

MEM-336

Managed External Modem

User's Guide



Warnings and Cautions:



No Serviceable Parts Inside; Authorized Service Personnel Only

Do not attempt to repair or service this device yourself. Internal components must be serviced by authorized personnel only.

- **Shock Hazard - Do Not Enter**

Nameplate Power Warning

This device should only be operated with the type of power source indicated on the instrument nameplate. If you are not sure of the type of power service available, consult your local power company.

- **Connect unit only to a properly measured supply. Use only three wire cord which is provided with the unit.**
- **Reliable earthing of this equipment must be maintained. Particular attention should be given to supply connections when connecting to power strips, rather than direct connections to the branch circuit.**

Rack Mount Installation

When installing this device in an instrument rack, the following factors must be accounted for:

1. **Enclosed Racks:** Enclosed racks must provide adequate ventilation. Make certain that the rack is not overly crowded and note that each unit in the rack generates its own heat. An enclosed rack should have louvered sides and a fan to circulate cooling air.

When mounting the unit in an enclosed rack with a ventilation fan at the top of the rack, note that excessive heat generated by devices at the bottom of the rack can be drawn upward and into the ventilation slots of units located at the top. Make certain to provide adequate ventilation for equipment installed at the bottom of the rack.

(Continued)

Rack Mount Installation (Continued)

1. Enclosed Racks (Continued):

The ambient within the rack may be greater than room ambient. Installation should be such that the amount of air flow required for safe operation is not compromised. The maximum temperature for the equipment in this environment is 45°C. Consideration should be given to the maximum rated ambient.

Installation should be such that a hazardous stability condition is not achieved due to uneven loading.

- 2. Open Racks:** Make certain that the rack frame does not block the ventilation slots on the instrument cover. If the device is installed on sliders, check the unit when seated all the way into the rack to make certain that ventilation slots are not blocked.

Ventilation

Slots in the instrument cover are provided to allow ventilation for heat dissipation. To ensure safe, reliable operation, these openings must not be covered or blocked.

Disconnect Power

If any of the following events are noted, immediately disconnect the unit from the power source and contact qualified service personnel:

1. If the power cord becomes frayed or damaged.
2. If liquid has been spilled into the device or if the device has been exposed to rain or water.

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1. Introduction

The MEM-336 Managed External Modem is designed for applications that require a "must answer" modem that can be installed on a desktop or in a Zero-U rack bracket. The MEM is also ideal for remote sites, the managed external modem always resets itself to answer on the specified number of rings and is set to a fixed baud rate at the modem port. No external "AT" commands are required to configure the modem upon power-up, which is ideal when the MEM is attached to equipment that cannot send an "AT" setup string.

Remote Configuration

Remote configuration is a network management tool, which allows you to configure modems anywhere in your network from one location. With password-protected remote configuration, you can issue AT commands to a remote MEM for maintenance or troubleshooting as if you were on-site.

Fault Tolerant Operation

Special circuitry in the MEM monitors for power brown-out, static discharge and loss of carrier conditions. Any of these conditions will cause the modem to be reset and refreshed with an internal "AT" command string to assure reliable, "must answer" operation.

Reliability and Support

The MEM is built in the USA and backed by a two year warranty. NetReach products are installed in thousands of network sites world wide. Our customers know they can depend on every WTI product's superior quality and reliability for their most mission-critical operations.

Features

- Remotely Configurable
- Internal Filtered and Surge Protected Power Supply
- Powers up to Specified Answer Rings and Baud Rate
- Standard "AT" 33.6 Kbps Modem
- All Metal Construction

Typographic Conventions

COURIER FONT Indicates characters typed on the keyboard.
For example, **AT&W0** or **ATO**.

[Bold Font] Text set in bold face and enclosed in square brackets, indicates a specific key.
For example, **[Enter]** or **[Esc]**.

2. Unit Description

2.1. Front Panel Indicators

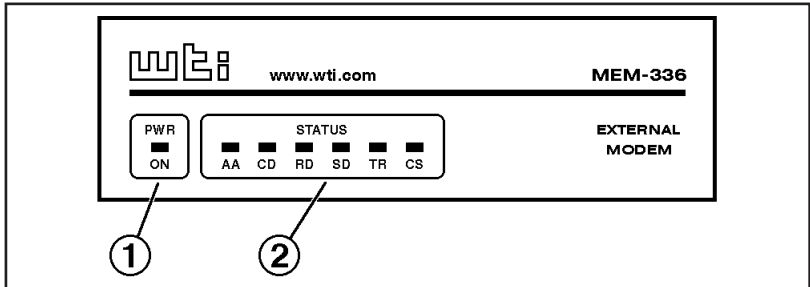


Figure 2.1: Front Panel Indicators

- ① **ON Indicator:** Lights when power is applied to the unit.
- ② **Status Indicators:** A series of six LEDs, which indicate modem status as follows:
 - **AA (Auto Answer):** Normally On; Flashes when modem is answering a call.
 - **CD (Carrier Detect):** Lights to indicate that a valid data carrier signal has been received from a remote modem. (DCD high at modem port.)
 - **RD (Receive Data):** Flashes to indicate that the modem is sending result codes or passing received data bits. (RXD high at serial modem port.)
 - **SD (Send Data):** Flashes to indicate that the unit is sending data bits.
 - **TR (Data Terminal Ready):** Lights to indicate that the modem is receiving the DTR signal from the computer (DTR high at serial modem port).
 - **CS (Clear to Send):** Lights when hardware flow control is enabled. (CTS signal is enabled.)

2.2. Back Panel

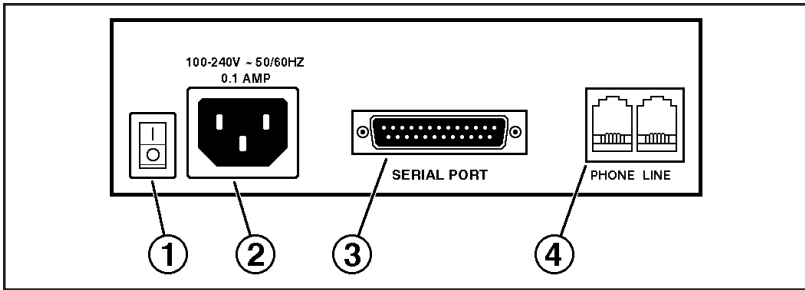


Figure 2.2: Back Panel

- ① **Power Switch**
- ② **Power Input:** An IEC-32 inlet for connection to a three wire (grounded) power cord.
- ③ **Serial Port:** A serial modem port, for connection to your local PC or terminal.
- ④ **Telco Line Connector:** For connection to your telecommunications (telephone) line. The RJ11 jack labeled "Line" is used for connection to your telco line. The jack labeled "Phone" is not used.
- ⑤ **Default Switches:** (Not Shown) A bank of eight DIP switches, located on the underside of the unit, which select the default modem rate, Echo Mode, Response Mode, and other parameters as described in Section 3.2.

3. Set Up & Operation

3.1. Connecting power to the MEM-336



CAUTIONS:



- This device should only be operated with the type of power source indicated on the instrument nameplate. If you are not sure of the type of power service available, please contact your local power company.
- Reliable earthing (grounding) of this unit must be maintained. Particular attention should be given to supply connections when connecting to power strips, rather than direct connections to the branch circuit.

Plug the supplied power cable into the receptacle on the MEM-336 back panel, and then connect the power cable to an appropriate, grounded (earthed) outlet.

3.2. Default Switch Settings

The Default (DIP) Switches, located on the underside of the MEM-336 unit are used to select modem parameters such as the baud rate, local echo and response type. Switch settings are also listed on a label adjacent to the Default Switches.

3.2.1. Baud Rate (Sw1 & Sw2)

Switches one and two select the baud rate at which the modem will be initialized upon power up, 30 minute AT refresh, and after a disconnect.

Baud Rate	Switch	
	Sw1	Sw2
9600	On	On
2400	Off	On
19.2K	On	Off
38.4K	Off	Off

3.2.2. Local Echo (Sw3)

Switch three selects the local echo mode.

Local Echo	Sw3
Enable	On
Disable	Off

3.2.3. Response Mode (Sw4)

Switch four determines the response mode, and can be set to select either verbose (text) or quiet mode (responses disabled).

Response Mode	Sw4
Verbose	On
Quiet Mode	Off

3.2.4. ARQ/Compression (Sw5)

Switch five enables / disables error correction and compression.

ARQ Compression	Sw5
Enable	On
Disable	Off

3.2.5. Flow Control (Sw6)

Switch six selects the flow control method, and can select either CTS/RTS for hardware control, or None for applications that require three wire (pins 2, 3 and ground) connection.

Flow Control	Sw6
CTS/RTS	On
None	Off

3.2.6. Speaker (Sw7)

Switch seven enables or disables the modem speaker.

Speaker	Sw7
On	On
Off	Off

3.2.7. Auto Reset / Configure (Sw8)

Switch eight enables/disables the Auto-Reset/Configure mode. When enabled, the MEM will perform an automatic "AT" refresh Upon power-up, after a disconnect, and every 30 minutes during periods of no modem activity. When disabled, the MEM will behave like a standard, external modem.

Auto Reset / Configure	Sw8
On	On
Off	Off

3.3. Remote Configuration

Remote configuration is a network management tool, which allows you to invoke AT commands and configure the modem from a remote location. After a valid password is entered, remote users can view modem setup and change AT parameters for maintenance or troubleshooting, in exactly the same manner as if you were on site.

Note however, that the remote configuration password can only be checked or changed by a local user, communicating with the MEM via the serial modem port. Remote users are not allowed to check or change the remote configuration password.

3.3.1. Check Setup Password

To check the currently defined Remote Configuration Password, proceed as follows:

1. Start your communications program (e.g.; Hyperterminal) at a local PC, connected to the MEM's Serial Modem Port.
2. At the communication program's command prompt, type **AT#Snnn** and then press **[Enter]** (where **nnn** is the currently defined Remote Configuration Password.) For example, to check the default password (MTSMODEM), type **AT#SMTSMODEM** and press **[Enter]**.
3. The modem will respond with "OK", if the Remote Configuration Password is correct, or "ERROR" if the password specified in the **AT#S** command line is incorrect.

Note: the currently defined Remote Configuration Password cannot be displayed; if you have forgotten the password, you must define a new one.

3.3.2. Change Password

To change the existing Remote Configuration Password, proceed as follows:

1. Start your communications program at the local PC that is connected to the MEM's Serial Modem Port.
2. At the communication program's command prompt, type **AT#S=nnn**, and press **[Enter]** (Where **nnn** is the desired Setup Password.)
3. If the new password is accepted, the modem will respond with "OK", indicating that the new password has been successfully redefined and saved.

Notes:

- The password function is case sensitive.
- The password must be from one to eight characters long, and may contain any keyboard character.
- Make certain to record your Remote Configuration Password. If the password is lost or forgotten, you must access the MEM from a local PC and define a new password.
- In order to protect access to modem configuration functions, it is strongly recommended that you redefine the default password as soon as possible.

3.3.3. Remote Configuration Procedure

1. Establish a data connection with the MEM from a remote modem.
2. Enter the three character escape code (The default is %%), followed by **AT** and the current Setup Password, and then press **[Enter]**. For example, if the current password is "MTSMODEM" (the default password), then to access the Remote Configuration mode, you would type %%**ATMTSMODEM** and press **[Enter]**.
 - a) Note that the MEM will allow four attempts to enter the correct password before terminating the connection.
 - b) If the correct Setup Password is entered, the MEM will respond with the "OK" message, indicating that you can now send AT commands to configure the modem.
3. **Save Parameters:** When you have finished configuring the remote modem, you must save the new configuration before exiting from Remote Configuration mode. To save newly selected parameters, type **AT&W0** and press **[Enter]**. Note that if new configuration parameters are not saved before exiting from Remote Configuration mode, they will be lost.
4. **Exit Remote Configuration Mode:** Type **ATO** ("O" for "Out") and press **[Enter]** to exit from Remote Configuration Mode. To resume normal modem use or break the connection, proceed as you normally would.
5. The escape character "%" can also be changed using the S9 Register.
 - a) To define a new escape character, access the modem command mode, then type **ATS9=*n*** and press **[Enter]** (where ***n*** is the ASCII code for the desired escape character.)
 - b) Note that the default, factory-set escape character is % (ASCII Code 37). Setting Register S9 to 0 (zero) will disable the Remote Configuration mode.
 - c) After redefining the escape character, save the new values; type **AT&W** and then press **[Enter]**.

3.4. Fault Tolerant Operation

The MEM-336 features special circuitry, which constantly monitors for power brown-outs, static discharge and loss of carrier conditions. If any of these conditions are detected, the modem will automatically be reset and refreshed with an internal AT command string to ensure reliable, "must answer" operation.

When the MEM is automatically reset, it will configure itself for 9600 bps operation for incoming calls.

4. AT Command Summary

The AT commands are used to control and configure the modem, and can be issued only when the modem is in Command Mode or Remote Configuration Mode.

The Command Mode is active whenever the MEM is *not* connected to another modem. The Remote Configuration Mode is a temporary state, which allows you to send AT Commands to the MEM from a remote modem. To activate the Remote Configuration Mode, proceed as described in Section 3.3.3.

To send AT commands to the MEM you must use a communications program, such as HyperTerminal, or another terminal emulation program. You can issue commands to the modem either directly, by invoking them at the communication program's command prompt, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, most communications programs make daily operation of modems effortless by hiding commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem (e.g. To turn autoanswer On or Off.)

The format for entering an AT command is **ATXn**, where **X** is the command and **n** is the desired value or parameter. The value is always a number, and if the value is zero, you can omit it from the command line; thus **AT&W** is equivalent to **AT&W0**. Most commands have a default value, and these default values are shown in the "AT Command Summary" on the pages that follow.

In order to send each AT command to the modem, you must press [**Enter**] after keying in the command line. Any time the modem receives a command, it sends a response known as a "result code". The most common result codes are OK, ERROR, and the CONNECT messages that the modem sends when it is connecting to another modem. For a table of valid result codes, please refer to Section 6.

You can also issue several commands in one line, in what is called a command string. The command string begins with **AT** and ends when you press **[Enter]**. Spaces to separate the commands are optional; the command interpreter ignores them. The most familiar command string is the initialization string, which is used to configure the modem when it is turned on or reset, or when the MEM calls another modem.

4.1. Modem Status Screens

To display current modem configuration parameters, invoke the **AT&V** command to display the modem setup status screens shown in Figures 4.1 through 4.4. Note that the modem status report is split into four separate screens; to display the next screen, press any key, or press **[Esc]** to quit the modem status display.

Option	Selection	AT Cmd
-----	-----	-----
Comm Standard	CCITT	B
CommandCharEcho	Enabled	E
Speaker Volume	Medium	L
Speaker Control	OnUntilCarrier	M
Handshake Speed	Fall Back Ena	N
Result Codes	Enabled	Q
Dialer Type	Tone	T/P
ResultCode Form	Text	V
ExtendResultCode	Enabled	X
DialTone Detect	Enabled	X
BusyTone Detect	Enabled	X
CDC Action	Standard RS232	&C
DTR Action	Standard RS232	&D

Press any key to continue; ESC to quit.

Figure 4.1: Modem Status Screen (Part 1)

Option	Selection	AT Cmd
-----	-----	-----
V22b Guard Tone	Disabled	&G
Flow Control	Hardware	&K
DSR Control	DSR High	&S
Break Control	\K5	\K
Error Control Mode	V42,MNP,Buffer	\N
Data Compression	V42bis/MNP5	%C
DTR Dialing	Off	\$D
AutoAnswerRing#	1	S0
AT Escape Char	43	S2
CarriageReturn Char	13	S3
Linefeed Char	10	S4
Backspace Char	8	S5
Blind Dial Pause	3 sec	S6
NoAnswer Timeout	65 sec	S7

Press any key to continue; ESC to quit.

Figure 4.2: Modem Status Screen (Part 2)

Option	Selection	AT Cmd
-----	-----	-----
", " Pause Time	2 sec	S8
Remote Config Char	37	S9
No Carrier Disc	2000 msec	S10
DTMF Dial Speed	95 msec	S11
Escape GuardTime	1000 msec	S12
Data Calling Tone	Enabled	S35
Line Rate	33600	S37
Callback Security	Disabled	#CBS
Callback Delay	15 sec	#CBD
Callback Parity	None/Space	#CBP
Callback Inactivity	20 min	#CBI
Callback Retries	4	#CBA
User Profile	Not Stored	&W
Xon/Xoff Pacing	Pacing On	&E12/13

Press any key to continue; ESC to quit.

Figure 4.3: Modem Status Screen (Part 3)

Stored Phone Numbers

&Z0=
&Z1=
&Z2=

Figure 4.4: Modem Status Screen (Part 4)

4.2. AT Commands

Command:	AT	Attention Code
Values:		N/A
Description:		The attention code precedes all command lines except A/ , A: , and escape sequences.
Command:		[Enter] Key
Values:		N/A
Description:		Press the [Enter] key to execute most commands.
Command:	A	Answer
Values:		N/A
Description:		Answer call before final ring.
Command:	A/	Repeat Last Command
Values:		N/A
Description:		Repeat the last command string. Do not precede this command with AT . Do not press [Enter] to execute.
Command:	Bn	Communication Standard Setting
Values:		n = 0-3, 15, 16
Default:		1 and 16
Description:	B0	Select ITU-T V.22 mode when modem is at 1200 bps.
	B1	Select Bell 212A when modem is at 1200 bps.
	B2	Deselect V.23 reverse channel (same as B3).
	B3	Deselect V.23 reverse channel (same as B2).
	B15	Select V.21 when the modem is at 300 bps.
	B16	Select Bell 103J when the modem is at 300 bps.

Command:	Ds	Dial
Values:		s = dial string (phone number and dial modifiers)
Default:		None
Description:		Dial telephone number s , where s may be up to 40 characters long, and may include the 0-9, *, #, B, C, and D characters, and the L, P, T, V, W, S, comma (,), semicolon (;), !, @, ^, and \$ dial string modifiers.
		Dial String Modifiers:
	L	Redial last number (must be placed immediately after ATD .)
	P	Pulse-dial the following numbers.
	T	Tone-dial the following numbers.
	V	Switch to speakerphone mode and dial the following number. Use the ATH command to hang up.
	W	Wait for a new dial tone before continuing to dial. (X2, X4, X5, X6, or X7 must be selected)
	,	Pause during dialing for time set in register S8.
	;	Return to command mode after dialing. (Place at end of dial string.)
	!	Hook flash. Causes the modem to go on-hook for one half second, then off-hook again.
	@	Wait for quiet answer. Causes the modem to wait for a ringback, then 5 seconds of silence, before processing the next part of the command. If silence is not detected, the modem returns a NO ANSWER code.
	^	Disable data calling tone transmission.
	\$	Detect AT&T call card "bong" tone. The \$ character should follow the phone number and precede the user's call card number. (For example, ATDT5551234\$123456789)
Command:	DS=y	Dial Stored Telephone Number
Values:		y = 0-2
Default:		None.
Description:		Dial a number that has been previously stored in directory number y using the &Zy=x command. (For example, ATDS=2 .)
Command:	En	Echo Command Mode Characters
Values:		n = 0 or 1
Default:		1
Description:		E0 Do not echo keyboard input to the terminal. E1 Echo keyboard input to the terminal.
		Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command En will be overridden according to the current setting of Default Sw3.

Command:	Fn	Echo Online Data Characters
Values:		n = 1
Default:		1
Description:		F0 Enable online data character echo (Not Supported.) F1 Disable online data character echo (included for backward compatibility with some software.)
Command:	Hn	Hook Control
Values:		n = 0 or 1
Default:		0
Description:		H0 Go on-hook (hang up.) H1 Go off-hook (make the phone line busy.)
Command:	In	Information Request
Value:		n = 0-5, 9, 11
Default:		None
Description:		I0 Display default speed and controller firmware version. I1 Calculate and display ROM checksum (e.g. 12AB.) I2 Check ROM and verify the checksum, displaying OK or ERROR. I3 Display default speed and controller firmware version. I4 Display firmware version for data pump I5 Display the board ID: software version, hardware version, and country ID. I9 Display the country code (e.g. NA Ver. 1.) I11 Display diagnostic information for the last modem connection, such as DSP and firmware version, link type, line speed, serial speed, type of error correction/data compression, number of past retrains, etc.
Command:	Mn	Monitor Speaker Mode
Values:		n = 0, 1, 2, or 3
Default:		1
Description:		M0 Speaker always off. M1 Speaker on until carrier signal detected. M2 Speaker always on when modem is off-hook. M3 Speaker on until carrier is detected except while dialing. Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command Mn will be overridden according to the current setting of Default Sw7.

Command:	Nn	Modulation Handshake
Values:		n = 0 or 1
Default:		1
Description:		<p>N0 Modem performs handshake only at the communication standard specified by register S37 and the B command.</p> <p>N1 Modem begins handshake at communication standard specified by register S37 and the B command. During handshake, fallback to a lower speed can occur.</p>
Command:	On	Return to Data Mode
Values:		n = 0, 1, or 3
Default:		None.
Description:		<p>O0 Exit Remote Configuration mode and return to data mode (see +++AT<CR>, Escape Sequence.)</p> <p>O1 Issue a retrain and return to online data mode.</p> <p>O3 Issue a rate renegotiation and return to data mode.</p>
Command:	P	Pulse Dialing
Values:		P, T
Default:		T
Description:		Configures the modem for pulse (non-touch-tone) dialing. Dialed digits are pulsed until a T command or dial modifier is received.
Command:	Qn	Result Codes Enable/Disable
Values:		n = 0 or 1
Default:		0
Description:		<p>Q0 Enable Result Codes.</p> <p>Q1 Disable Result Codes.</p> <p>Q2 Returns an OK for backward compatibility with some software.</p> <p>Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command Qn will be overridden according to the current setting of Default Sw4.</p>
Command:	Sr=n	Set Register Value
Values:		r = S-Register number; n varies
Default:		None.
Description:		Sets the value of Register Sr to n , where n is entered in decimal format (e.g. S0=1 .)
Command:	Sr?	Read Register Value
Values:		r = S_Register number.
Default:		None.
Description:		Reads the value of register Sr and displays it in 3-digit decimal form (e.g. S2? Gives the response 043).

Command:	T	Tone Dialing
Values:		P, T
Default:		T
Description:		Configures the modem for DTMF (touch-tone) dialing. Dialed digits are tone dialed until a P command or dial modifier is received.
Command:	Vn	Result Code Format
Values:		n = 0 or 1
Default:		1
Description:		V0 Displays result codes as digits (terse.) V1 Displays result codes as text (verbose.) Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command Vn will be overridden according to the current setting of Default Sw4.
Command:	Wn	Result Code Options
Values:		n = 0, 1, or 2
Default:		2
Description:		W0 CONNECT result code reports serial port speed, disables protocol result codes. W1 CONNECT result code reports serial port speed, enables protocol result codes. W2 CONNECT result code reports line speed, enables protocol result codes.
Command:	Xn	Result Code Selection
Values:		n = 0-7
Default:		4
Description:		X0 Basic result codes (e.g. CONNECT); does not look for dial tone or busy signal. X1 Extended result codes (e.g. CONNECT 4600 V42bis); does not look for dial tone or busy signal. X2 Extended result codes with NO DIALTONE; does not look for busy signal. X3 Extended result codes with BUSY; does not look for dial tone. X4 Extended result codes with NO DIALTONE and BUSY. X5 Extended result codes with NO DIALTONE and BUSY. X6 Extended result codes with NO DIALTONE and BUSY. X7 Basic result codes with NO DIALTONE and BUSY.

Commands:	Zn	Modem Reset
Values:		n = 0 or 1
Default:		None.
Description:		Z0 Resets modem to profile saved by the last &W command. Z1 Same as Z0.
Command:	&Cn	Data Carrier Detect (DCD) Control
Values:		n = 0 or 1
Default:		1
Description:		&C0 Forces the DCD circuit to always be high. &C1 DCD goes high when the remote modem's carrier signal is detected, and goes low when the carrier signal is not detected.
Command:	&Dn	Data Terminal Ready (DTR) Control
Values:		n = 0, 1, 2, or 3
Default:		2
Description:		&D0 Modem ignores the true status of the DTR signal and responds as if it is always on. &D1 If DTR drops while in online data mode, the modem enters command mode, issues an OK, and remains connected. &D2 If DTR drops while in online data mode, the modem hangs up. If the signal is not present, the modem will not answer or dial. &D3 If DTR drops, the modem hangs up and resets as if an ATZ command were issued. Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command &Dn will be overridden according to the current setting of Default Sw6.
Command:	&En	XON/XOFF Pass-Through
Values:		n = 6 or 7
Default:		6
Description:		&E6 Modem responds to XON/XOFF characters, but does not allow XON/XOFF characters to pass through to remote sites. &E7 Modem responds to XON/XOFF characters, and allows them to pass through to remote site.
Command:	&Fn	Load Factory Settings
Values:		n = 0
Default:		None.
Description:		&F0 Load factory settings as active configuration. Note: See also the Z command.

Command: **&Gn** **V.22bis Guard Tone Control**

Values: **n** = 0, 1, or 2

Default: 0

Description: **&G0** Disable Guard tone.
 &G1 Set guard tone to 550 Hz.
 &G2 Set guard tone to 1800 Hz.

Note: The **&G** command is not used in North America.

Command: **&Kn** **Flow Control Selection**

Values: **n** = 0, 3, or 4

Defaults: 3

Description: **&K0** Disable flow control.
 &K3 Enable CTS/RTS hardware flow control.
 &K4 Enable XON/XOFF software flow control.

Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command **&Kn** will be overridden according to the current setting of Default Sw6.

Command: **&Pn** **Pulse Dial Make-to-Break Ratio Selection**

Values: **n** = 0, 1, or 2

Default: 0

Description: **&P0** 60/40 make-to-break ratio.
 &P1 67/33 make-to-break ratio.
 &P2 20 pulses per second.

Note: The **&P2** command is available only if the country code is sent to Japan.

Command: **&Qn** **Asynchronous Communications Mode**

Values: **n** = 0, 5, 6, 8, or 9

Default: 5

Description: **&Q0** Asynchronous with data buffering.
 Same as **\N0**.
 &Q5 Error control with data buffering.
 Same as **\N3**.
 &Q6 Asynchronous with data buffering.
 Same as **\N0**.
 &Q8 MNP error code control mode. If MNP error control is not established, the modem falls back according to the setting in register S36.
 &Q9 V.42 or MNP error control mode. If neither error control is established, then the modem falls back according to the setting of register S36.

Command: **&Sn** **Data Set Ready (DSR) Control**

Values: **n** = 0 or 1

Default: 0

Description: **&S0** DSR is always high (on).
 &S1 DSR goes high only during a connection.

Command:	&Tn	Loopback Test (V.54 Test) Commands
Values:		n = 0, 1, 3, or 6
Default:		None.
Description:		The modem can perform selected test and diagnostic functions. A test can be run only when the modem is operating in non-error-correction mode (normal or direct mode.) For tests 3 and 6, a connection between the two modems must be established. To terminate a test in progress, enter the escape sequence (+++AT). &T0 Stops any test in progress. &T1 Starts a local analog loopback, V.54 Loop 3 test. If a connection exists when this command is issued, the modem hangs up. When the test starts, a CONNECT message is displayed. &T3 Starts local digital loopback, V.54 Loop 2 test. If no connection exists, an ERROR message is returned. &T6 Initiates a remote digital loopback, V.54 Loop 2 test without self-test. If no connection exists, an ERROR message is returned.
Command:	&V	Display Current Settings
Values:		N/A
Description:		Displays the active modem settings.
Command:	&Wn	Store Current Configuration
Values:		n = 0 or 1
Default:		0
Description:		&W0 Stores modem settings in non-volatile memory and causes them to be loaded at power on or following the ATZ command instead of the factory defaults. See also the &F command. &W1 Clears user default settings from memory and causes the factory defaults to be loaded at power on or following the ATZ command.
Command:	&Zy=x	Store Dialing Command
Values:		y = 0 to 2 x = Dialing Command
Default:		None.
Description:		Stores dialing command x in memory location y . To dial the stored command, use the command ATDS=y .
Command:	\An	Select Maximum MNP Block Size
Values:		n = 0, 1, 2, or 3
Default:		3
Description:		\A0 64-character maximum. \A1 128-character maximum. \A2 192-character maximum. \A3 256-character maximum.

- Command: **\Bn** **Transmit Break**
Values: **n** = 0 to 9 in 100 ms units.
Default: 3
Description: In non-error-correction mode only, sends a break signal of the specified length to a remote modem. Works in conjunction with the **\K** command.
- Command: **\Kn** **Break Control**
Values: **n** = 0 to 5
Default: 5
Description: Controls the response of the modem to a break received from the computer, the remote modem, or the **\B** command. The response is different for each of the three different states:
- Data mode. The modem receives the break from the computer:**
- \K0** Enter Remote Configuration mode, no break sent to the remote modem.
 - \K1** Clear data buffers and send break to the remote modem.
 - \K2** Same as **\K0**.
 - \K3** Send break immediately to the remote modem.
 - \K4** Same as **\K0**.
 - \K5** Send break to the remote modem in sequence with the transmitted data.
- Data mode. The modem receives the break from the remote modem:**
- \K0** Clear data buffers and send break to the computer.
 - \K1** Same as **\K0**.
 - \K2** Send break immediately to the computer.
 - \K3** Same as **\K2**.
 - \K4** Send break to the computer in sequence with the received data.
 - \K5** Same as **\K4**.
- Remote Configuration mode. The modem receives a \Bn command from the computer:**
- \K0** Clear data buffers and send break to the remote modem.
 - \K1** Same as **\K0**.
 - \K2** Send break immediately to the remote modem.
 - \K3** Same as **\K2**.
 - \K4** Send break to the remote modem in sequence with the transmitted data.
 - \K5** Same as **\K4**.

Command:	\Nn	Error Correction Mode Selection
Values:		<i>n</i> = 0 to 5, or 7
Default:		3
Description:		<p>\N0 Non-error-correction mode with data buffering (buffer mode; same as &Q6.)</p> <p>\N1 Direct Mode.</p> <p>\N2 MNP reliable mode. If the modem cannot make an MNP connection, it disconnects.</p> <p>\N3 V.42/MNP auto-reliable mode. The modem attempts first to connect in V.42 error correction mode, then in MNP mode, and finally in non-error-correction (buffer) mode with continued operation.</p> <p>\N4 V.42 reliable mode. If the modem cannot make a V.42 connection, it disconnects.</p> <p>\N5 V.42, MNP, or non-error-correction (same as \N3.)</p> <p>\N7 V.42, MNP, or non-error-correction (same as \N3.)</p> <p>Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command \Nn will be overridden according to the current setting of Default Sw5.</p>
Command:	\Qn	Flow Control Selection
Values:		<i>n</i> = 0, 1, or 3
Default:		3
Description:		<p>\Q0 Disable flow control (same as &K0.)</p> <p>\Q1 XON/XOFF software flow control (same as &K4)</p> <p>\Q2 CTS-only flow control. Not supported.</p> <p>\Q3 RTS/CTS hardware flow control (same as &K3)</p>
Command:	\Tn	Inactivity Timer
Values:		<i>n</i> = 0, 1 to 255
Default:		0
Description:		<p>Sets the time (in minutes) after the last character is sent or received that the modem waits before disconnecting. A value of zero disables the timer. Applies only in buffer mode.</p> <p>Note: You can also set the inactivity timer by changing the value of register S30.</p>
Command:	\Vn	Protocol Result Code
Values:		<i>n</i> = 0, 1, or 2
Default:		1
Description:		<p>\V0 Disables the appending of the protocol result code to the DCE speed.</p> <p>\V1 Enables the appending of the protocol result code to the DCE speed.</p> <p>\V2 Same as \V1.</p>

- Command: **-Cn** **Data Calling Tone**
Values: **n** = 0 or 1
Default: 0
Description: **-C0** Disable V.25 data calling tone to deny remote data / fax / voice discrimination.
 -C1 Enable V.25 data calling tone to allow remote data / fax / voice discrimination.
- Command: **%B** **View Numbers in Blacklist**
Values: N/A
Description: If blacklisting is in effect, **AT%B** displays the numbers for which the last call attempted in the previous two hours failed. In countries that do not require blacklisting, the ERROR result code is returned.
- Command: **%Cn** **Data Compression Control**
Values: **n** = 0 or 1
Default: 1
Description: **%C0** Disable V.42bis/MNP 5 data compression.
 %C1 Enable V.42bis/MNP 5 data compression.
Note: If Auto-Reset/Configure is enabled (Default Sw8 = On), then command **%Cn** will be overridden according to the current setting of Default Sw5.
- Command: **%DCn** **AT Command Control**
Values: **n** = 0 or 1
Default: 0
Description: **%DC0** The modem responds to AT commands.
 %DC1 The modem ignores AT commands.
Note: The modem will respond to **AT%DC** for 10 seconds after power-up.
- Command: **%En** **Fallback and Fall Forward Control**
Values: **n** = 0, 1, or 2
Default: 2
Description: **%E0** Disable fallback and fall forward.
 %E1 Enable fallback, disable fall forward.
 %E2 Enable fallback and fall forward.
- Command: **\$Dn** **DTR Dialing**
Values: **n** = 0 or 1
Default: 0
Description: **\$D0** Disables DTR dialing.
 \$D1 Dials the number in memory location 0 when DTR goes high.

Command:	\$Mb<i>n</i>	Online BPS Speed
Values:		<i>n</i> = speed in bits per second
Default:		28,800
Description:	\$MB75	Selects CCITT V.23 mode.
	\$MB300	Selects 300 bps online.
	\$MB1200	Selects 1200 bps online.
	\$MB2400	Selects 2400 bps online.
	\$MB4800	Selects 4800 bps online.
	\$MB9600	Selects 9600 bps online.
	\$MB14400	Selects 14,400 bps online.
	\$MB19200	Selects 19,200 bps online.
	\$MB28800	Selects 28,800 bps online.
	\$MB33600	Selects 33,600 bps online.
Command:	\$SB<i>n</i>	Serial Port Baud Rate
Values:		<i>n</i> = speed in bits per second
Default:		115200
Description:	\$SB300	Selects 300 bps at serial port.
	\$SB1200	Selects 1200 bps at serial port.
	\$SB2400	Selects 2400 bps at serial port.
	\$SB4800	Selects 4800 bps at serial port.
	\$SB9600	Selects 9600 bps at serial port.
	\$SB19200	Selects 19,200 bps at serial port.
	\$SB38400	Selects 38,400 bps at serial port.
	\$SB57600	Selects 57,600 bps at serial port.
	\$SB115200	Selects 115,200 bps at serial port.
	\$SB230400	Selects 230,400 bps at serial port.
Command:	#S<i>x</i>	Enter Setup Password
Values:		<i>x</i> = password (1 to 8 character, case sensitive)
Default:		MTSMODEM
Description:		Enters the remote configuration setup password.
Command:	#S=<i>x</i>	Store Setup Password
Values:		<i>x</i> = password (1 to 8 character, case sensitive)
Default:		MTSMODEM
Description:		Stores a new remote configuration setup password.

Command: **+++AT <CR>** **Escape Sequence**

Values: N/A

Description: Puts the modem in command mode (and optionally issues a command) while remaining online. Type **+++AT** and up to two optional command characters; then press [Enter]. Used mostly to issue the hang-up command: **+++ATH <CR>**.

Command: **%%AT <CR>** **Remote Configuration Escape Code**

Values: N/A

Description: Initiates remote configuration mode while online with remote modem. The remote configuration escape character is defined via register S13.

5. S-Registers

Certain modem values, or parameters, are stored in memory locations called "S-Registers." To change a setting, use the `ATSr=n` command, where *r* is the desired S-register and *n* is a decimal value from 0-255 (unless otherwise indicated).

Register	Default	Description
S0	1	Sets the number of rings until the modem answers. ATSO=0 disables autoanswer completely. The valid range is 0 to 255.
S1	0	Counts the rings that have occurred. The valid range is 0 to 255
S2	43(+)	Sets the ASCII code for the escape sequence character. The valid range is 0 to 127 and 128 to 255. Values greater than 127 disable the escape sequence.
S3	13 (^M)	Sets the ASCII code for the carriage return character. The valid range is 0 to 127.
S4	10 (^J)	Sets the ASCII code for the line feed character. The valid range is 0 to 127.
S5	8 (^H)	Sets the ASCII code for the backspace character. The valid range is 0 to 32 and 33 to 127. Values greater than 32 disable the backspace character.
S6	2*	Sets the time (in seconds) that the modem waits after it goes off-hook before it begins to dial the telephone number. The valid range is 2 to 65*.
S7	50*	Sets the time (in seconds) that the modem waits for a carrier signal before aborting a call. Also sets the wait for silence time for the @ dial modifier. The valid range is 1 to 255.
S8	2	Sets the length of a pause (in seconds) caused by a comma character in a dialing command. The valid range is 0 to 65
S9	37 (%)	Sets the ASCII code for the remote configuration escape character. s9=0 disables remote configuration. The valid range is 0 to 127.
S10	20	Sets how long a carrier signal must be lost before the modem disconnects. The valid range is 1 to 254.
S11	95	Sets spacing and duration of dialing tones. The valid range is 50 to 150.
S28	1	V.34 Modulation. 0 disables V.34 modulation, 1 to 255 enables v.34 modulation. The valid range is 0 to 255.

Register	Default	Description
S30	0	Sets the length of time that the modem waits before disconnecting, when no data is sent or received. A value of zero disables the timer. The valid range is 0, 1 to 255. See also the VT command.
S35	0	V.25 Calling Tone. A value of zero disables the V.25 calling tone, and a value of one enables the V.25 calling tone. The V.25 calling tone allows remote data/fax/voice discrimination. The valid range is 0 to 1.
S36	7	Specifies the action to be taken in the event of a negotiation failure when error control is selected. (See S48.) The valid range is 0 to 7.
S37	0	Sets the maximum V.34 "Upstream" speed at which the modem attempts to connect. The valid range is 0 to 19. 0 = Maximum Speed 1 = Reserved. 2 = 300 bps. 4 = Reserved. 5 = 1200 bps. 6 = 2400 bps. 7 = 4800 bps. 8 = 7200 bps. 9 = 9600 bps. 10 = 12000 bps. 11 = 14400 bps. 12 = 16800 bps. 13 = 19200 bps. 14 = 21600 bps. 15 = 24000 bps. 16 = 26400 bps. 17 = 28800 bps. 18 = 31200 bps. 19 = 33600 bps.

Register	Default	Description															
S38	1	<p>Sets the "downstream" data rate, where V.90 provides rates of 28,000 to 56,000 bps in increments of 1,333 bps. The valid range is 0 to 23.</p> <p>0 = V.90 disabled. 1 = V.90 autorate. 2 = 28000 bps. 3 = 29333 bps. 4 = 30666 bps. 5 = 32000 bps. 6 = 33333 bps. 7 = 34666 bps. 8 = 36000 bps. 9 = 37333 bps. 10 = 38666 bps. 11 = 40000 bps. 12 = 41333 bps. 13 = 42666 bps. 14 = 44000 bps. 15 = 45333 bps. 16 = 46666 bps. 17 = 48000 bps. 18 = 49333 bps. 19 = 50666 bps. 20 = 52000 bps. 21 = 53333 bps. 22 = 54666 bps. 23 = 56000 bps.</p>															
S43	1	<p>For testing and debugging only. Enables/disables V.32bis start-up auto mode operation. The valid range is 0 = disable, 1 = enable.</p>															
S48	7	<p>Enables (7) or disables (128) LAPM negotiation. The valid range is 7 or 128. The following table lists the S36 and S48 configuration settings for certain types of connections:</p> <table border="1"> <thead> <tr> <th></th> <th>S48 = 7</th> <th>S48 = 128</th> </tr> </thead> <tbody> <tr> <td>S36 = 0, 2</td> <td>LAPM or Hang-Up</td> <td>Do Not Use.</td> </tr> <tr> <td>S36 = 1, 3</td> <td>LAPM or Async</td> <td>Async</td> </tr> <tr> <td>S36 = 4, 6</td> <td>LAPM, MNP or Hang-Up</td> <td>MNP or Hang-Up</td> </tr> <tr> <td>S36 = 5, 7</td> <td>LAPM, MNP, or Async</td> <td>MNP or Async</td> </tr> </tbody> </table>		S48 = 7	S48 = 128	S36 = 0, 2	LAPM or Hang-Up	Do Not Use.	S36 = 1, 3	LAPM or Async	Async	S36 = 4, 6	LAPM, MNP or Hang-Up	MNP or Hang-Up	S36 = 5, 7	LAPM, MNP, or Async	MNP or Async
	S48 = 7	S48 = 128															
S36 = 0, 2	LAPM or Hang-Up	Do Not Use.															
S36 = 1, 3	LAPM or Async	Async															
S36 = 4, 6	LAPM, MNP or Hang-Up	MNP or Hang-Up															
S36 = 5, 7	LAPM, MNP, or Async	MNP or Async															
S89	10	<p>Sets the length of time in the off-line command mode before the modem goes into standby mode. A value of zero prevents standby mode; a value of 1 to 4 sets the value to 5. Standby mode (sleep mode or low power mode) is controlled by register S89. It programs the number of seconds of inactivity before the modem will go to sleep. The default value is 10. The modem will wake on an incoming ring or an AT command. The valid range is 0 and 5 to 255.</p>															

Register	Default	Description
S108	6	Selects the 56K digital loss if using the modem through a PBX line. The default value is -6 dB loss, the value used when calling from a typical POTS line long distance. The valid range is 0 to 3, 6 and 7. 0 = -0 dB digital loss, no robbed-bit signaling 1 = -3 dB PBX digital loss 2 = -2 dB digital loss 3 = -3 dB digital loss 6 = -6 dB digital loss 7 = -0 dB digital loss with robbed-bit signaling

6. Result Codes

When AT commands are invoked, the MEM-336 can respond with messages called "result codes", which provide information regarding the current status of the modem. These result codes can either be completely disabled by selecting the "Quiet Mode" (via Default Switch 4 or the **ATQ1** command), or you can invoke the **ATVn** command to select either verbose responses (text messages) or terse responses (numeric / abbreviated messages.)

When the verbose response mode or the terse mode is selected, the MEM will respond as follows:

Terse	Verbose	Description
0	OK	Command Executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5*	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
10*	CONNECT 2400	Connected at 2400 bps
11*	CONNECT 4800	Connected at 4800 bps
12*	CONNECT 9600	Connected at 9600 bps
13*	CONNECT 14400	Connected at 14400 bps
14*	CONNECT 19200	Connected at 19200 bps
24*	CONNECT 7200	Connected at 7200 bps
25*	CONNECT 12000	Connected at 12000 bps
26*	CONNECT 16800	Connected at 16800 bps
40*	CONNECT 300	Connected at 300 bps
55*	CONNECT 21600	Connected at 21600 bps
56*	CONNECT 24000	Connected at 24000 bps

Terse	Verbose	Description
57*	CONNECT 26400	Connected at 26400 bps
58*	CONNECT 28800	Connected at 28800 bps
59*	CONNECT 31200	Connected at 31200 bps
60*	CONNECT 33600	Connected at 33600 bps
88	DELAYED	Delay is in effect for the dialed number
89	BLACKLISTED	Dialed number is blacklisted
90	BLACKLIST FULL	Blacklist is full

* "EC" is added to these result codes when the extended result codes configuration option is enabled (command ATXn.) "EC" is replaced by one of the following codes, depending on the type of error control connection:

V42bis - V.42 error control (LAP-M) and V.42bis data compression.

V42 - V.42 error control (LAP-M) only.

MNP5 - MNP4 error control and MNP5 data compression.

MNP4 - MNP4 error control only.

NoEC - No error control protocol.

A. Specifications

Compatibility:

ITU-T V.22 bis (2400 bps) to ITU-T V.34+ (33.6 Kbps)
Bell: 212 / V.22, 103 / V.21

Command Set:

MultiTech Chipset
Industry Standard "AT" Commands.

Supports: V.42 / MNP 2-4 Error Control

V.42 bis / MNP 5 Data Compression.

Modem Port:

Interface: RS-232C, DB-25S

Power: IEC-320 Inlet, 100 - 240 VAC, 50/60 Hz, 5 Watts

Physical / Environmental:**Size:**

Height: 1.75" (4.5 cm)

Width: 5.80" (14.7 cm)

Depth: 7.00" (17.8 cm)

Weight: 4 Lbs. (1.8 Kg) Shipping Weight.

Operating Temperature: 32° to 122° F (0° to 50° C)

Humidity: 10 - 90% RH

Ordering Information:

MEM-336 115/230 VAC Powered Modem

MEM-336ZU Mounting Bracket for Zero U Mounting.

Approvals:

UL and cUL (Canada) UL-1950

FCC Part 15, Class A

FCC Part 68

FCC Registration No. AU7USA-25814-M5-E

Ringer Equivalence: 0.3B

B. Customer Service

Customer Service hours are from 8:00 AM to 5:00 PM, PST, Monday through Friday. When calling, please be prepared to give the name and make of the unit, its serial number and a description of its symptoms. If the unit should need to be returned for factory repair it must be accompanied by a Return Authorization number from Customer Service.

WTI Customer Service
5 Sterling
Irvine, California 92618

Local Phone: (949) 586-9950
Toll Free Service Line: 1-888-280-7227
Service Fax: (949) 457-8138

Email: service@wti.com

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