202T

INSTALLATION AND OPERATION

Document No. 6202519702004
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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 A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial 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.

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SPECIAL REQUIREMENTS FOR CANADIAN UDS MODEMS

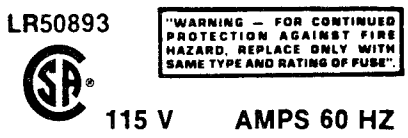
Requirements of Canadian Standards Association (CSA).

1. Modem covers must be fastened so that they require a tool for removal in Canada. This is accomplished in two ways.

   a. One method uses a screw through the top rear panel that holds the top tightly.

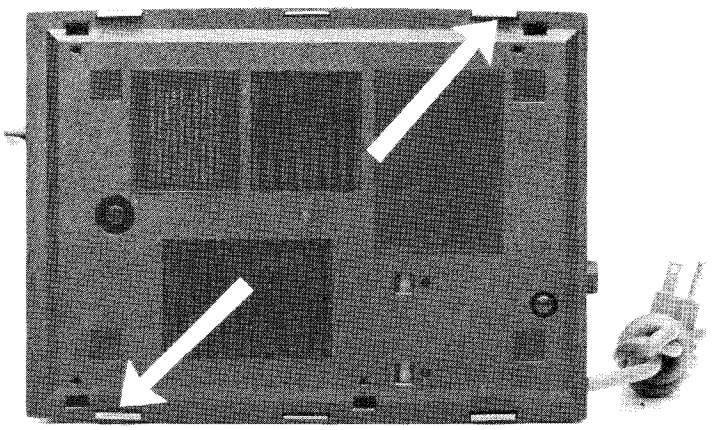
   b. The alternate method uses plastic tabs snapped into the bottom between the cover latch and the bottom plate. A small screw driver is required to remove the plastic tabs before the cover can be removed.

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



The CSA Logo

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



The bottom cover of the modem is secured with two locking tabs. To remove the tabs, pry them up with a screwdriver.

NOTICE

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.

202T

DATA MODEM

202T Functional Compatibility

0-1800 BPS Asynchronous

Operation	2-wire half duplex or 4-wire full duplex private line operation.
Data Rate	0-1200 bps asynchronous on worst case line. 0-1800 asynchronous on C2 conditioned line.
Modulation	Phase coherent, Frequency Shift Keyed (FSK).
Carrier Frequencies	Mark 1200 Hz ±0.1% Space 2200 Hz ±0.1%.
Line Impedance	600 ohms ± 10% transformer coupled and transient protected.
Transmitter Output Level	Selectable from 0 to -12 dBm in 2 dB steps.
Clear to Send Delay	8.3, 33.2, 59.9, 219.6 ms.
Carrier Detect Delay	6 ± 1 or 23 ± 5 ms On, 6 ± 1 ms Off.
Digital Interface	EIA RS-232-C and CCITT V.24.
Package	Standalone, UL approved.
Turnaround Squelch	0, 8.3 or 159.6 ms.
Anti-Streaming	Option to turn transmitter Off after selected time, even if RTS is On.
Test Features	Self Test, Analog Loopback, Digital Loopback and Test Pattern Transmit.

Chapter 1
Introduction

Contents

1.1 GENERAL

The Universal Data Systems 202T, shown in Figure 1-1, is a Frequency Shift Keyed (FSK) modem designed for asynchronous operation up to 1800 bits per second (bps). The modem provides asynchronous half-duplex communication on 2-wire private line circuits or full-duplex communication on 4-wire private line circuits.

The performance of the modem allows the user maximum freedom in the design of his communication network with such features as:

- No line conditioning required for 0 to 1200 bps operation.
- C2 line conditioning required for 0 to 1800 bps operation.
- Analog Loopback, Digital Loopback, Self Test and Test Pattern Transmit.
- LED displays for Transmit Data, Receive Data, Carrier Detect, Power and Test.

Reliability of the unit is assured by a conservative electrical design parts selection program. Prior to shipment, all modems are 100% burned-in at elevated temperatures. To maintain and ensure the inherent reliabilty of the modem's design, the modem undergoes a final test program.

1.2 DESCRIPTION

The front panel of the 202T modem contains seven LED indicators and a rotary test switch. One of the LEDs is designated POWER and is On when power is applied to the modem. The remaining six LEDs are described in the Controls and Indicators section (Chapter 3). The switch and its function are also described in Chapter 3.

The rear panel contains a power cord or power input connector, POWER switch, fuse, DTE connector, and TELCO connector. These are described in Chapter 2.

1.3 TECHNICAL DATA

1.3.1 Dimensions and Weight

a. Width: 7.00 inches (17.8 cm)
b. Length: 9.60 inches (24.4 cm)
c. Height: 2.25 inches (5.7 cm)

1.3.2 Environmental Conditions

a. Temperature
   Operating: 0 to 50°C
   Storage: -40 to +85°C

b. Humidity: 95% relative, non-condensation.

1.3.3 Primary Power

Power Requirements
a. 115 Vac ±10%; 50/60 Hz or
b. 230 Vac ±10%; 50/60 Hz
c. 12 to 60 Vdc
For applicable models.

1.3.4 Interface

The interface to the modem is as follows:

a. DTE Connector - EIA RS-232-C (See Paragraph 2.8.2)
b. TELCO Connector - 8 pin connector (See Paragraph 2.8.1)

Chapter 2
Installation

Contents

2.1 GENERAL

This chapter provides the information required to plan and accomplish the mechanical and electrical installation of the modem. After completion of the installation procedure, refer to Chapter 3 for operating and system checkout information to ensure normal operation.

2.2 SITE PREPARATION

Install the modem within six 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, well-lighted, and free from extremes of temperature, humidity, appreciable shock, and vibration. See Section 1-3 for detailed information on these items. Be sure that there is a 4-inch minimum space at the rear of the modem for signal line and interface cable clearance.

2.3 INSTALLATION PROCEDURE

Service personnel should be familiar with the complete installation procedure before attempting to install the modem.

2.3.1 Tools/Equipment/Material Required

No special tools or test equipment are required for installation of the modem.

2.3.2 Unpacking

After unpacking the equipment shipping crate, check the contents against the packing list. Inspect the equipment carefully for any damage that may have occurred in shipment. If any damage or material shortage is noted, contact the shipper's agent and the nearest UDS representative or Universal Data Systems for advice and assistance. It is suggested that the shipping crate and packing material be retained for use in future repacking and shipment.

2.4 MECHANICAL ASSEMBLY

The modem is designed for placement on a tabletop or bench and arrives at the site completely assembled. Provisions are not made for bolting the modem to the tabletop.

2.5 ELECTRICAL INSTALLATION (Figure 2-1)

Ac power is supplied to the modem through a 6-foot line cord with a grounded 3-wire plug. If chassis (protective) ground is connected through the third prong of the ac power plug, a separate chassis ground wire is not required.

See Appendix B for a description of dc powered modem installation.

2.6 DATA TERMINAL EQUIPMENT CONNECTION

The DTE interfaces to the modem by way of the DTE connector (25-pin, located on rear panel). The DTE connector and its function is described in detail in Paragraph 2.8.2.

2.7 TELEPHONE LINE CONNECTION - COMM LINE

The modem interfaces to the communication line by way of the COMM LINE connector (8 pin, located on rear panel). The COMM LINE connector is described in detail in Paragraph 2.8.1.

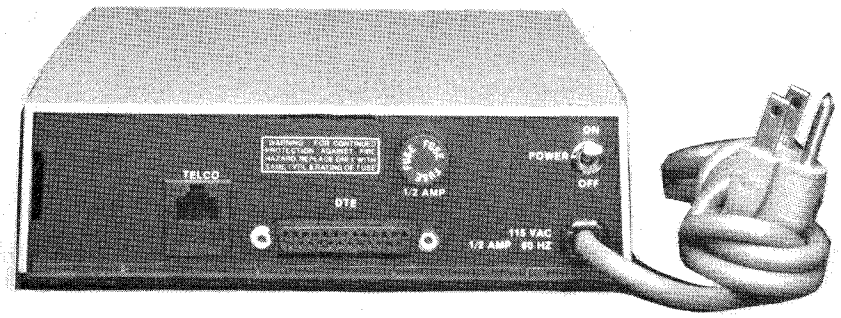


Figure 2-1
Rear Panel

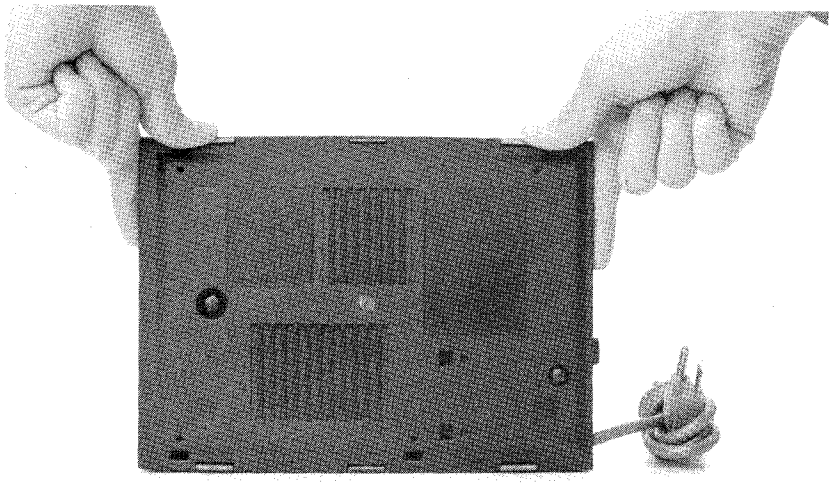


Figure 2-2
Removing the Cover

2.8 PIN FUNCTIONS

2.8.1 COMM LINE Connector Pin Functions

An 8-pin COMM LINE (TELCO) connector is used to connect the modem to the private line communication circuit. The pin functions are as follows:

Pin 4,5 . . Transmit pair for 4-wire mode.
Transmit/Receive Pair for 2-wire mode

Pin 3,6 . . Receive pair for 4-wire mode

Remaining pins are not used.

2.8.2 Modem Data Terminal Interface/Pin Functions

The modem interfaces with the DTE via a 25-pin connector located on the rear panel of the unit. This connector is labeled DTE and is a Cannon DB-25S or equivalent. The DTE should have a cable no longer than 50 feet with a Cinch or Cannon plug per DB-19604-432 plus a DB-51226-1 hood or equivalent. All interface functions are RS-232-C compatible.

The connector pin functions for the modem are as follows:

Pin	RS-232C Circuit	CCITT V.24 Circuit	Function
1	AA	101	Protective Ground
2	BA	103	Transmitter Data
3	BB	104	Receive Data
4	CA	105	Request to Send
5	CB	106	Clear to Send
6	CC	107	Data Set Ready
7	AB	102	Signal Ground
8	CF	109	Data Carrier Detect
9	--	---	+12 Volts Test Only
10	--	---	- 12 Volts Test Only
25	--	---	ANALOG LOOPBACK

NOTE

All unused pins have no electrical connection.

The interface functions are defined as follows:

Pin 1 . . . Protective Ground (AA). This pin is connected to the modem case and to the ground lead on the 3-wire ac power connection. It is not connected to Signal Ground (Pin 7) although it may be as an option of the user.

Pin 2 . . . Transmitter Data (BA). Data to be transmitted is furnished on this lead to the modem from the business machine. Required voltage levels are:

Mark	- 3	to	-	25V
Space	+ 3	to	+	25V

Activity on the transmit data line (i.e., any space) is indicated by the TRANSMIT DATA (TD) LED on the front panel.

Pin 3 . . . Received Data (BB). Data which is demodulated from the received phone line signal is presented to the terminal by the modem on Pin 3. Output voltage levels into greater than 3K are:

Mark	- 5	to	-	15V
Space	+ 5	to	+	15V

The data output is inhibited in a Mark state when no valid carrier is present on the receive phone line as indicated by Carrier Detect (Pin 8). Activity on the Receive Data line (i.e., any Space) is indicated by the RECEIVE DATA (RD) LED on the front panel.

Pin 4 . . . Request to Send (CA). RTS is supplied by the business machine to the modem when it is required to transmit a message. Voltage levels required are:

RTS ON	+ 5	to	+	25V
RTS OFF	- 5	to	-	25V

With RTS Off, the modem carrier remains Off. When RTS is turned On, the modem will immediately turn On the carrier. The modem data input will be inhibited so that a constant Mark is transmitted until the end of the Clear to Send (CTS) delay period. At the end of the CTS delay period, the input data inhibit is removed and the terminal may begin transmitting normal data. When RTS is turned Off at the end of the message, CTS will immediately turn Off.

In applications requiring a constant carrier, RTS may be connected to the required positive voltage by strap option on the modem board.

Pin 5 . . . Clear to Send (CB). Clear to Send (CTS) is a function supplied to the terminal by the modem which indicates that it is permissible to begin the transmission of a message. CTS follows the Off to On transition of RTS after a time delay (delay chosen by strap option). The output levels into greater than 3K ohms load are:

CTS ON	+ 5	to	+	15V
CTS OFF	- 5	to	-	15V

Pin 6 . . . Data Set Ready (CC). DSR is a function supplied by the modem to the terminal to indicate that the modem is ready to transmit data (DSR is Off when modem is in Test). Output levels are:

DSR ON	+ 5	to	+	15V
DSR OFF	- 5	to	-	15V

Pin 7 . . . Signal Ground (AB). Common return lead for all signals at the modem interface.

Pin 8 . . . Data Carrier Detect (CF). CF is furnished by the modem to the terminal to indicate that a valid carrier is being received, i.e., a continuous level above the threshold level established by the Carrier Detect level option (level is strap selectable).

The carrier must persist above the required level for 6 or 23 ms (strap option) before CF can come true. This prevents false CF signals due to line noise. While CF is false, Received Data (Pin 3) is clamped to a constant Mark.

CF ON . . . . . + 5V to + 15V
CF OFF . . . . . - 5V to - 15V

A true condition of CF is indicated by the CARRIER DETECT (CD) LED on the front panel.

Pin 9
& 10 . . . . These are protected supply voltages at +12V and -12V respectively, for use in testing only.

Pin 25 . . A true condition of this line will place the modem in ANALOG LOOPBACK.

NOTE

All interfaces on the RS-232-C digital connector conform to the requirements of EIA-RS-232-C.

2.9 STRAP SELECTION

When the mechanical and electrical installation procedures are completed and inspected, determine the configuration of the modem in the data system and position the straps as required.

CAUTION

The modem power cord should be unplugged prior to option strap changes.

To gain access to strap options, perform the following procedure:

a. Turn off the power switch.
b. Remove the cover of the modem. To do this, first stand the modem on its side; then using your thumb, push the tabs through the slots (see Figure 2-2).

2.9.1 Modem Board (Figure 2-3)

The following strap options are located on the modem board. The jumper sockets should be installed as described in the following paragraphs.

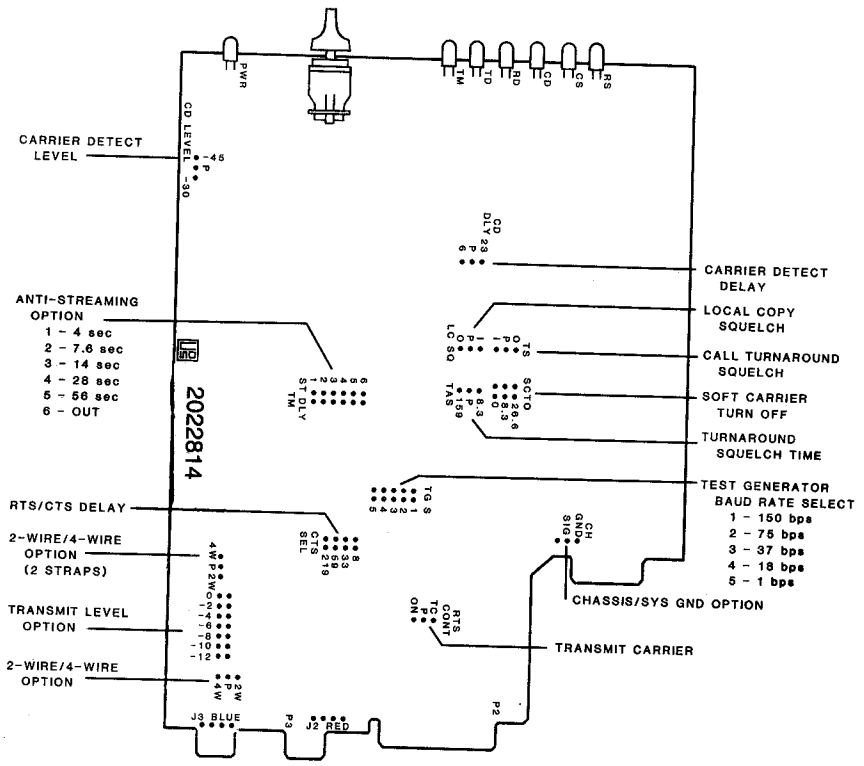
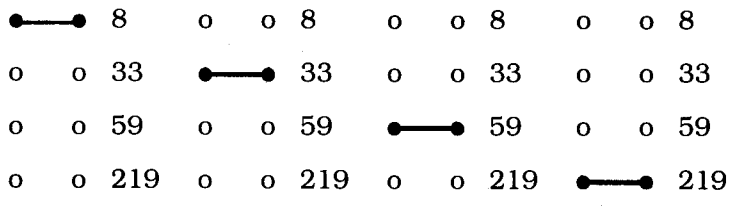


Figure 2-3
Modem Board Strap Options
2022814

2.9.1.1 RTS/CTS Delay.

Four choices of Clear to Send Delay timing are available.



2.9.1.2 Transmit Carrier.

A strap has been provided to allow the transmitter to be placed under terminal control or the transmitter may be turned On continuously. The transmitter may not be turned On continuously in a 2-wire half duplex system.

Strapped for Terminal Control of Carrier by Exercising the RTS Input Line

Strapped for Constant Carrier

2.9.1.3 Local Copy Squelch.

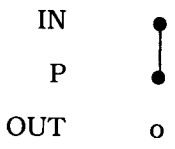
This strap is normally placed in the IN position when operating on a 2-wire network. This inhibits the local receiver from receiving the transmission of the local transmitter.

No Local Copy

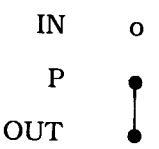
Local Copy

2.9.1.4 Call Turnaround Squelch.

If this strap is placed in the IN position, the receiver will be inhibited for a period of time after the local transmitter is turned Off. This guards against echoes caused by the transmission just completed. The time is determined by the "Turnaround Squelch Time Option."



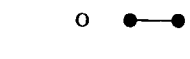
Turnaround Squelch IN



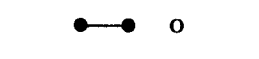
Turnaround Squelch OUT

2.9.1.5 Turnaround Squelch Time.

This option is exercised in conjunction with the Call Turnaround Squelch option above. The available times are 8.3 ms and 159.6 ms.



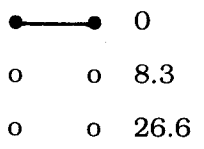
8.3 ms Squelch



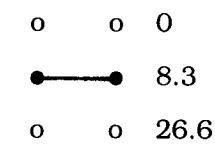
159.6 ms Squelch

2.9.1.6 Soft Carrier Turn Off.

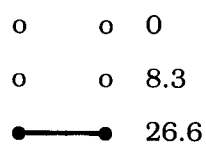
The transmitter may either turn Off immediately upon release of Request to Send or may send a Soft Carrier Turn Off signal of 900 Hz at the end of each transmission.



Do Not Send Soft Carrier



Send Soft Carrier for 8.3 ms



Send Soft Carrier for 26.6 ms

2.9.1.7 Carrier Detect Level.

The dynamic range of the primary receiver may be selected. The dynamic range may be set for 0 to -30 dBm or for 0 to -45 dBm. If the incoming signal is above -24 dBm, the -30 dBm position should be selected. If the modem is operated on the switched dial network, the -45 dBm position should be used.

-30 P -45

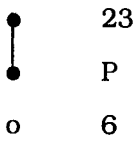
-30 dBm Level

-30 P -45

-45 dBm Level

2.9.1.8 Carrier Detect Delay.

Two choices of Carrier Detect Delay timing are availabe. The delay chosen must be consistent with the Clear to Send delay section and must be less than the CTS delay. The delays are 6 ms and 23 ms. The carrier detect drop out is 6 ms.

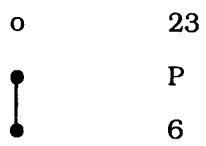


23

P

6

23 ms Option



23

P

6

6 ms Option

2.9.1.9 Test Generator Baud Rate Select.

The modem generates a dot test pattern when in local SELF TEST or TEST PATTERN mode. The baud rate is selectable to be 1 bps, 18 bps, 37 bps, 75 bps, or 150 bps The options are marked 1. 2. 3, 4, and 5. (Position 1 is 150 bps, 2 is 75 bps, etc.)

NOTE

Position 1 and 2 may cause errors in SELF TEST mode under certain line conditions. If errors occur, change strap to select lesser baud rate.

1

2

3

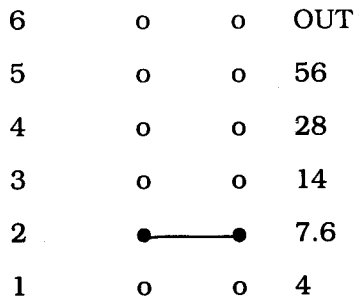
4

5

Shown Strapped for 18 bps.

2.9.1.10 Anti-Streaming Option

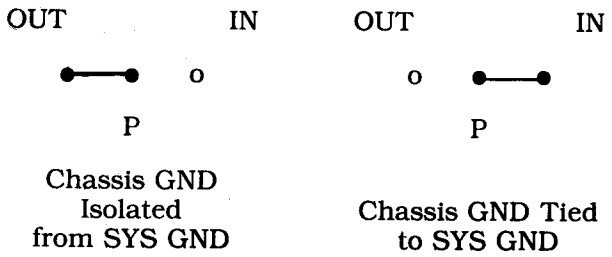
The time is selectable to be 4, 7.6, 14, 28, or 56 seconds. Delays only apply if the Anti-Stream Option is IN.



Time Set to 7.6 Seconds.

2.9.1.11 Chassis/SYS GND Option.

Earth GND can be tied to modem system GND.



Chapter 3
Operation

Contents

3.1 GENERAL

This chapter contains a list of controls and indicators with their functions, an operating procedure consisting of power turn-on, operating instructions and power turn-off, and a modem test procedure for use by the operator. Following initial power turn-on, the modem is designed to operate totally unattended.

3.2 CONTROLS AND INDICATORS

The front panel of the modem contains diagnostic LEDs that indicate the operating status of the modem. The indicators are marked PWR, TM, CD, RD, RS, CS, and TD. Functions of the LEDs are:

PWR	On when power is applied to the modem.
TM	On when Rotary Front Panel switch is in any Test position. The LED will be On when data is good and turns Off when errors occur in switch positions Self Test or Transmit Test Pattern.
CD	On when a carrier is detected by the modem receiver.
RD	On when data is received, decoded and furnished to the terminal equipment. On when the receive data line goes to a space condition.

RS	On when the Request-to-Send line is On from the DTE.
CS	On when the Clear-to-Send line is On from the modem.
TD	Responds in the same manner as the Receive Data (RD) LED, but only when data to be "transmitted" is furnished to the modem. However, the LED may be On when the DTE is not connected.

3.3 POWER TURN ON/OFF PROCEDURES

When modem power is turned On, operating personnel are not exposed to voltages in excess of 30 volts on any card or accessible area of the power supply.

3.3.1 Power Turn On

To apply power to the regulated dc power supply, place the POWER ON switch found on the rear panel of the modem in the On position. The PWR LED located on the front panel will be activated at this time.

3.3.2 Power Turn Off

To turn Off power to the modem, place the POWER ON switch on the rear panel of the modem to the Off position. Power is removed from the regulated dc power supply and all LEDs will go Off.

3.4 SYSTEM TEST AND FAULT ISOLATION

3.4.1 Test Switch (Front Panel)

A five-position rotary switch is used to select the various operating modes of the modem. The switch positions are DATA, AL, DL, ST, and TTP.

3.4.2 DATA Position

The switch must be in the DATA position for all normal data transmissions.

3.4.3 Analog Loopback (AL)

When the switch is in the (AL) position, the modem can be functionally tested by the local terminal device. The transmitter output of the modem is disconnected from the output coupling transformer and connected to the modem receiver input.

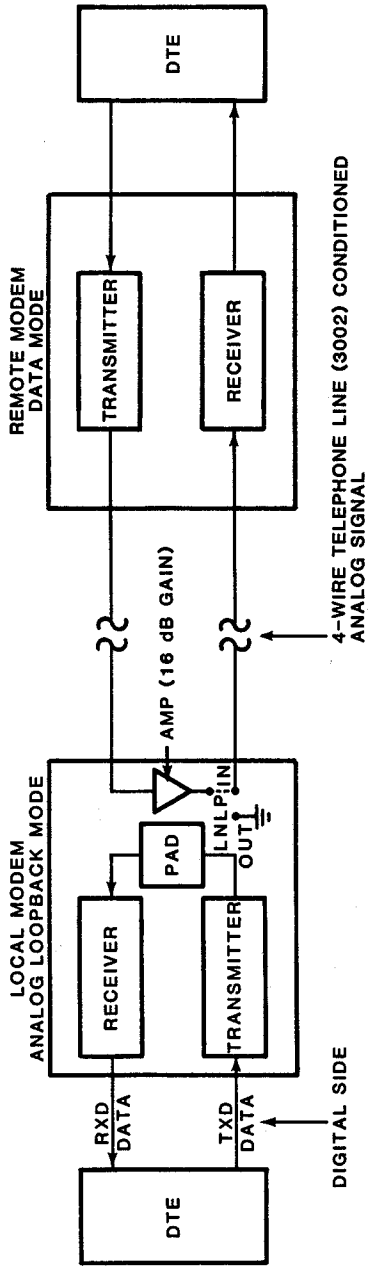


Figure 3-1
Analog Loopback Test

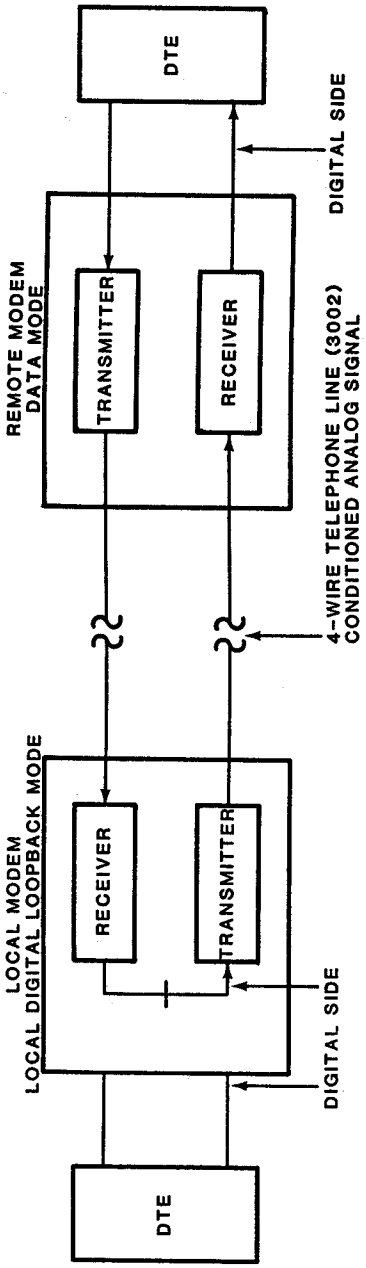


Figure 3-2
Digital Loopback Test

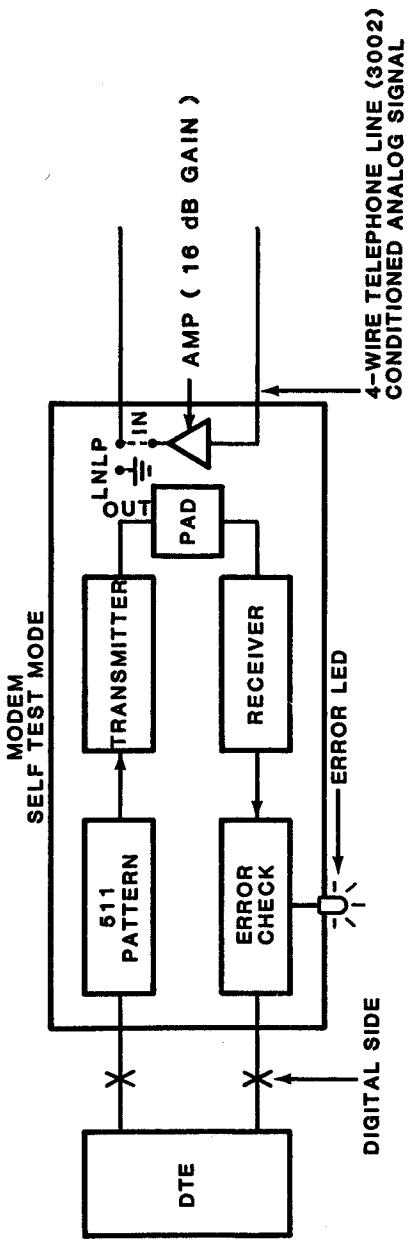


Figure 3-3
Self Test

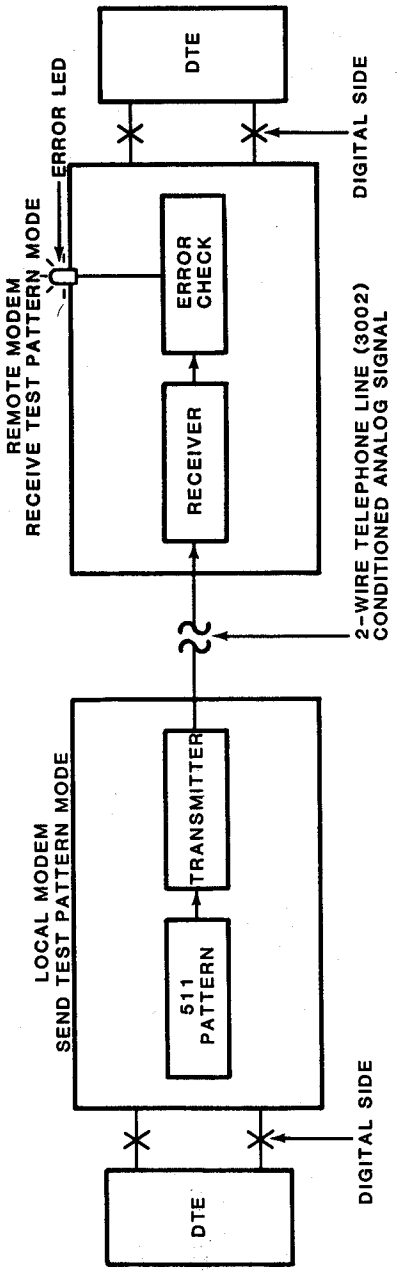


Figure 3-4
Transmit Test Pattern

3.4.4 Digital Loopback (DL)

When the switch is in the DL position, the received data is looped back into the transmitter and the data is retransmitted to the remote end. The RS-232-C interface to the terminal is not active in this test mode.

3.4.5 Self Test (ST)

When the switch is in the ST position, the RS-232-C interface is not active, and the modem is inhibited from transmitting or receiving data on the COMM LINE.

The test pattern (dot pattern) is passed through the transmitter, looped back into the receiver, demodulated and checked for errors. If errors occur, the TM LED will turn Off. The LED will remain Off for a period of time which is dependent on the pattern generator baud rate.

In ANALOG LOOPBACK and SELF TEST modes, the received analog data is buffered, amplified by 16 dB (if output level is set to 0 dB) and routed out on the transmit analog pair.

3.4.6 Transmit Test Pattern (TTP)

When the switch is in the TTP position, the transmitter is forced On and transmits the data from the test generator out on the COMM LINE. The RS-232-C interface lines to the transmitter are not active (RTS, CTS, TRANSMIT DATA).

The TM LED will be On when the data is good. If there are errors, or if the received data does not compare with the transmit data, the TM LED will turn Off.

The RS-232-C interface lines to the receiver are active in this mode.

Chapter 4
Principles of Operation

Contents

4.1 GENERAL

The modem processes 0 to 1800 bps serial asynchronous data for transmission. The modem accepts asynchronous data from the terminal, converts the data to an FM signal and transmits this signal out to the telephone line. The receiver accepts the FM signal, bandlimits the signal for noise rejection, recovers the data from the carrier, and presents the recovered digital data to the terminal.

4.2 TRANSMITTER (See Figure 4-1)

The modem begins carrier transmission when RTS turns On. The transmit data input is inhibited in a mark state until the modem has timed out the Clear to Send (CTS) delay. After CTS turns On, the terminal may begin transmitting the normal data.

The transmitter consists of an FSK oscillator that generates one frequency for a mark input and another frequency for a space. Digital input data (baseband) creates an oscillator output comprising a resultant carrier frequency and multiple sidebands on the other side of the carrier that are as wide as the baseband. Since higher order sidebands contain significant energy levels, the oscillator spectrum must be bandlimited to comply with the bandwidth requirements of the switched telephone network.

An important consideration in FSK oscillator design is the effect of shifting frequencies on the phase of the output wave. Ideally, the oscillator should shift frequencies at any point along the output wave excursion with complete phase coherence. Discontinuous phase creates jitter by distorting zero-crossing points and spreading the frequency spectrum. Phase discontinuities occur in oscillators that shift frequencies with an energy storing component (capacitor or inductor), if no other compensations are made.

The modem transmitter consists of a crystal controlled oscillator, a divider chain with the proper controls for generating the appropriate frequencies, and a filter to eliminate harmonics before the signal is applied to the output amplifier and transformer.

The modulation method is FSK wherein a mark at the transmit data input (BA) causes 1200 Hz to be transmitted and a space causes 2200 Hz to be transmitted. At the end of data transmission, RTS is turned Off by the terminal. The modem will send a soft carrier turn-off frequency (if the SCTO option is exercised) for 8.3 ms or 26.6 ms (option) before turning the carrier Off.

If the Anti-Streaming Option is exercised, the transmitter will be turned Off when the stream time expires. The carrier will remain Off until the RTS line turns Off then On again.

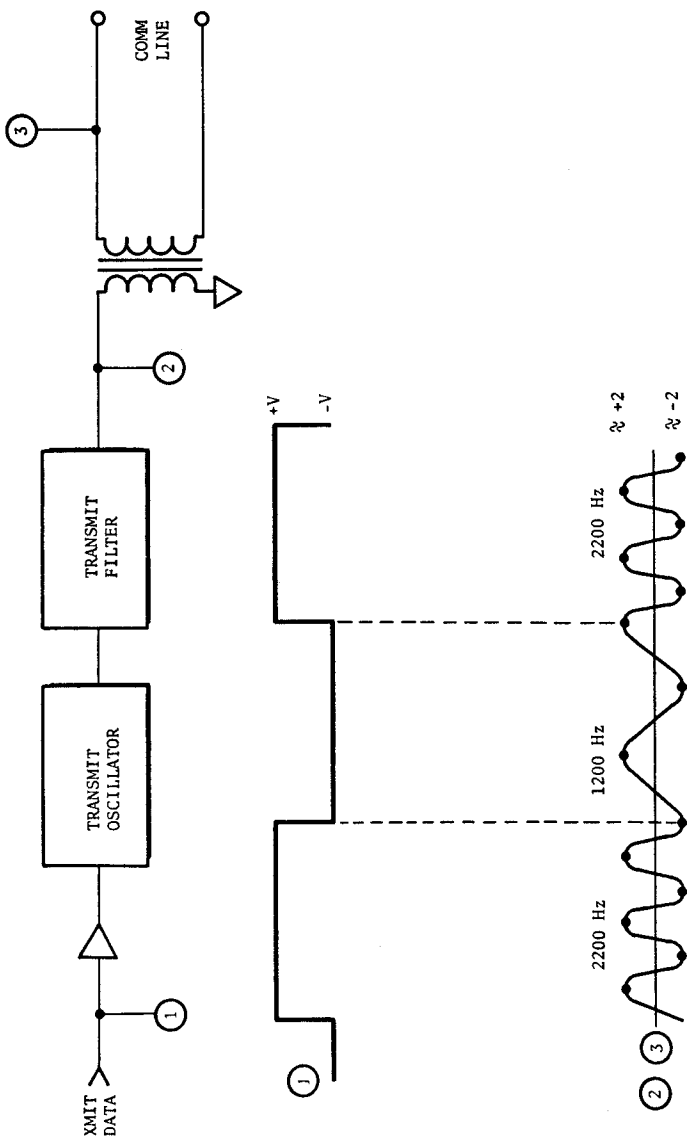


Figure 4-1. Transmitter Timing

4.3 RECEIVER (See Figure 4-2)

The modem RCV DATA line is held in a mark state (Off) under the following conditions:

a. CD is Off.
b. RTS is On and an 8.3 ms or 159 ms (option) following RTS turn Off is selected (if local copy inhibit and turnaround squelch options are exercised.)

The received signal is filtered to attenuate signals outside the channel passband and reduce noise energy added to the signal during transmission. The filter utilizes a highly stable active bandpass network to provide proper out-of-band signal rejection. This signal is supplied to a limiter which passes a narrow amplitude slice to the received signal centered about zero amplitude, preserving only the zero-crossing information of the data wave.

The resulting constant amplitude wave enables the discriminator to detect on the basis of frequency alone. While FM detection filters out amplitude changes, it remains sensitive to phase distortion and frequency offset that shift zero-crossing points. The limiter utilized maintains linearity over the range of input signals from +5 to -55 dBm to minimize bias distortion.

The limiter output is applied to a demodulator which is comprised of a CMOS circuit which operates as a frequency comparator. Part of the demodulator is adjusted to the center frequency of the band. The output of this circuit (from a CMOS gate) is a variable duty cycle which is dependent on the received cycle change from about 20% to 80%.

This signal then passes through a low pass filter resulting in level changes at the data rate most commonly known as the "eye pattern". That signal is then routed to a level comparator whose output is received data. This signal is supplied to a slicer which consists of a zero-crossing detector that restores high frequency components in the recovered baseband, shaping the discriminator output into a digital data wave. Like the limiter, the slicer maintains a stable threshold level to avoid bias distortion.

The carrier detector provides an output indicating the presence or absence of a valid data signal on the line. Some carrier detectors integrate the limiter output and test with a threshold device. Since the limiter itself is a threshold device, it will switch with low level signals generated by other channels if no signal exists in this channel, causing spurious "carrier on" indicators. A preferable technique--used in this modem--senses the energy present in the receive filter and the limiter output to provide a highly reliable carrier detect function.

4.4 POWER SUPPLY

4.4.1 AC Power

The power supply transformer, fuse and ON/POWER switch are mounted to the modem enclosure. The power cord connects to the transformer after routing through the fuse and power switch. The transformer has a centered tapped winding rated at 20 Vac and 150 mA and a winding rated at 10 Vac and 225 mA. The transformer connects to the Board through a 6-pin connector and cable.

The voltage from the transformer is rectified, filtered and regulated on the modem board. The 20 Vac is converted to ± 12V and the 10 Vac is rectified and used to supply positive voltage to the LEDs.

4.4.2 DC Power

The dc to dc converter, fuse and power switch are mounted to the modem enclosure. The barrier strip connects to the dc to dc converter after routing through the fuse and power switch. The converter provides three unregulated dc voltages, +8.5, + 15 and -15 Vdc, to the modem. The converter connects to the board through a 6-pin connector.

The voltage from the converter is filtered and regulated on the modem board. The ± 15 Vdc is converted to ± 12 V and the 8.5 Vdc is used to supply positive voltage to the LEDs.

4.5 ERROR CHECK CIRCUITRY

The test pattern data is compared to the received data and the TM LED is turned Off if the data is in error.

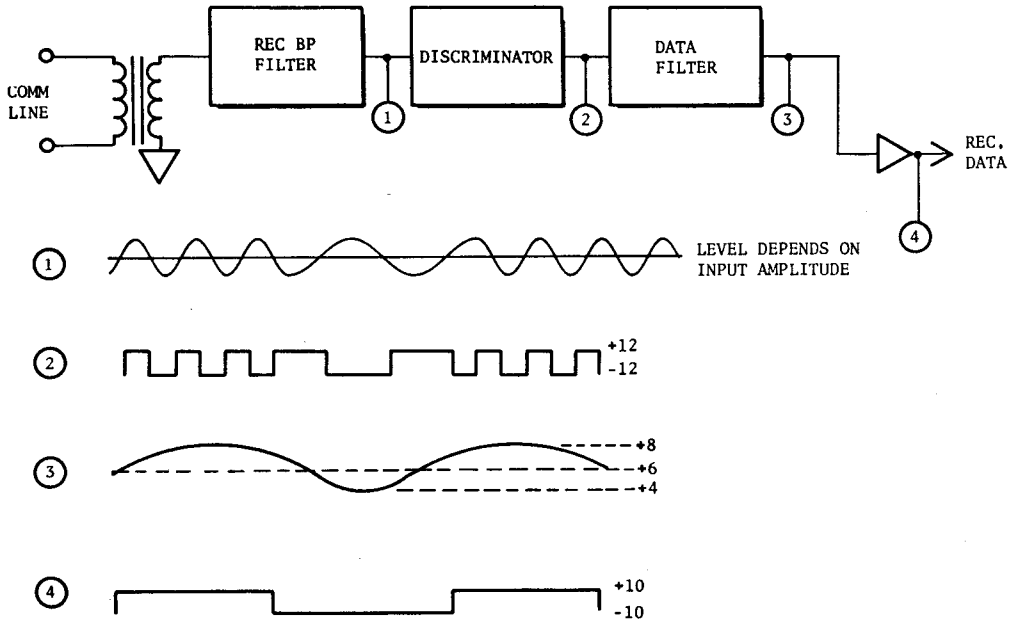


Figure 4-2. Receiver Timing

Chapter 5
Maintenance

Contents

5.1 GENERAL

The following troubleshooting procedure should be used for isolating a system fault.

5.2 TROUBLESHOOTING PROCEDURE

5.2.1 Local Modem Test

Local Modem Test using the terminal as a Controller:

a. Put the modem in Analog LP mode.
b. Turn on the Request to Send line.
c. Transmit the data pattern and check for data errors on the receive data line.

Local Modem Test using a modem test pattern:

a. Put the modem in Self Test mode.
b. The TM indicator should turn ON. If the indicator turns OFF or flashes, errors are occurring.

NOTE

The modem may register errors if the test generator baud rate is 150 bps. If errors occur, set the baud rate to a lower setting.

5.2.2 Line and Modem Test

Line and Modem Test using the terminal as a Controller:

a. Put the remote modem in Digital Loopback mode.
b. Put the Local modem in Data mode and transmit a data pattern. Check for data errors on the Receive Data line.

Line and Modem Test using a modem test pattern:

a. Put the Remote modem in Remote Test mode.
b. Put the Local modem in Remote Self Test mode.
c. The TM LED should turn On and remain On if the data is error free.

5.3 REPAIRS AND REPLACEMENTS

An inoperative modem should be replaced; no attempt at field repair is recommended. Contact the nearest UDS representative or Universal Data Systems, 5000 Bradford Drive, Huntsville, Alabama 35805, (205) 721-8000.

APPENDIX A

ABBREVIATIONS AND ACRONYMS

ASCII	American Standard Code for Information Interchange (7 level)
bps	Bits per second
CCITT	International Consultative Committee for Telegraphy and Telephony
CMOS	Complementary Metal Oxide Semiconductor
CTS	Clear to Send
DAA	Data Access Arrangement (AT&T)
dB	Decibel
DCE	Data Communications Equipment
DDD	Direct Distance Dialing
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
EIA	Electronic Industries Association
FGND	Frame Ground
FM	Frequency Modulation
FSK	Frequency-Shift Keying
Hz	Hertz (cycles per second)
LED	Light-emitting diode
Modem	Modulator/Demodulator
PC	Printed Circuit (Board)
RTS	Request to Send
SCTO	Soft Carrier Turn Off
TELCO	Telephone Company
TEL SET	Telephone Set
USOC	Universal Service Ordering Code
V.	CCITT Code Designation
V.24	List of definitions for interchange circuits between Data Terminal Equipment and Data Circuit-terminating Equipment (and provisional amendments, May 1977).
RS-232-C	Interface between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange.
RS-366	Interface between Data Terminal Equipment and Automatic Calling Equipment for Data Communications.

APPENDIX B
DC POWERED 202T

The dc powered modem connects to a 12 to 60 Vdc, 10 watt minimum power source.

The isolation provided by the dc converter between the dc source and the modem circuitry is 500 Vdc.

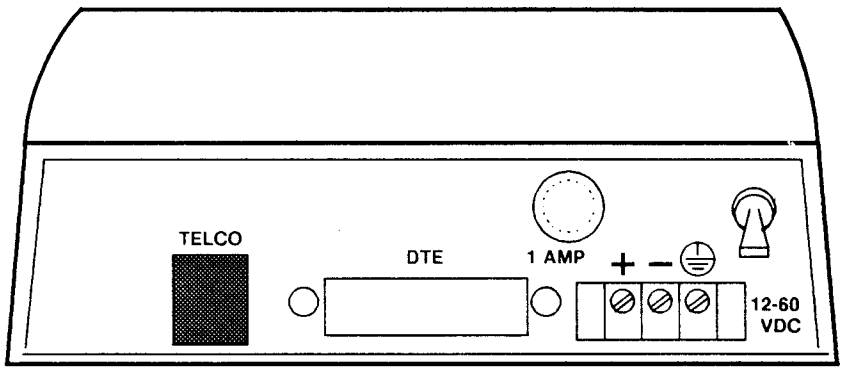


Figure B-1
Rear Panel, DC Input