V.3225/V.3225L
Manual

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Chapter 1
Introduction

GENERAL

The UDS V.3225 and the V.3225L are versatile high speed modems that can operate full duplex on both dial-up and leased lines. The modems are compatible with all required standards and recommendations and it offers a wide variety of automatic, remote, and backup capabilities. The most notable characteristics are MNP error control protocols through level 5 data compression. Other special features include a V.25 bis autodialer, secure operation, and trellis coding for improved signal-to-noise performance.

The modem operates at data rates of

- 9600 bits per second trellis-coded, as stated in CCITT recommendation V.32

- 9600 and 4800 bps uncoded, as stated in CCITT recommendation V.32

- 2400 and 1200 bps compatible with CCITT recommendation V.22 bis

- 300 bps as stated in Bell specification 103*

DESCRIPTION

Functional

The V.3225 / V.3225L processes 19200, 9600, 4800, 2400, 1200, or 300 bps of serial asynchronous data or 9600, 4800, 2400, or 1200 bps synchronous data for transmission over the dial-up telephone network and 2- or 4-wire dedicated leased lines. In 9600 bps trellis mode, near- and far-end echo canceling combine with 8 state, 2-dimensional trellis coded modulation to maximize modem performance, even on lines of reduced quality.

* 4-wire leased line mode supports 4800 and 9600 rates only.

Integral test features allow the operator to determine system performance and isolate faults in the communications link.

The front panel or the AT or V.25 command set controls a wide variety of modem operation configurations. Changes between different modes of operation can be made easily and rapidly.

A security scheme prevents unauthorized access by a remote modem.

The V.25 bis autodialer broadens compatibility with host equipment.

Physical

The modem is a standalone desktop unit. Operator inputs are via three front panel pushbuttons, YES, NO, and TALK/DATA, or by AT or V.25 bis command set (the "L" model only has the TALK/DATA button). Operating options are stored in nonvolatile memory. A menu driven, 32-character liquid crystal display (LCD) provides the operator with command feedback as well as real time displays of unit operation. Modem and DTE operation can be monitored by six light emitting diodes (LEDs) and the display status screen on the front panel. Figure 1-1 shows the LCD front panel and Figure 1-2 shows the non-LCD "L."

The rear panel (Figure 1-3) contains an EIA-232 connector for DTE interface, an 8-pin (TELSET / LEASED LINE) connector, an 8-pin (DIAL) connector, and the ON / OFF toggle switch, the fuse and power cord are also on the rear panel.

Internally the unit includes two printed circuit boards and the AC line transformer. Hardware straps on the main board offer additional options.
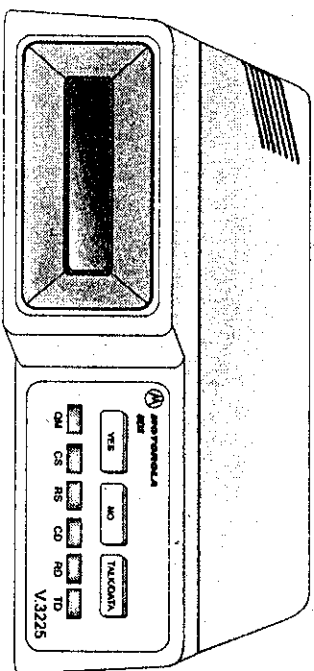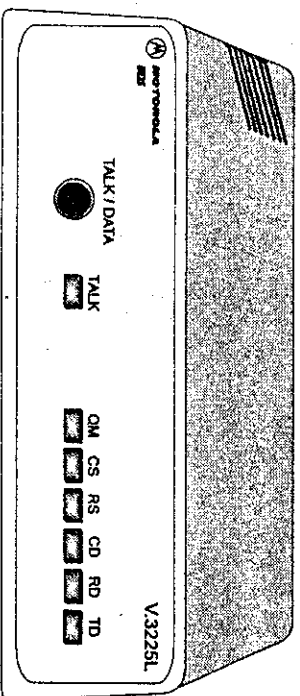
Figure 1-1
Front Panel

Figure 1-2
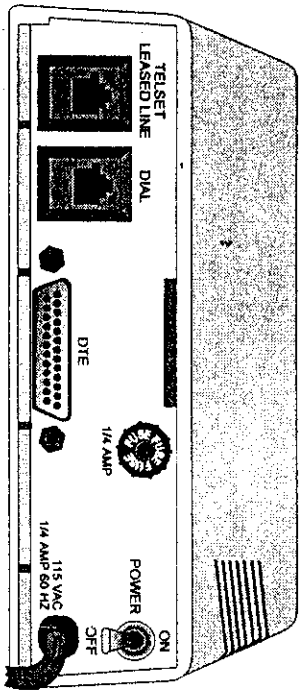Typical Front Panel for "L" Model

Figure 1-3
Rear Panel

Standard and "L" Models

The modem is available in two models: the standard and the "L" models. The "L" model does not have the LCD and pushbutton control panel so these functions are controlled by the AT command set. The "L" model also has an additional TALK LED and TALK/DATA pushbutton. The LED is on in talk mode and off in data mode; the pushbutton selects between the two modes.

HOW TO USE THIS MANUAL

Most of the manual text applies to both the standard and the "L" products. Users of the non-LCD model can avoid Chapter 3 and smaller discussions of LCD and pushbutton operation throughout the manual. Discussions of LCD and pushbutton operation, however, do include valid operating information and can be consulted as desired.

Specifications

Modem specifications are listed in Appendix A.

Option Selection

Six methods of selecting or changing modem options are available. The major portion of this manual consists of the descriptions for using each method. The user need only be concerned with the method selected.

• LCD - Using the front panel LCD and pushbuttons for changing modem options is simple, straightforward, and requires the least amount of technical background.

• Software program - A wide variety of communication software programs is available, or advanced computer users can write their own software programs that will interact with the modem memory to select options.

• AT Commands - The AT compatible command set can be used to select modem options.

• S-Registers - A series of special ATS commands allows the operator to change the decimal or hexadecimal value of a memory byte thereby changing one or more options in that byte.

• Single Bit S-Registers - A second series of special ATS commands allows the user to change single bits within a byte thereby changing an option.

• V.25 bis Commands - A set of V.25 bis commands allows selection of modem options during synchronous operation.

Chapter 3 provides detailed information on using the LCD method. Chapters 5 and 6 provide detailed information on using the AT command and the S-register methods. Chapter 7 provides detailed information for using the V.25 bis commands. The software program method for option selection is not discussed in this manual.

Quick Startup

> *Note: Option selection via the LCD can be made without the DTE or phone line connected.*

A quick startup procedure at the beginning of Chapter 4 provides information for quickly getting online.

GENERAL

This chapter provides information for the mechanical and electrical installation of the modem.

SITE SELECTION

Install the modem within 6 feet of a 115 or 230 Vac grounded outlet as required for the specific model and no farther than 50 feet from the terminal equipment.

The installation area should be clean and free from extremes of temperature, humidity, appreciable shock, and vibration. Refer to Appendix A for details. Allow clearance for operation and maintenance access and at least 4 inches at the rear for cables and air flow.

Tools Required

Normal installation requires a screwdriver to secure the data terminal equipment (DTE) cable to the modem and to attach the Telco cable to the phone jack for leased line operation.

Receipt Inspection

After unpacking the equipment, check the contents against the packing list. Inspect the equipment for any damage that may have occurred in shipment. If any damage or equipment shortage is noted, refer to the warranty literature. Keep the shipping container and material for future shipment.

ELECTRICAL INSTALLATION

The rear panel (Figure 2-1) houses the power cord and receptacles for interfacing the modem to the DTE and telephone lines.
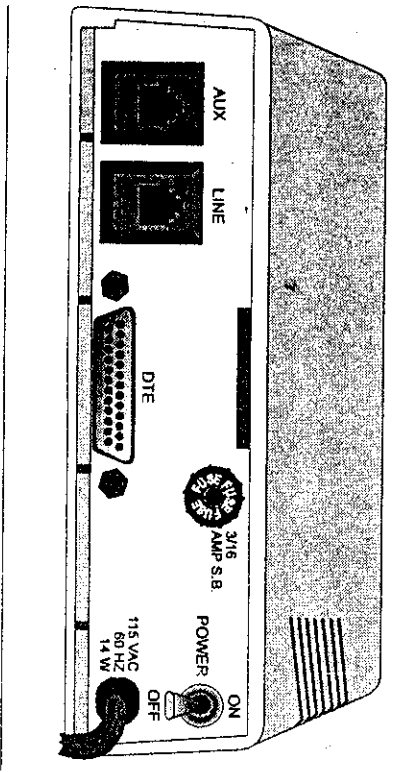
Figure 2-1
Rear Panel I/O

AC Power Connection

Power is supplied through a 6-foot line cord with a grounded 3-wire plug. If chassis ground is available through the third prong of the plug, a separate ground wire is not required.

Caution: To protect the DC to DC converter from reverse polarity damage, ensure the positive and negative leads are properly connected.

The modem can be ordered for DC power input. Connect 12 to 60 Vdc power to the terminal block attached to the modem back panel. A chassis ground connection is also supplied on the terminal block.

DTE CONNECTION

The DTE connector is a 25-pin D-series type conforming to EIA-232 specifications. The digital interface signals are illustrated in Figure 2-2 and described in Table 2-1.
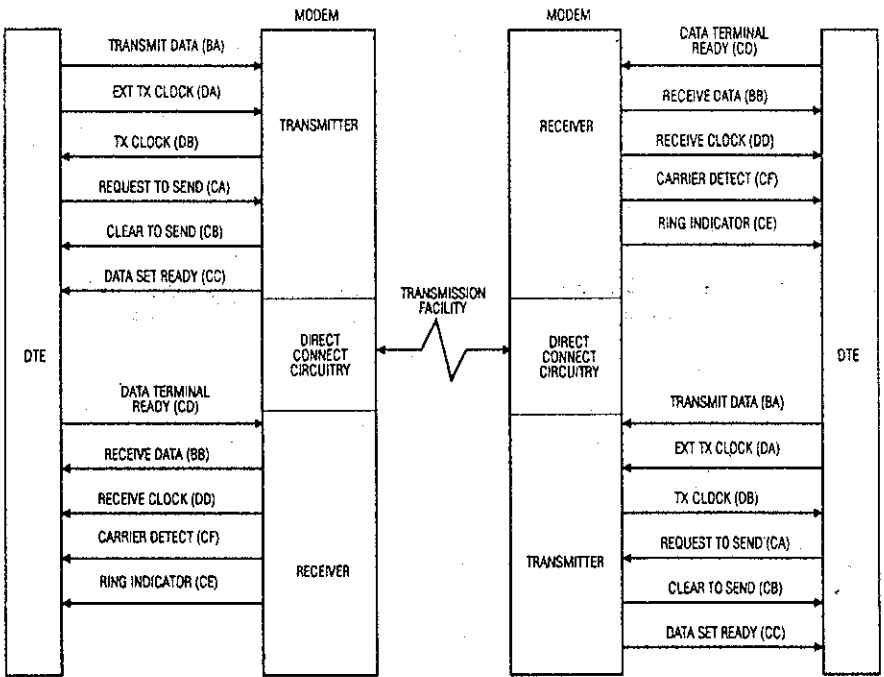
Figure 2-2
Digital Interface Signals

Table 2-1
Digital Interface Signal Descriptions

Pin No.	EIA-232D	CCITT V.24	Signal Name	Description
1		101	≶ Shield	No connection
2	BA	103	Transmitted Data	Serial digital data (to be modulated) from a data terminal or other digital data source. Synchronous data must be accompanied by the modem transmit clock (pin 15) or by an external data rate clock (pin 24). Data transitions should occur on positive-going clock transitions; asynchronous data does not require a transmit clock.
3	BB	104	Received Data	Serial digital data output to the DTE interface. Sync data is accompanied by an internal data rate (receive) clock (pin 17) that has positive-going transitions on the data transition. Async data does not require a receive clock.
4	CA	105	Request to Send	A positive level to the modem when data transmission is desired.
5	CB	106	Clear to Send	A positive level from the modem in response to request to send and when the modem is ready to transmit.*
6	CC	107	Data Set Ready	A positive level from the modem when power is on and ready to operate. In dial-up operation, the modem must be off hook to give a high DSR signal.*
7	AB	102	Signal Ground or Common Return	Common signal and DC power ground.
8	CF	109	Received Line Signal Detector	A positive level from the modem indicating the presence of a received signal (carrier detect).*
9			+12 Volts	+12 voltage reference
10			-12 Volts	-12 voltage reference

* Modem options may force these signals on or cause them to be ignored.

Table 2-1
Digital Interface Signal Descriptions, continued

Pin No.	EIA-232D	CCITT V.24	Signal Name	Description
11			Signal Quality Indicator	This circuit indicates probability of errors in the received data: a positive level indicates poor signal quality while a negative level indicates good signal quality. †
15	DB	114	Transmit Clock (DCE)	A transmit data rate clock output for use by an external data source. Positive clock transitions correspond to data transitions.
17	DD	115	Receive Clock	A receive data rate clock output for use by an external data sink. Positive clock transitions correspond to data transitions.
18		141	Local Loopback (Loop 3) Control	A positive level causes the modem to enter the local analog loopback test mode.
20	CD	108.2	Data Terminal Ready	This circuit is positive when the DTE is ready to originate or answer a call in dial-up operation. DTR must always be active (high) in 2-wire private line operation. Cycling DTR causes retraining.*
21		140	Remote Digital Loopback	A positive level causes a digital loopback test mode at the remote modem.
22	CE	125	Ring Indicator	In direct dial operation this circuit is positive in response to an incoming ring signal.
23	CH	111	Data Rate Select	Supplies a data rate control input to select primary or fallback data rate: Negative voltage selects primary data rate and positive voltage selects fallback data rate.
24	DA	113	External Transmit Clock	A serial data rate clock input from the data source. Positive clock transitions correspond to data transitions.
25		142	Test Mode	Indicates the modem is in a test mode.

* Modem options may force these signals on or cause them to be ignored.
† This function can be disabled or its logic sense reversed by hardware straps. Refer to Strap Options.

TELEPHONE CABLES

The cables used for connection between the modem and the various Telco jacks are illustrated in Figure 2-3. The part number is printed on the cable near one end.

PART NUMBER	MODEM CONNECTION	MECHANICAL LAYOUT	TELCO CONNECTION	TELCO JACK
61020202-0301	8-PIN Pins 4 and 5 connected	← 6 FEET → 2-WIRE CABLE	6-PIN Pins 3 and 4 connected	RJ11C PERMISSIVE
61020192-0301	8-PIN Pins 3-8 connected	← 6 FEET → 6-WIRE CABLE	8-PIN Pins 3-8 connected	RJ41S (PROG ONLY) RJ45S PROGRAMMED
61020569-0000	8-PIN Pins 1,2,7,8 connected	← 6 FEET → 4-WIRE CABLE	4-SPADE LUG	LEASED LINE CABLE FOR USE WITH 42A BLOCK
61020576-0000 NOT SUPPLIED WITH MODEM	8-PIN Pins 1,2,7,8 connected	← 6 FEET → 4-WIRE CABLE	8-PIN Pins 1,2,7,8 connected	LEASED LINE CABLE FOR USE WITH JM8 JACK

Figure 2-3
Telephone Cables

TELEPHONE LINE CONNECTION

The modem operates in one of three modes:

- Permissive (PSTN)
- Programmable (PSTN)
- Private line

Permissive and programmable modes are used on the dial-up Public Switched Telephone Network (PSTN). Private line mode is used on 4-wire or 2-wire dedicated leased lines. The user must decide which mode to use and then select the telephone jack arrangement accordingly.

Modems must be registered by the Federal Communications Commission (FCC) for direct connection to the PSTN. The label on the chassis bottom gives the FCC registration number and other information.

PSTN Connection

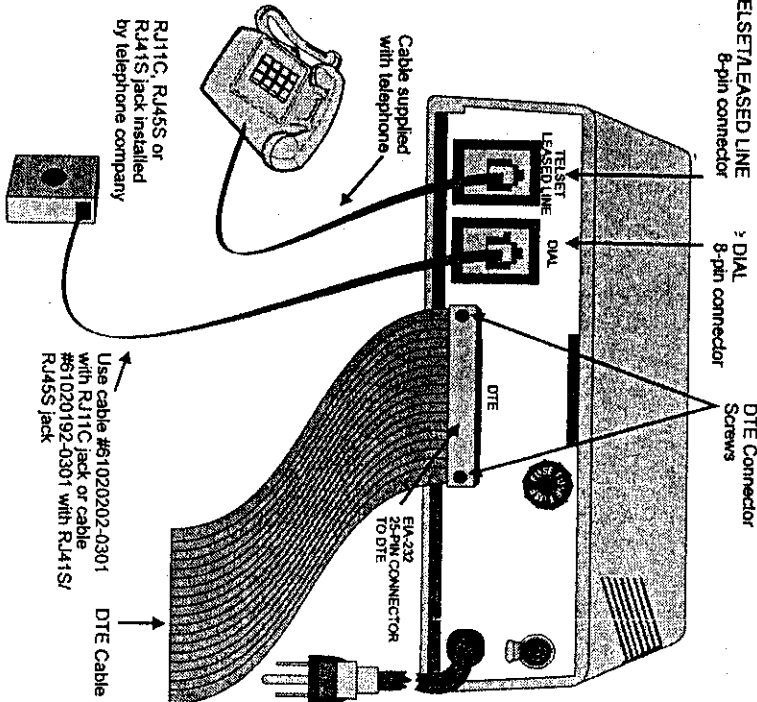Direct connection to the PSTN provides two modes of operation (Figure 2-4):

- Permissive
- Programmable

Permissive

In permissive mode, the modem transmits a maximum signal level of -9 dBm. Signal loss between the modem and telephone company central office is not controlled. Jack arrangements for this mode are the RJ11C for standard telephones and the RJ16X for exclusion key telephones. Cable PN 61020202-0301 is used to connect the DIAL jack on the back of the modem to the RJ11C or RJ16X wall jack.

Programmable

Programmable mode corrects for the signal level loss between the modem and the telephone company central office. This is done by setting the modem transmit output signal level with a fixed-value programming resistor selected and installed in the jack by the telephone company. This allows the output signal to reach the central office at the optimum level of -12 dBm. Jack arrangements for this mode are the RJ45S and RJ41S. RJ41S has a switch

option that must be selected to Programmed (P). Cable PN 61020192-0301 is used to connect the DIAL jack on the back of the modem to the RJ41S or RJ45S wall jack.

TELSET/LEASED LINE
8-pin connector

DIAL
8-pin connector

DTE Connector Screws

Cable supplied with telephone

RJ11C, RJ4SS or RJ41S jack installed by telephone company

TELSET
LEASED LINE

DIAL

DTE

EIA-232 25-PIN CONNECTOR TO DTE

Use cable #61020202-0301 with RJ11C jack or cable #61020192-0301 with RJ41S/RJ4SS jack

DTE Cable

Notes:

1. A TELSET jack is provided on the back of the modem for use with a standard rotary or tone dial telephone regardless of the telephone jack arrangement ordered from the telephone company.

2. This standard rotary or tone dial telephone set can be used for originating a call or for voice communication. For sites requiring only autoanswer capability, a phone is not needed.

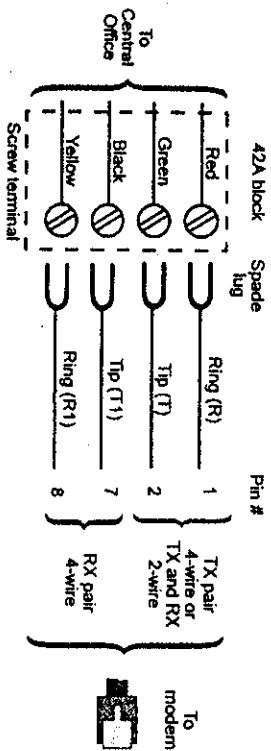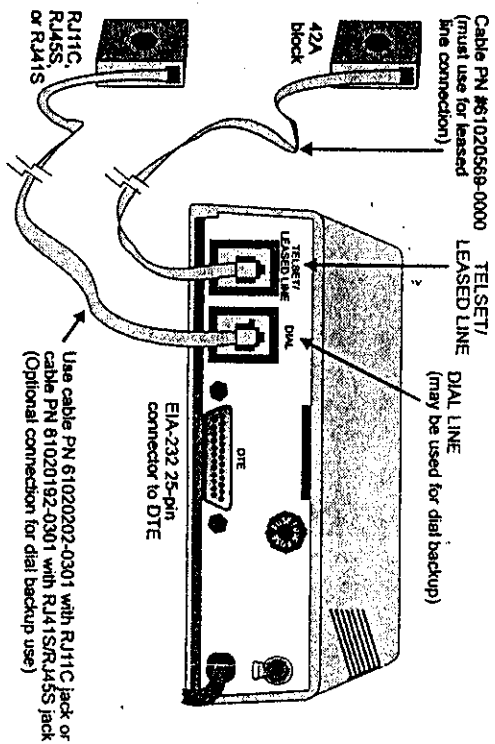*Figure 2-4*
Permissive or Programmable Connection

> *Note: The modem is compatible with exclusion key phone arrangements.*

Leased Line Connection

Leased lines use either a 2-wire or 4-wire connection. The telephone company will install the leased line and wall jack at your site. The line connects to the modem at the 8-position TELSET / LEASED LINE jack.

The 42A block is most common for leased line use. It requires the use of the 8-pin modular to spade lug cable (PN 61020569-0000). Figure 2-5 illustrates the typical hook-up of the modem for operation over private leased lines with dial backup.

> *Note: Some Bell operating companies have discontinued the 42A block for leased line terminations. Instead, the modular jack JM8 is used. If this is the case in your area, you need a special cable (PN 61020575-0000). Contact your distributor for further information.*

Cable PN #61020569-0000
(must use for leased
line connection)

42A
block

RJ11C,
RJ45S,
or RJ41S

TELSET/
LEASED LINE

DIAL LINE
(may be used for dial backup)

Use cable PN 61020202-0301 with RJ11C jack or
cable PN 61020192-0301 with RJ41S/RJ45S jack
(Optional connection for dial backup use)

TELSET/
LEASED LINE

DIAL

EIA-232 25-pin
connector to DTE

DTE

42A block

Spade lug	Pin #	
Red — Ring (R)	1	TX pair 4-wire or TX and RX 2-wire
Green — Tip (T)	2	
Black — Tip (T1)	7	RX pair 4-wire
Yellow — Ring (R1)	8	

To
Central
Office

Screw terminal

To
modem

Notes:

1. Set the transmit output level to 0 dBm.
2. The LCD must show IDLE.
3. DTR, which is the signal on pin 20 of the DTE interface, must be active or the option DTR IGNORED must be set for 2-wire leased line operation.
4. The connection shown includes dial backup. Connect only the 42A block to the TELSET/LEASED LINE jack for regular leased line use.

Figure 2-5
Leased Line Connection