

Special Requirements for Canada

The following requirements exist for Universal Data Systems modems manufactured for use in Canada:

Department of Communications (DOC) Requirements:

DOC stamps are affixed to the rear of each standalone unit sold in Canada. Card modems which are installed in the user's equipment are shipped with a stamp included. The user should place the stamp on the outside of his equipment as close as possible to the telephone line connector. This stamp has the UDS registration number for that particular unit. The numbers are different for each modem model.

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. For their own protection users should ensure 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.

CAUTION

Users should not attempt to make installation connections themselves, but should contact the appropriate electric inspection authority or electrician.

DOC Connector Codes:

MODE	CODE
Permissive	CA12
Programmable	CA47A
Private Line	CA02A

Canadian Standards Association (CSA) Requirements:

The Universal Data Systems CSA number and CSA logo are on the rear panel or a tag contains this information. The CSA number for Universal Data Systems is LR 50893.

CSA requirements apply only to standalone modems, not to card modems.

With these exceptions, all units perform exactly as described in the manual.

PREFACE

This manual is written for users of the 202S/T modem. Please read it before operating the modem. This manual includes the following:

- **Chapter 1** Introduction - Contains introductory information and equipment specifications;
- **Chapter 2** Installation - Contains instructions for mechanical and electrical installation of the modem;
- **Chapter 3** Operation - Describes modem operation and test procedures;
- **Chapter 4** Principles of Operation - Provides functional descriptions of the modem transmitter, receiver, and interface circuits;
- **Chapter 5** Pin Functions - Describes the DTE connector functions;
- **Appendix A** Specifications;
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- **Warranty**
- **Registration Card**



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Chapter 1 Introduction

GENERAL

The 2025/T, shown in Figures 1-1 and 1-2 is a frequency-shift keyed (FSK) modem designed for asynchronous operation at rates up to 1200 bps. The modem connects directly to the telephone network through the appropriate Universal Service Operating Code (USOC) plug and jack arrangements. The unit also operates in 2-wire or 4-wire mode on private leased lines.

The modem allows manual/automatic answer on the public switched telephone network (PSTN). You will need to use the telephone connected with the modem for manual answer.

The 2025/T-R (Figure 1-3) is a 2025/T with a secondary channel plug-in card installed which allows operation at 0 to 5, 0 to 75 or 0 to 150.

Another optional plug-in board is available which will allow synchronous operation. With the addition of the plug-in board, the modem will operate 0 to 1200 baud asynchronous and 600 or 1200 baud synchronous.

NOTE

Only one plug-in card can be installed at one time.

DESCRIPTION

The 2025/T is a standalone unit consisting of a pc board (and a secondary channel plug-in board for the 2025/T-R), an enclosure, and interface connectors. The interface connectors connect to the telephone line, telephone set, data terminal equipment and primary power. The front panel has a mode switch and nine LEDs. The switch is normally left in the DATA position. It is placed in the TALK position for manual answer or manual call origination.

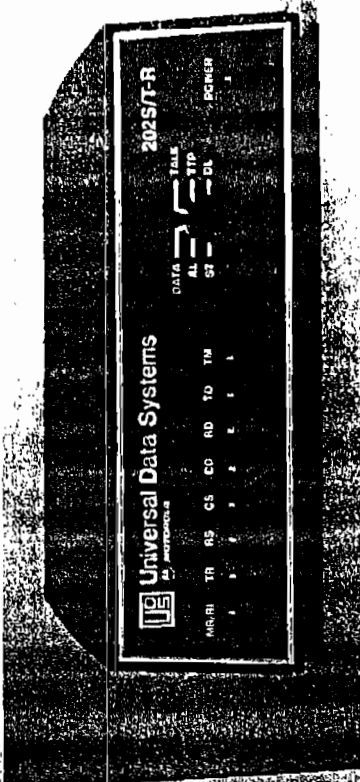


Figure 1-3
2025/T-R

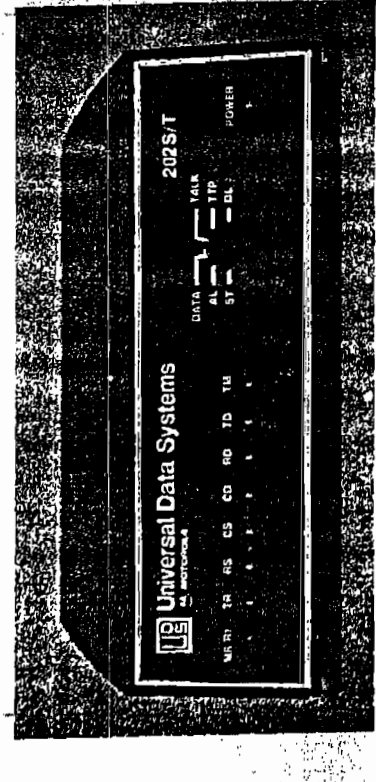


Figure 1-1
2025/T Modem

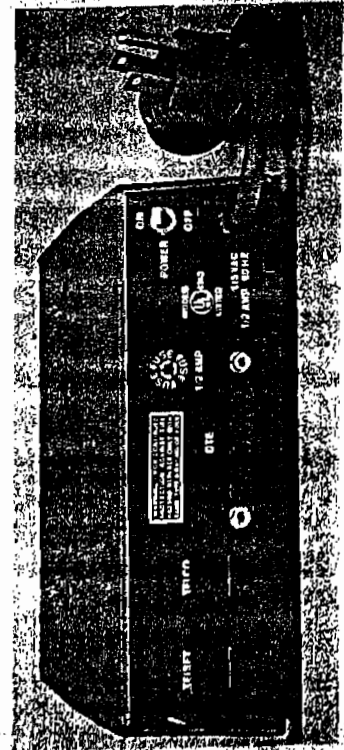


Figure 1-2
Rear Panel

Chapter 2 Installation

This chapter provides the information you need to install the unit. After you complete the installation, refer to Chapter 3 for operation information and system checkout to assure normal operation.

After unpacking the equipment, check the contents against the packing list. Inspect the equipment carefully for damage that may have occurred in shipment. If there is damage or material shortage, contact the shipper's agent and Universal Data Systems for advice and assistance. UDS suggests that you keep the shipping container and packing material for future shipment.

The installation area should be clean, well lighted, and free from extremes of temperature, humidity, appreciable shock, and vibration. No special tools or test equipment are required for installation.

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

The modem is designed for placement on a table top or bench and arrives at the site completely assembled.

The data terminal equipment interfaces to the modem by way of the DTE connector (25-pin, located at rear panel). The pin functions are explained in detail in Chapter 5.

GENERAL

RECEIPT INSPECTION

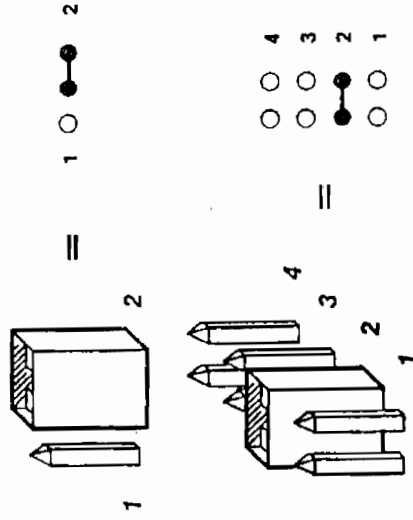
SITE PREPARATION

INSTALLATION

DATA TERMINAL EQUIPMENT (DTE) CONNECTION

Replace the cover by aligning front and rear guide grooves, then the lock tabs in the slots and press until they engage.

Figure 2-2 shows a typical strap application. Figures 2-3, 2-4, and 2-5 show the positions of the straps and switches on the pc boards.



Strapped to position 2

Figure 2-2
Typical Strap Application

HARDWARE STRAP OPTIONS

Because of the versatile nature of the 2025/T modem, several decisions must be made before installation. Proper operation is only possible if you choose the correct options. Carefully read the following strapping information before operating the modem.

Removing Cover

To select or inspect options, remove the modem cover.

CAUTION

Do not remove the cover unless the power cord is unplugged.

Stand the unit on its side with the bottom facing you. Release the cover by pressing the locking tabs through the slots with your thumbs (Figure 2-1). Repeat this with the tabs on the other side and remove the cover. The cover is inscribed "FRONT" on the underside.

CSA SECURITY REQUIREMENTS

On modems sold in Canada, security latches are inserted alongside two of the locking tabs. To disengage those locking tabs, the security latches must first be pried out with a small screwdriver.



Figure 2-1
Cover Removal

2 Installation

2 Installation

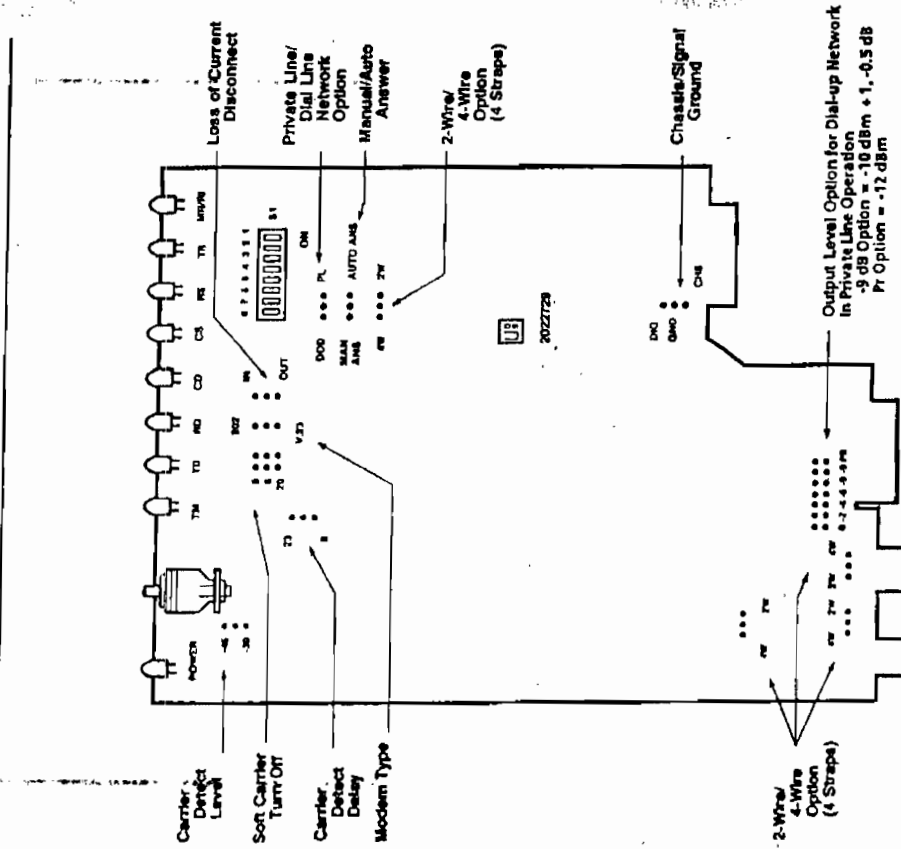


Figure 2-3
2025T Option Strap Locations

Modem Type

The modem may be operated as a 202S type modem or as a V.23 type modem. The strap is labeled "V.23" or "202". In V.23 mode, the modem is V.23 compatible in frequency only.



202S type modem selected

Loss of Current Disconnect Option

The recommended procedure for call termination is to turn off the DTR signal to the modem. As an option, the modem offers a loss of current disconnect. This option is not recommended as a primary disconnect method since some central offices do not give an indication of far-end disconnect.



Loss of current disconnect enabled selected

2 Installation

Output Level Option

The modem may be operated on a PSTN line that has a programmable or a permissive data jack. If the data jack is programmable, the strap can be set to the PR position. If the data jack is permissive, the strap should be set to the -9 dBm position. If the modem is operated on private lines, the strap may be set to the 0, -2, -4, -6, -8, -9 or PR position. In private line operation, the -9 position will set the output level to -10 dBm + 1, -0.5 dBm. The PR position will set the output level to -12 dBm.

	●—●	PR
Use with	○ ○ ○	-9
programmable	○ ○ ○	-8
data jack selected.	○ ○ ○	-4
(-12 dBm)	○ ○ ○	-2
	○ ○ ○	0

NOTE

Earlier versions of the board may have only the 0, -4, -6, -9 and PR options.

Private Line/Dial Line Network Option

The modem may be operated on the switched dial-up network (DDD) or private leased lines. Strap to DDD for dial-up lines and PL for leased line operation.

DDD	PL
●—●	○

Dial up line selected

Automatic or Manual Answer

The modem will automatically go off hook when an incoming ring is detected if DTR is on and the strap is set to the AUTO position. If the strap is set to the MAN position, the line must be answered with the associated telephone set.

MAN	AUTO
ANS ○ ●—●	ANS

Auto answer selected

2-Wire/4-Wire Option (4 straps)

The modem may be operated on the 2-wire dial-up network or on 2-wire or 4-wire private leased lines. Set all four straps to the 2W position if you are operating on the dial-up network or on a 2-wire private line. If you are operating on a 4-wire private line, set all four straps to the 4W position.

4W ○ ●—●	2W
----------	----

2-wire dial or private line selected

Carrier Detect Receive Level

The modem receiver carrier detect circuit can be set to respond to signals in the 0 to -30 dBm range or 0 to -45 dBm range. If the incoming signal is above -24 dBm, the -30 dBm position may be selected. If the modem is operated on the switched dial network, the -45 dBm position should be selected.

●—●	-45
○	-30

-45 dBm selected

2 Installation

Soft Carrier Turn Off

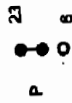
The transmitter may turn off immediately upon the release of Request To Send or may send a soft carrier turn off signal of 900 Hz at the end of each transmission. The times are 0, 8, or 20 ms.

- 0
- 8
- 20

SCTO time is 0 ms
no signal is sent

Carrier Detect Delay

Two choices of Carrier Detect Delay timing are available. The delay chosen must be consistent with the CTS delay option and must be less than the CTS delay. The delays are 6 ms and 23 ms. The carrier detect drop-out time is 6 ms.



CD delay of 23 ms selected

SWITCH CONTROLLED OPTIONS

The remaining options on the modem are controlled by the 8-position DIP switch S1 located on the main board.

CAUTION

Use only the switch combinations shown. Other combinations could cause the equipment to malfunction.

2 Installation

RTS/CTS Delay

Set switch S1 as shown in Table 2-1.

Delays	S1-1	S1-2	S1-3	S1-4
0 ms	OFF	OFF	OFF	OFF
8 ms ± 1 ms	ON	OFF	OFF	OFF
30 ms ± 3 ms	OFF	ON	OFF	OFF
60 ms ± 6 ms	OFF	OFF	ON	OFF
180 ms ± 18 ms	OFF	OFF	OFF	ON

Table 2-1
RTS/CTS Delays

Turnaround Receive Squelch

The receiver will be inhibited for a period of time after the local transmitter is turned off if switches S1-5 and S1-6 are on. Refer to Table 2-2.

Squelch Delay	S1-5	S1-6
0 ms	OFF	OFF
8.7 ms	ON	OFF
156 ms	OFF	ON

Table 2-2
Turnaround Receive Squelch

Local Copy Squelch

When the Local Copy Squelch option is on, the receiver is inhibited during local transmission of data.

Switch S1-7 On = Local copy squelch
S1-7 Off = Local copy of transmitted data

Satellite Delay Option

This option allows the user to set a time delay of 426 ms between the transmission of answer tone and Data Set Ready signal. If S1-8 is On the delay will occur.

Switch S1-8 On = Delay of 426 ms
Off = No delay

SECONDARY CHANNEL STRAP OPTIONS

The 2025/T becomes a 2025/T-R when one of two secondary channel plug-in boards is installed. Plug-in board 2022819 has an 8-position switch, S1, and a 4-position switch, S2, used to select the options for the secondary channel. Plug-in board 2023266 has an additional 4-position switch, S3, used to select a call-waiting option. The switches are mounted at the edge of the plug-in board and can be set without removing it. See Figures 2-4 and 2-5 for the locations of the straps and switches.

Secondary Channel Type

The secondary channel plug-in board can be configured to be 5 baud reverse channel, a 0 to 75 baud secondary channel, or a 0 to 150 baud secondary channel. The switch settings to configure the secondary channels are shown in the following tables.

CAUTION

Use only the switch combinations shown. Other combinations could cause the equipment to malfunction.

0 to 75 Baud CCITT Frequency Mode:

S1-6	S1-5	S1-4	S1-3	S1-2	S1-1
OPEN (off)	CLOSED (on)	CLOSED (on)	OPEN (off)	OPEN (off)	OPEN (off)

Table 2-3
Switch S1

S2-4	S2-3	S2-2	S2-1
*	*	CLOSED (on)	OPEN (off)

* Transmit level, Table 2-8
Table 2-4
Switch S2

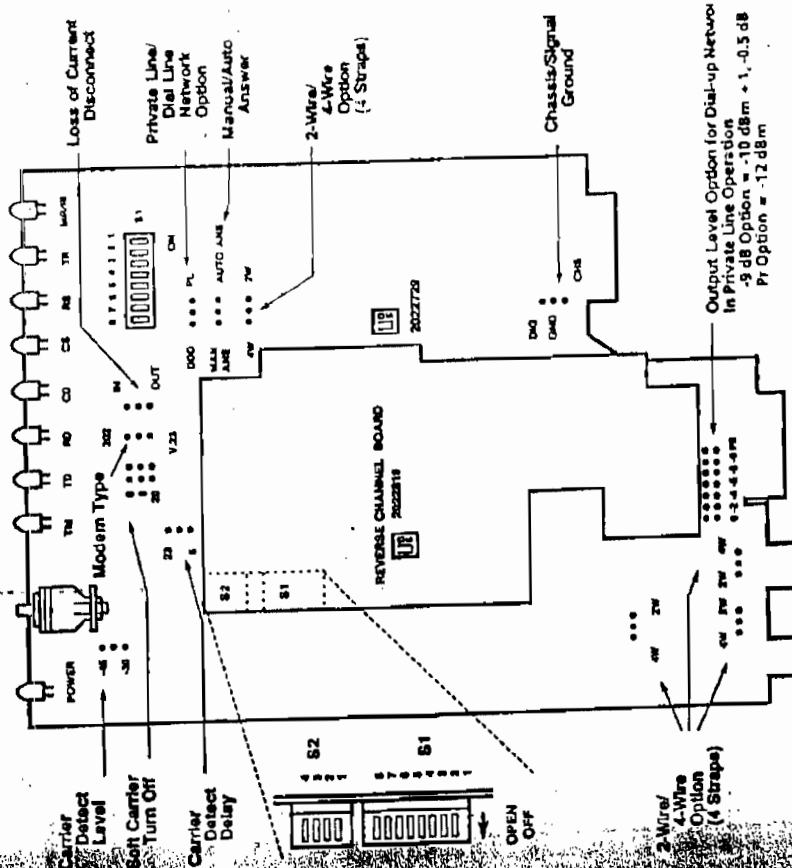
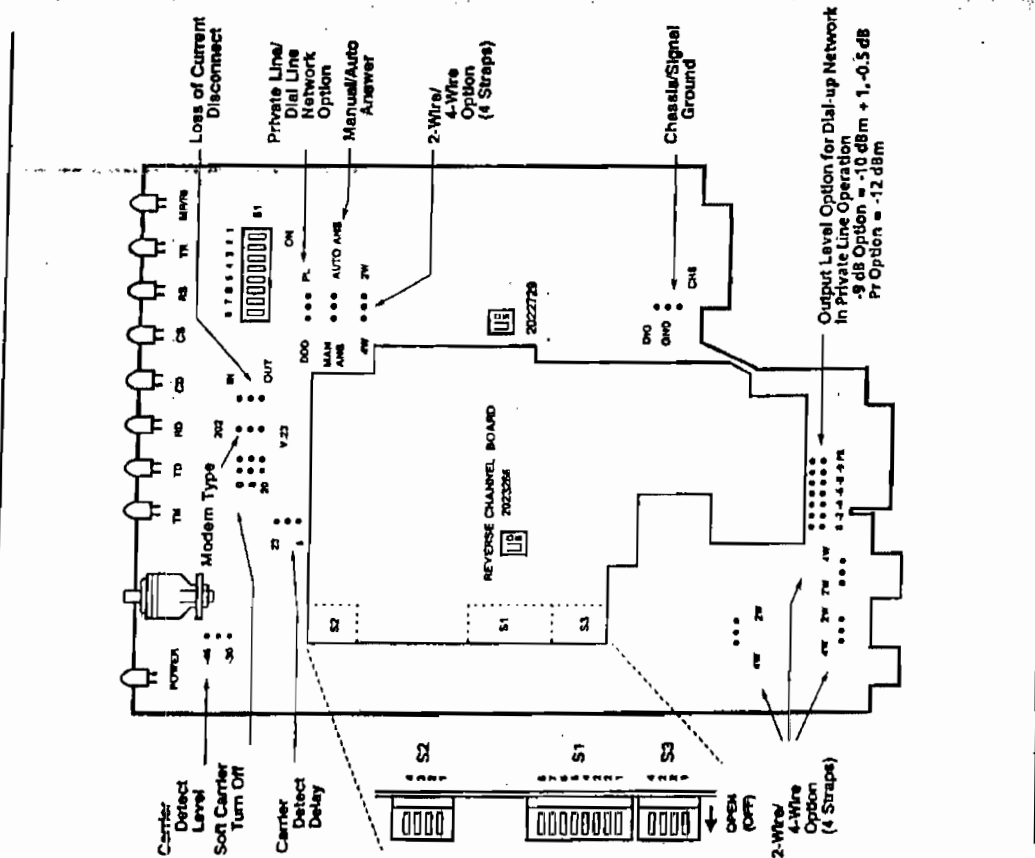


Figure 2-4
2025/T-R (2022819) Option Selection Locations

Figure 2-5
2025/T-R (2023266) Option Selection Locations



2 Installation

0 to 150 Baud Mode:

S1-6	S1-5	S1-4	S1-3	S1-2	S1-1
OPEN (off)	CLOSED (on)	CLOSED (on)	OPEN (off)	OPEN (off)	OPEN (off)

Table 2-5
Switch S1

S2-4	S2-3	S2-2	S2-1
*	*	OPEN (off)	OPEN (off)

* Transmit Level, Table 2-8
Table 2-6
Switch S2

Reverse Channel Control

The reverse channel control is determined by the settings of S1. The switch settings and control mode are shown in Table 2-7.

S1-6	S1-5	S1-4	S1-3	S1-2	S1-1	Control Mode
CLOSED (on)	OPEN (off)	OPEN (off)	CLOSED (on)	OPEN (off)	OPEN (off)	Secondary RTS controls carrier
CLOSED (on)	OPEN (off)	OPEN (off)	OPEN (off)	OPEN (off)	CLOSED (on)	Primary channel RTS controls reverse channel carrier. When RTS is off, reverse channel transmitter is on; when RTS is on, reverse transmitter is off.
CLOSED (on)	OPEN (off)	OPEN (off)	OPEN (off)	CLOSED (on)	OPEN (off)	Primary channel carrier detect controls reverse channel transmitter. When CD is on, the reverse channel transmitter is on; when CD is off, the reverse channel transmitter is off.

Table 2-7
Reverse Channel Control

Transmit Level

The output level can be -3 dBm or -6 dBm. The level is referenced to the primary transmitter output level strap selection. The option is set by S2-3 and S2-4 (refer to Table 2-8).

S2-4	S2-3	Output Level
OPEN (off)	CLOSED (on)	-3 dBm
CLOSED (on)	OPEN (off)	-6 dBm

Table 2-8
Transmit Level

Local Copy Squelch and Turnaround Squelch

When Local Copy Squelch is on, the receiver is inhibited during local transmission of secondary data. Turnaround Squelch inhibits the receiver for 110 ms after transmission has ended. Refer to Table 2-9.

Local Copy Squelch	Turnaround Squelch	S1-8	S1-7
No	No	OPEN (off)	OPEN (off)
Yes	No	CLOSED (on)	OPEN (off)
No	Yes	OPEN (off)	CLOSED (on)
Yes	Yes	CLOSED (on)	CLOSED (on)

Table 2-9
Squelch Selection

Call Waiting Option

The call waiting option is available only with the 2023266 secondary channel board. The option is used to prevent secondary carrier detect (SCD) from going low for the time set with switch S3 if there is an interruption in the connection.

CD Fallout	S3-1	S3-2	S3-3	S3-4
15 ms	CLOSED (on)	OPEN (off)	OPEN (off)	OPEN (off)
0.5 sec	OPEN (off)	CLOSED (on)	OPEN (off)	OPEN (off)
10 sec	OPEN (off)	OPEN (off)	CLOSED (on)	OPEN (off)
1.5 sec	OPEN (off)	OPEN (off)	OPEN (off)	OPEN (off)

Table 2-10
Call Waiting Option

SYNCHRONOUS OPTIONS

The 2025T will operate either asynchronously, or synchronously with the addition of a synchronous plug-in board (2023096). The 2025T-R does not allow synchronous operation.

The plug-in board has a four-position dip switch to select either 600 baud or 1200 baud operation. The switch is mounted at the edge of the plug-in board and can be set without removing the plug-in board (Figure 2-6). All switches are set to the up position for 600 baud operation. All switches are set to the down position for 1200 baud operation.

2 Installation

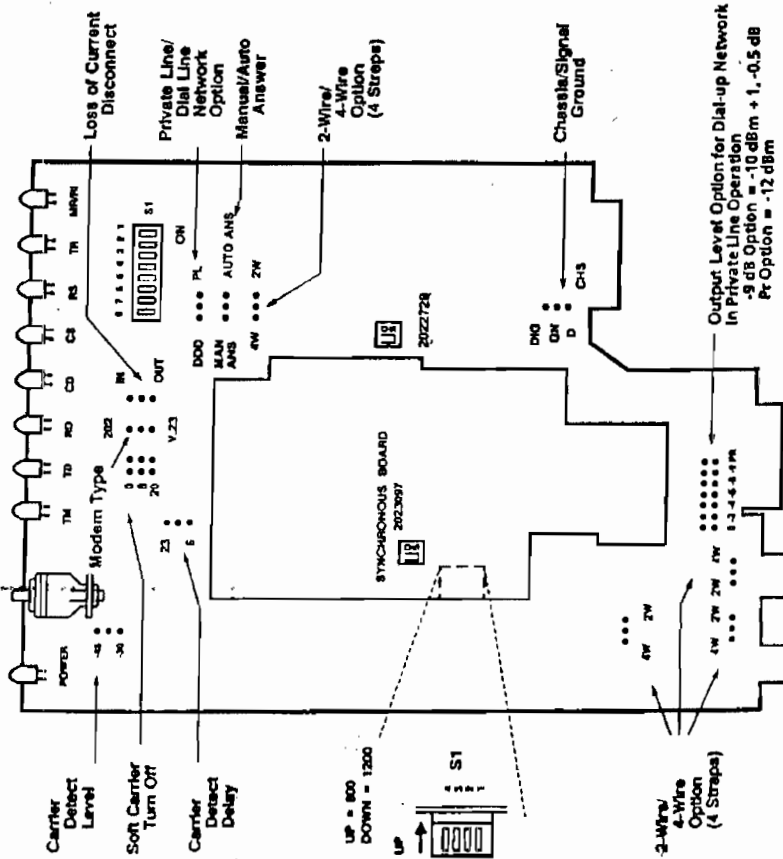


Figure 2-6
2025/T-5 Option Selection Locations

2 Installation

Option	PSTN Network	Private Line
2-wire/4-wire	2-wire	4-wire
Output Level	-9 dBm	0 dBm
Chassis/Sys Gnd	OUT	OUT
Modem Type	202	202
Loss of Current Disconnect	OUT	OUT
Private Line or PSTN	DDD	Private Line
Automatic or Manual Answer	Automatic	Manual
Carrier Detect Receive Level	-45 dBm	-45 dBm
Carrier Detect Delay	23 ms	6 ms
RTS/CTS Delay	180 ms	30 ms
Turnaround Receive Squelch Time	156 ms	0 ms
Local Copy Squelch	IN	OUT
Satellite Delay	OUT	OUT
Soft Carrier Turnoff Delay	20 ms	8 ms

Secondary Channel Options		
Option	PSTN Network	Private Line
Secondary Channel Type	0 to 75 Baud	0 to 75 Baud
Reverse Channel Control	Secondary RTS Control	Secondary RTS Control
Transmit Level	-3 dBm	-3 dBm
Local Copy Squelch	IN	OUT
Turnaround Squelch	IN	OUT

Table 2-11
Recommended Strap Option Settings

Adjust the option settings as needed to meet your system requirements



Chapter 3 Operation

GENERAL

This chapter describes operating procedures, system tests, and indicator functions.

CONTROLS AND INDICATORS

Rotary Switch

The LED indicators on the front of the modem show the operating status of the modem. The rotary switch selects modem operating modes.

The six-position rotary switch on the front panel controls the diagnostic tests of the 2025/T which are detailed later in this chapter. The TALK position connects the Telset jack to the Telco connector and disconnects the modem from the line. (Note: The ring indicator circuit of the modem is still active in TALK mode.) When the switch is changed from TALK to DATA, the modem will go off hook if the DTR line is on. The switch must be in the DATA position for all normal data transmissions and for Auto Answer mode.

Indicators

The operation of the modem can be monitored with the nine LED indicators that reflect the state of the important EIA-232C signals. The LEDs are listed below:

PWR	On when power is applied to modem
MR/RI	On when the modem is in DATA mode. Flashes for incoming ring.
TD	On when the EIA-232C TD line is in a space condition
RD	On when the received data line is in a space condition

3 Operation

- CD On when a valid carrier is received by the modem
- TR On when the DTR line is on
- RS On when the RTS line is on
- CS On when the CTS line is on
- TM On when the modem is in a test mode. Flashes off for errors when in Self Test mode.

SYSTEM TEST AND FAULT ISOLATION

Function Switch

During normal operation, ensure the rotary switch is in the DATA position.

TALK

Used when a telephone set is connected to the Telset jack. In this position, the telephone line from the Telco jack is connected to the Telset jack.

When the telephone plugs into the Telset jack, the operation is as follows:

- Place switch in TALK position
- Use the telephone set in usual manner
- After normal use, if DATA mode is desired, place the switch in the DATA position. If DATA mode is not desired, hang up the telephone.

DATA

The switch must be in the DATA position for all normal data transmission or automatic answering of calls. The circuitry on the modem allows the telephone to ring on an incoming call if the switch is in TALK or DATA positions.

3 Operation

Analog Loopback (AL)

In the AL position, the modem can be tested by the local terminal device. See Figure 3-1

The OH relay is forced on, which makes the modem appear busy to incoming calls. The transmitter output of the modem is disconnected from the output coupling transformer and connected to the modem receiver input.

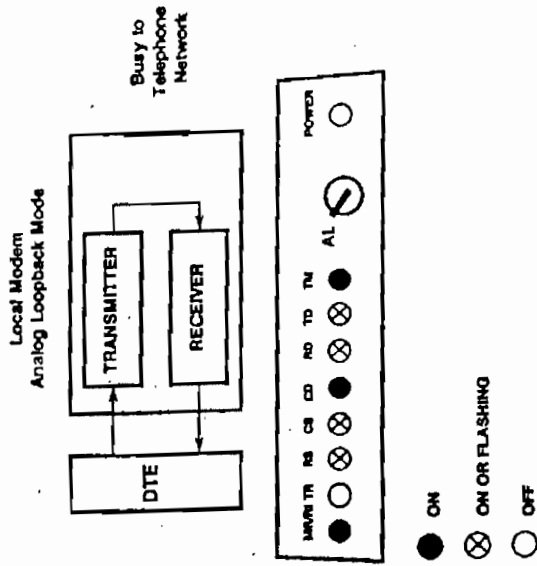


Figure 3-1
Analog Loopback Test

3 Operation

Self Test (ST)

In Self Test mode, the modem performs internal diagnostic procedures. The modem transmitter is disconnected from the output coupling transformer and connected to the modem receiver input. An internal data pattern is generated by the transmitter and monitored by the receiver. If there is an error, the test mode lamp will be turned off for 1 second and the test will continue. See Figure 3-2.

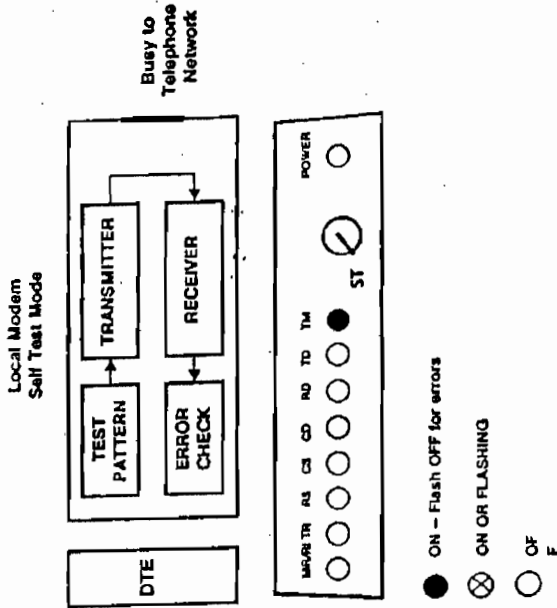


Figure 3-2 Self Test

3 Operation

Transmit Test Pattern (TTP)

In the TTP position, the modem is conditioned to look for an incoming ring, go off hook, remain quiet for 2 seconds, send 2 seconds of answer tone, and begin transmitting an alternate pattern at a 50 baud rate. The TM indicator is turned on. See Figure 3-3.

For leased line operation, the modem transmits the test pattern continuously when the switch is in the TTP position.

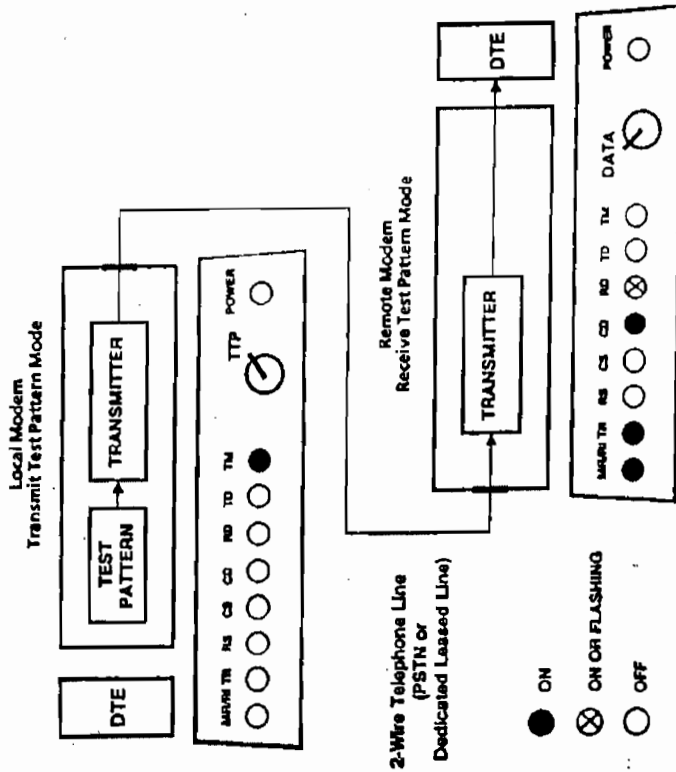


Figure 3-3 Transmit Test Pattern