.	Set the software and modem for hardware flow control (AT\Q3); or put flow=Off (AT\Q0).
Modem isn't disconnecting when DTR drops or when the communications software package calls for a disconnect command (+++ATH).	Verify the delay between ATH command and issue the escape sequence (+++). Software delay must be greater than the S Register 12 value (default is 1 second). Verify that DTR is not forced On (&D0).	Make certain that the escape sequence (+++) is complying with the guard time requirements of the modem. Refer to <i>Table 3-2, Register S12</i> . Set (AT&D2).
A file cannot be transferred by modem or is aborting during the transfer.	Check the flow control settings of the modem (AT\\$).  Verify that the computer uses a high speed COM port with a 16550 a UART (at high DTE speeds). Run MSD in DOS mode.	Set the flow control on the computer and the modem to RTS/CTS (\Q3).  Reduce the terminal speed until you get a speed that is slow enough, if you are not using a 16550 UART. Install a high speed serial port with a 16550 UART.
File is taking too long to transfer.	Determine connect speed (use \V0).	Force a lower connect speed using the &Gnn command.
Unexpected call termination.	Review termination table below.	Correct setting/issue.

**Table 4-1** Call-Termination Table

Cause of Termination	Explanation
Disconnect during the handshake.	S7 timed out - use a larger number security failure - check your password. character abort - disable by selecting %K1
Operator or software disconnect.	Command to disconnect was given (+++ATH) or TR was turned Off.
Carrier loss during transmissions - no carrier message.	S Register 10 timed out or remote modem may have dropped the call.
Receive long space disconnect	Only operates in V.22 bis mode. Remote operator terminated the call.
Clear down OK message	Disconnect method found in V.32 bis and V.34 mode on a normal disconnect sequence.
Test mode entered	Analog test modes force call-termination.
Modem is turned Off.	Loss of power.





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