44202
202 COMPATIBLE MODEM

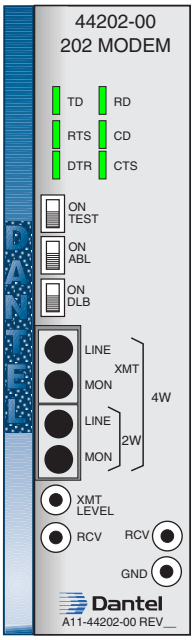

Table of Contents

About this Practice:

This practice has been reissued to:

- Replace modem alignment procedure and Table C, in ***Installation*** section, with new procedure.

Reissued Practices: Updated and new content can be identified by a banner in the right margin.

UPDATED

Issue date: August 1998

CAUTION

- Install or remove modules from the shelf only when the power is off. If you install a module in the shelf with the power on, the internal circuitry may suffer damage and the product warranty will be void.
- Remove and install circuit boards only in a static-safe environment (use antistatic wrist straps, smocks, footwear, etc.).
- Keep circuit boards in their antistatic bags when they are not in use.
- Do not ship or store circuit boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.
- For more complete information on electrostatic discharge safety precautions, refer to Bellcore™ Technical Reference # TR-NWT-000870.

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ORDERING INFORMATION

NOTE: This section lists the different options available for this product. To order any of the available options, contact Dantel Inside Sales through our toll-free number, **1-800-432-6835.**

OPTION NUMBER	FEATURES
A11-44202-00	202 Compatible Modem

GENERAL DESCRIPTION

This practice describes the Dantel 44202 202 Compatible Modem and supports installation and maintenance to the change-out level.

This module provides Bell type 202 (4-wire) or 103 (2- or 4-wire) data communications between distant digital equipment locations. It also provides on-board loop-back testing and multiple data interface inputs.

The 44202 is a plug-in P.C. board module that fits into any 400-type or similiar equipment housing. The front panel has:

- Jacks.
- LEDs.
- Switches.
- Test points.
- Level setting potentiometers.

The are no options for the 44202 and it is not equipped to accept subassemblies.

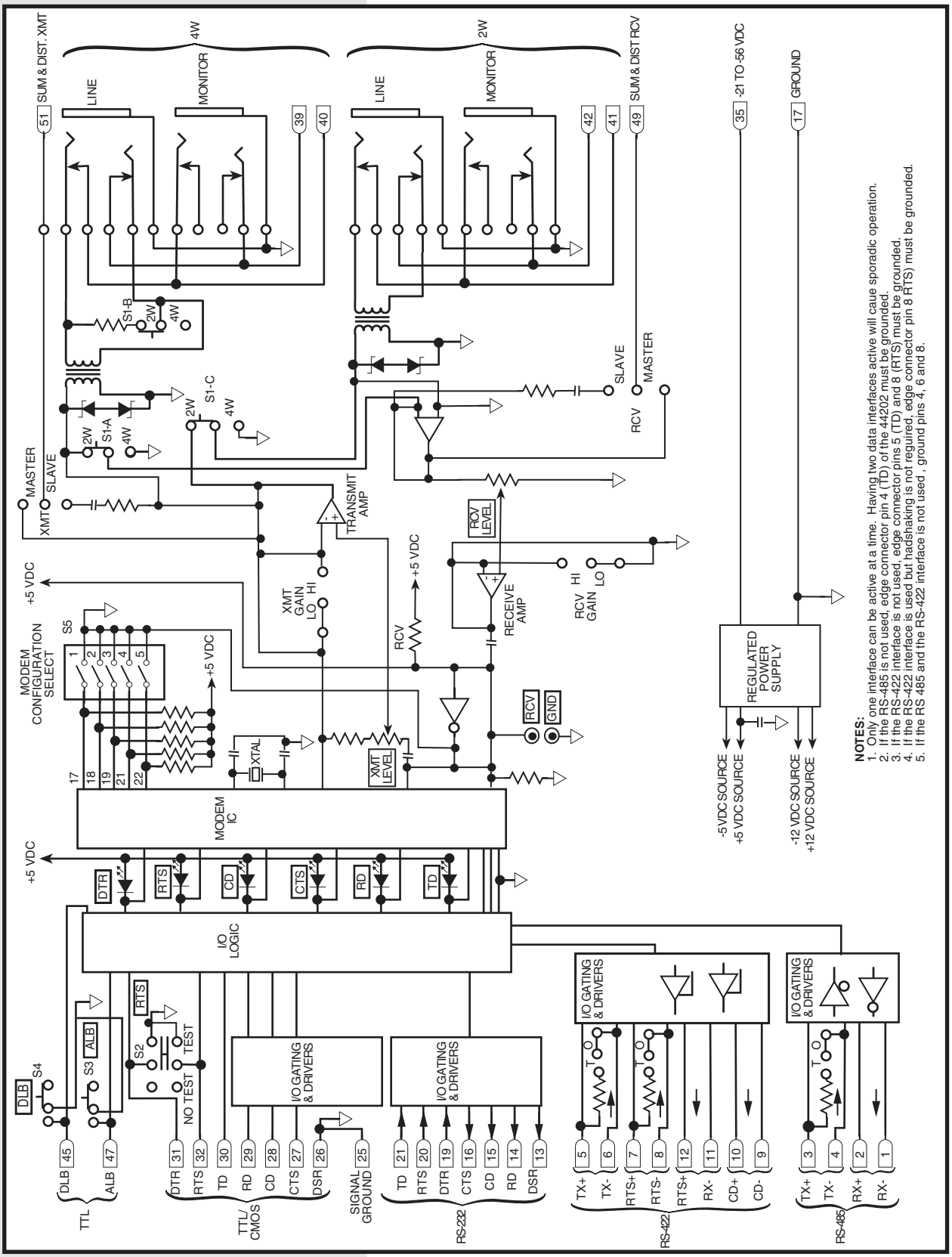
CIRCUIT DESCRIPTION

The 44202's functional schematic is shown is Fig. 1. The circuit consists of:

- Multiple data interfaces.
- Modem IC.
- Transformers.
- Adjustable transmit and receive amplifiers.
- Regulated power supply.

CIRCUIT DESCRIPTION

FIG. 1 - FUNCTIONAL SCHEMATIC, 44202 MODEM



CIRCUIT DESCRIPTION

NOTE:

1. No strapping is required to choose an interface. Data interfaces are selected by wiring to the appropriate edge connector pins.

2. Only one interface can be active at a time. Having two interfaces active will cause sporadic operation.

3. If the RS-485 interface is not used, edge connector pin 4 must be grounded.

4. If the RS-422 interface is not used, edge connector pins 6 and 8 must be grounded.

5. If neither RS-422 or RS-485 interfaces are used, edge connector pins 4, 6, and 8 must be grounded.

6. If the RS-422 interface **is** used, but handshaking is **not** required, edge connector pin 8 must be grounded.

Data Interfaces

The multiple data interfaces provide Inout/Output (IO) ports for:

- RS-232
- RS-422
- RS-485
- TTL/CMOS

Each interface has dedicated edge connector pins. The desired interface is selected by simply connecting leads to the appropriate pins. Each interface has all the necessary logic, gating, line drivers, and line receivers to interface to the data equipment.

Data activity activity is indicated by LEDs for:

- Interface Transmit (TD)
- Interface Receive (RD)
- Carrier Detect (CD)
- Clear To Send (CTS)
- Data Terminal Ready (DTR)
- Ready To Send (RTS)

Modem IC

The modem IC is an asynchronous FSK voiceband type with clocking oscillator and supplimentary functions for:

- Interface control and handshaking.
- Signal processing.
- Digital filtration

Transformers

The transformers are 600-to-600 ohm and provide facility-side to circuit isolation with circuit-side zener diode protection on both four-wire and two-wire applications. The facility-side is accessed using edge connector pins or by front panel jacks (normal-through and monitor).

Amplifiers

The transmit and receive amplifiers are place in the facility-side circuitry between the transformers and the modem IC. They provide separate transmit and receive gain adjustment using individual front panel potentiometers and 20dB High/Low gain straps. Front panel test points are provided for setting the receive level. The transmit level is adjustable using the front panel monitoring jack.

CIRCUIT DESCRIPTION

Power Supply

The regulated power supply provides:

- +5 VDC
- -5 VDC
- +12 VDC
- -12 VDC

These voltages are derived from a -21 to -56 VDC input source.

APPLICATION INFORMATION

Applications for the 44202 202 Compatible Modem consists of digital data transmission service between distant equipment sites. The 44202 can be used together with other manufacturer's equipment (alarm and control, for example) for transmitting and receiving data between remote locations and a central location, where the need for a DC powered modem exists. The 44202 does not need to be interfaced with another 44202. It can be interfaced to any modem operating under one of the following standards:

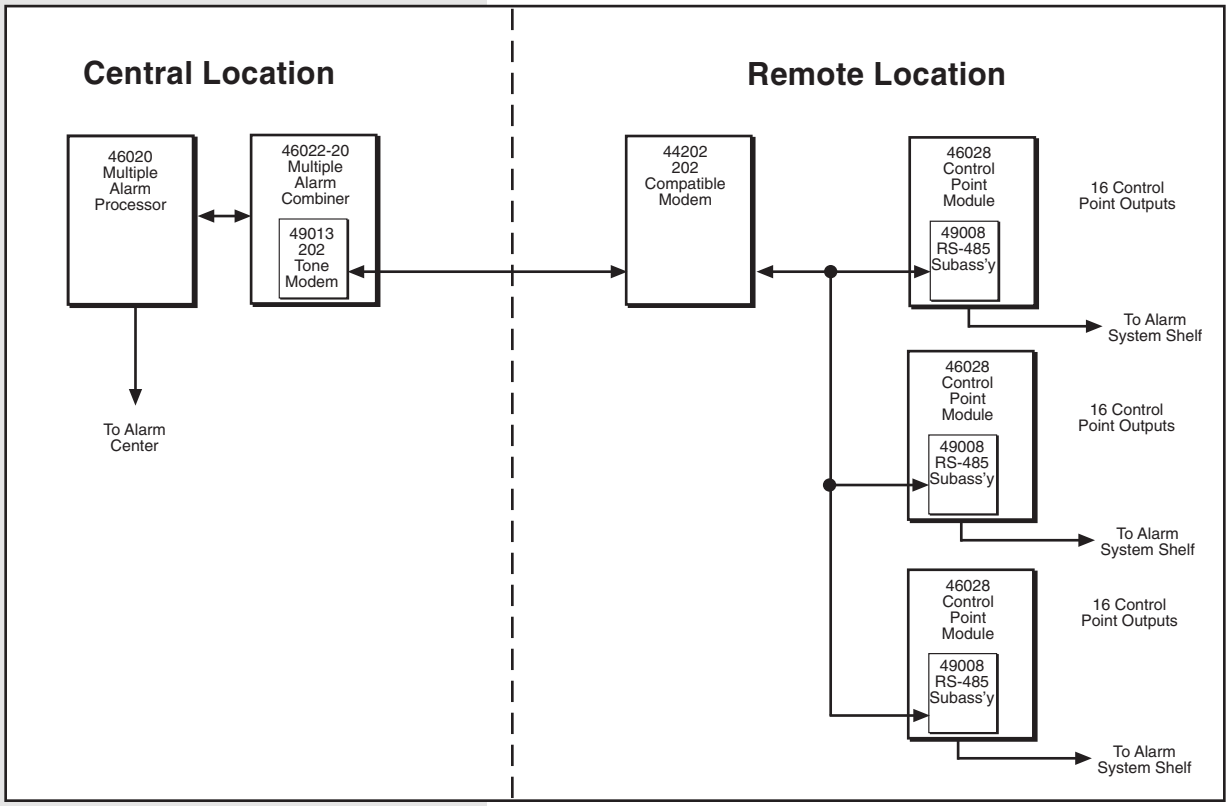
- Bell 202 (4-wire only)
- Bell 103 (2- or 4-wire)
- CCITT V.23 (4-wire only)
- CCITT V.21 (2- or 4-wire)

Example Application

Refer to Fig. 2. This application has one 44202 modem at a remote location being used to transmit 460 Alarm and Control System data to a 49013 202 Modem subassembly at a central data processing location. Because the 44202 uses a DC power source, it can provide stable operation when supplied by a battery that is independent of AC power interruptions. The 44202 may also be used with a 44124 Data Channel Termination Module, which provides data channel line conditioning

APPLICATION INFORMATION

FIG. 2 - EXAMPLE APPLICATION, 44202 MODEM



INSTALLATION

Installation consists of setting the switch and strap settings, wiring the pin connectors, installing the module in the shelf, and checking out the module.

Switches and Straps

Strapping options are selected by on-board mini-jumpers. Switch selections are made with a on-board slide switch, mini-DIP or recessed front panel slide switches. Refer to Fig. 3 and Tables A and B.

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FIG. 3 - STRAP AND SWITCH LOCATIONS, 44202 MODEM

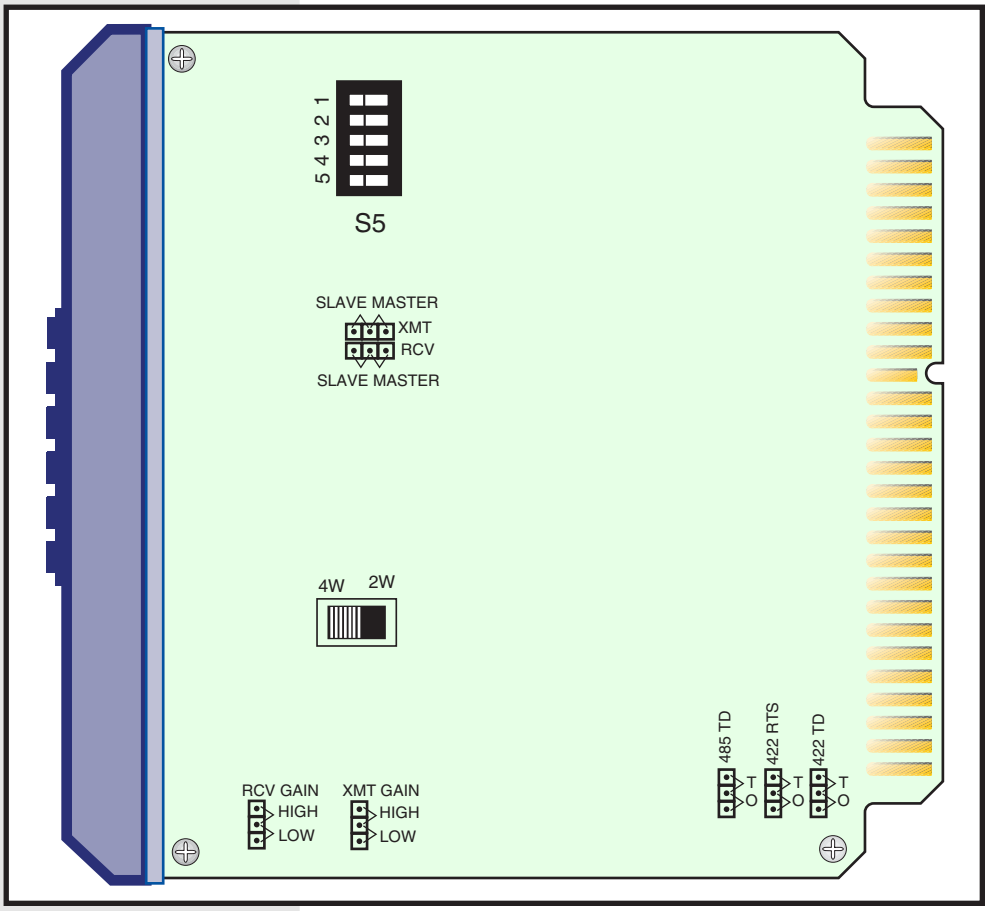


TABLE A - STRAP OPTIONS, 44202 MODEM

STRAP	POSITION	DESCRIPTION
TD422	O	No termination at 422 Transmit Data input.
	T	180 ohm termination at 422 Transmit Data input.
RTS422	O	No termination at 422 Request To Send input.
	T	180 ohm termination at 422 Request To Send input.
TD485	O	No termination at 485 Transmit Data input.
	T	180 ohm termination at 485 Transmit Data input.
XMT	MASTER	Modem is selected as transmit master for use in summing and distribution applications.
	SLAVE	Modem is selected as transmit slave for use in summing and distribution applications.
RCV	MASTER	Modem is selected as receive master for use in summing and distribution applications.
	SLAVE	Modem is selected as receive slave for use in summing and distribution applications.
***NOTE**: Both XMT and RCV Master and Slave straps must correspond.*		

TABLE B - SWITCH SETTINGS, 44202 MODEM

SWITCH	POSITION	DESCRIPTION
2W/4W	2W	Selects 2-wire operation
	4W	Selects 4-wire operation
RTS TEST	UP	Turns on RTS and DTR. Carrier is transmitted. (Switch on front panel)
	DOWN	Disables TEST functions.

***NOTE**: When RTS TEST switch is ON, RTS and DTR LEDs on front panel are ON.*

SWITCH	POSITION	DESCRIPTION
DLB	UP	Enables digital loopback (DLB) functions.
	DOWN	Disables DLB functions.
ALB	UP	Enables analog loopback (ALB) functions.
	DOWN	Disables ALB functions.

SWITCH S5 (5-POSITION MINI DIP)

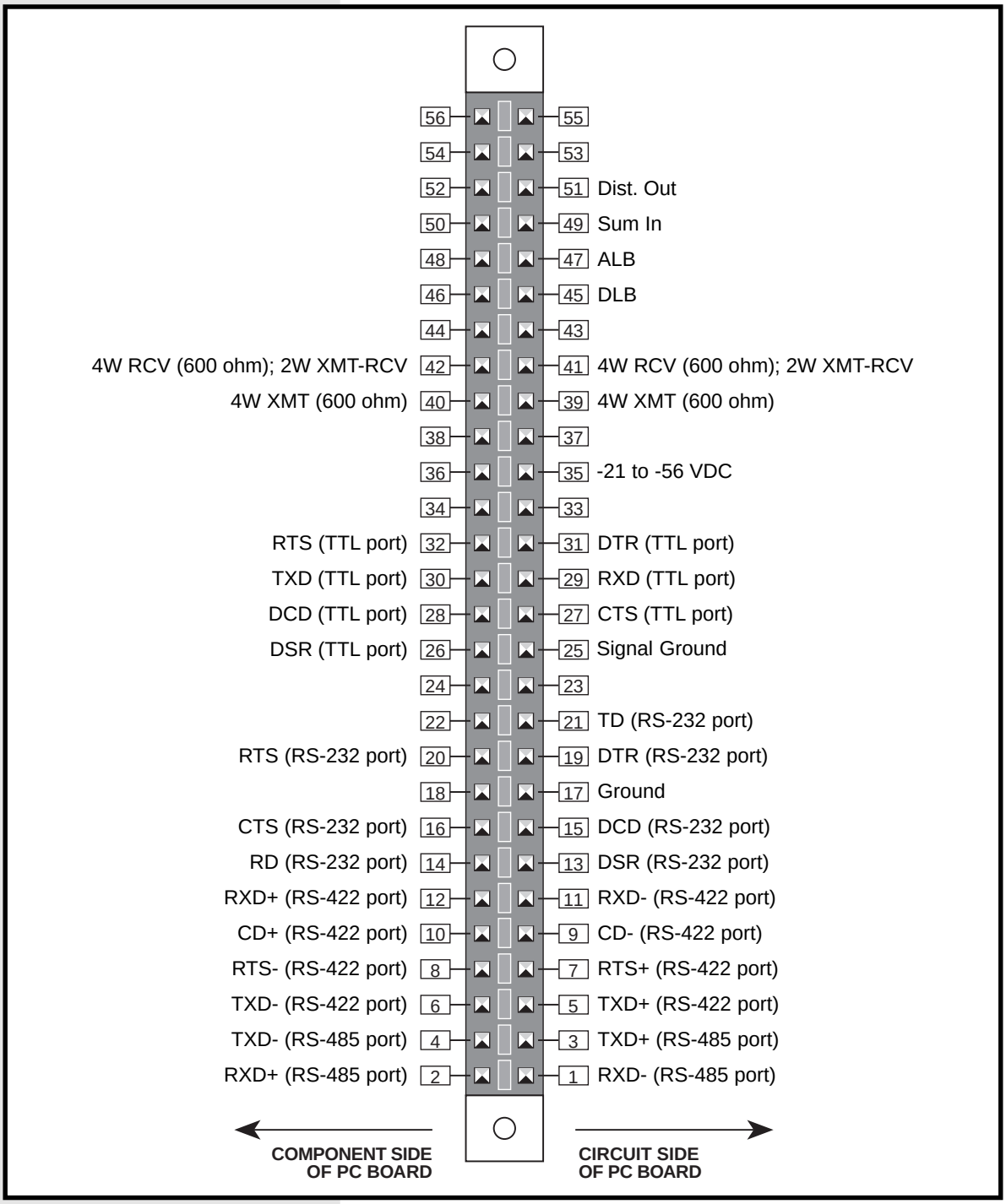
S5-1	S5-2	S5-3	S5-4	S5-5	DESCRIPTION
ON	ON	ON	ON	ON	Bell 103 Originate, 300 bps, Full Duplex
OFF	ON	ON	ON	ON	Bell 103 Answer, 300 bps, Full Duplex
ON	OFF	ON	ON	ON	Bell 202, 1200 bps, Half Duplex
OFF	OFF	ON	ON	ON	Bell 202, 1200 bps, w/Amplitude Equalizer
ON	ON	OFF	ON	ON	CCITT V.21, Originate, 300 bps, Full Duplex
OFF	ON	OFF	ON	ON	CCITT V.21, Answer, 300 bps, Full Duplex
ON	OFF	OFF	ON	ON	CCITT V.23, Mode 2, 1200 bps, Half Duplex
OFF	OFF	OFF	ON	ON	CCITT V.23, Mode 2, 1200 bps, Half Duplex, w/Amplitude Equalizer
ON	ON	ON	OFF	ON	CCITT V.23, Mode 1, 600 bps, Half Duplex
ON	OFF	ON	OFF	ON	Bell 202, 1200 bps
OFF	OFF	ON	OFF	ON	Bell 202, 1200 baud, w/ Amplitude Equalizer
ON	ON	OFF	OFF	ON	CCITT V.23, Mode 1, 600 bps, w/Soft Turn-Off
OFF	ON	OFF	OFF	ON	Reserved
ON	OFF	OFF	OFF	ON	CCITT V.23, Mode 2, 1200 bps, w/Soft Turn-1
OFF	OFF	OFF	OFF	ON	CCITT V.23, Mode 2, 1200 bps, w/Amplitude Equalizer and Soft Turn-Off
ON	ON	ON	ON	OFF	Bell 103, Originate Loopback
OFF	ON	ON	ON	OFF	Bell 103, Answer Loopback
ON	OFF	ON	ON	OFF	Bell 202, Main Loopback *
OFF	OFF	ON	ON	OFF	Bell 202, w/Amplitude Equalizer Loopback
ON	ON	OFF	ON	OFF	CCITT V.21, Originate Loopback
OFF	ON	OFF	ON	OFF	CCITT V.21, Answer Loopback
ON	OFF	OFF	ON	OFF	CCITT V.23, Mode 2, Main Loopback
OFF	OFF	OFF	ON	OFF	CCITT V.23, Mode 2, w/Amplitude Equalizer Loopback
ON	ON	ON	OFF	OFF	CCITT V.23, Mode 1, Main Loopback
OFF	ON	ON	OFF	OFF	CCITT V.23, Back Loopback
ON	OFF	ON	OFF	OFF	Bell 202

*** NOTE**: Normal setting is for Bell 202, Main Loopback.*

Wiring

In most cases, the 56-pin edge connector is prewired at the factory. If custom wiring is required, refer to Fig. 4 for module edge connector pin designations, or contact Dantel. Wire the connector in the shelf or housing as required.

FIG. 4 - PIN DESIGNATIONS, 44202 MODEM



Install Module

Disconnect power to the shelf. Install the module in the proper slot in the equipment housing by sliding the module along the guide slots, then firmly seating connector in its receptacle.

Checkout

Checkout of the 44202 202 Compatible Modem is done by setting the transmit and receive levels and testing the analog and digital circuit sides using the digital and analog loopback functions. Refer to Fig. 5 (in the ***Operation*** section of this manual) and the following procedure.

ALIGNMENT AND CHECKOUT PROCEDURE

Alignment

1. **Action**: Configure the 44202 module for the appropriate application. Ensure that power is removed from the equipment shelf. Install the module in the designated slot.
2. **Action**: Apply power to the shelf.
3. **Action**: Connect a Transmit Measure Set (TMS) to the "XMT LINE" jack on the front panel. Configure the TMS for 600 ohm terminated measurment. A db meter can be used to make a bridged measurement by connecting to the "XMT MON" jack.

NOTE: *The "XMT MON" jack does not open the jack normals and the 1200 hz tone will be transmitted to a connecting circuit, interrupting data communication.*

4. **Action**: Place the "TEST" switch in the on, or up, position.

   Result: The "RTS" and "DTR" LEDs are lit. A 1200 hz tone is transmitted to the test set.

NOTE: *A failure in step 4 indicates a lack of power or a defective module.*

5. **Action**: Adjust the "XMT LEVEL" potentiometer to reach the engineered data level. Turn clockwise to raise the level; counterclockwise to lower the level.

NOTE: *If the desired level cannot be reached, remove power from the shelf and unplug the module. Place the "XMT GAIN" strap in the "HIGH" position to add 20dB of gain. Replace the module, reconnect power, and adjust the "XMT LEVEL" pot for the desired level.*

Result: The transmitted tone is set to the desired level.

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NOTE: *If the transmit level cannot be adjusted, the module is defective and should be replaced*

6. **Action**: Connect the TMS, set for bridged reading, or a dB meter, to the test points labeled "RCV" and "GND". Send the engineered data level (13dB below tone level) into the 44202 modem from an available test point. (RCV Line, DST, CXR jack, etc.)

   Result: The "CD" LED lights.

7. **Action**: Adjust the "RCV GAIN" pot to achieve a -20dBm meter reading.

NOTE: *If the desired level cannot be reached, remove power from the shelf and unplug the module. Place the "RCV GAIN" strap in the "HIGH" position to add 20dB of gain. Replace the module, reconnect power, and adjust the "RCV GAIN" pot for the desired level.*

If the receive gain cannot be adjusted, the module is defective and should be replaced.

8. **Action**: Remove the data level tone. Place the "TEST" switch in the OFF position.

9. This completes the modem alignment.

Analog Loopback Test

1. **Action**: Place the "ALB" (analog loopback) switch and the "TEST" switch in the ON position. Connect a TMS with a speaker to the "XMT LINE" jack.

   Result: You should hear the 1200hz data tone from the modem.

2. **Action**: At the distant end, have someone send data to the modem.

   Result: You should hear the data they are sending along with the 1200hz tone.

3. **Action**: Return the "ALB" and "TEST" switches to OFF and remove the connection to the TMS.

4. This completes the analog loopback test.

Digital Loopback Test

1. **Action**: Place the "TEST" and "DLB" switches in the ON (up) position.

   Result: The "RTS", "DTR", "CTS", and "CD" LEDs come on.

2. **Action**: Configure a terminal or terminal emulator for 1200 baud, 8 bit word length, 1 stop bit, and no parity. Connect the terminal to the RS-232 port. Type on the terminal.

   Result: The "TD" and "RD" LEDs flash. The data is looped back and the typed characters are displayed on the screen.

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3. **Action**: Remove the terminal connection and place the "TEST" and "DLB" switches in the OFF(down) position.

4. This completes the digital loopback test and the alignment and test procedure.

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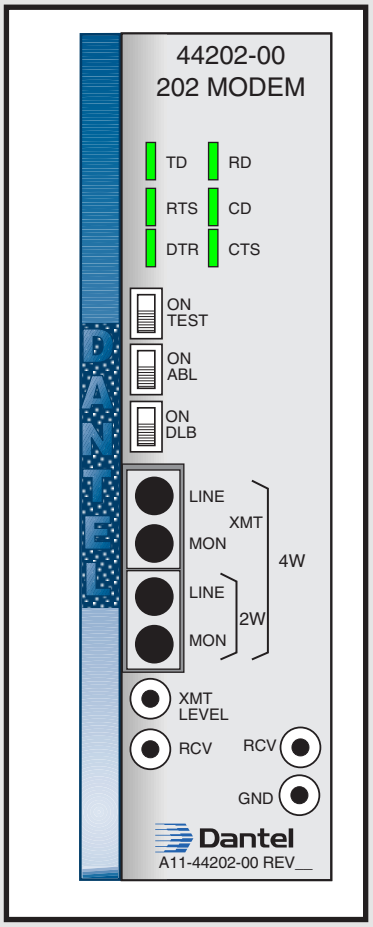
OPERATION

Operation of the 44202 consists of turning front panel switches OFF and ON for level setting and testing as described in the ***Installation*** section. While the 44202 is being used for normal data transmission, there are no user operations to be performed.

FIG. 5 - FRONT PANEL VIEW



LEDs

Six (6) green LEDs on the front panel indicate:

- TD (Transmit Data)
- RD (Receive Data)
- RTS (Ready To Send)
- CD (Carrier Detect)
- DTR (Data Terminal Ready)
- CTS (Clear To Send)

Each of the LEDs operates when the modem's activity is appropriate to the LED's designation.

Front Panel Switches

There are three (3) recessed switches are used for testing the module's operation. They are:

- ON TEST
- ON DLB
- ON ALB

Front Panel Jacks

Two (2) normal-through jacks are provided for connecting to the facility. These are:

- XMT LINE
- 2W LINE

The jack labeled "2W LINE" is the receive line jack. There are also two (2) jacks labeled:

- XMT MON
- 2W MON

CONTINUED . . .

These are used for monitoring the facility-side transmit and receive. The jack labeled "2W MON" is the receive monitor jack.

Test Points and Potentiometers

Two (2) front panel test points are used in conjunction with the front panel potentiometer labeled RCV LEVEL. The test points are labeled:

- RCV
- GND

They provide a means of adjusting the receive level at the modem IC. The other potentiometer is labeled XMT LEVEL, and is used to set the transmit level at the XMT LINE jacks on the front panel.

TECHNICAL SPECIFICATIONS

DESCRIPTION	VALUES			
POWER REQUIREMENTS				
Input Voltage	-21 to -56 VDC			
Input Current				
Idle	@ -21 VDC	@ -24 VDC	@ -48 VDC	@ -56 VDC
	120 mA	105 mA	75 mA	70 mA
Busy	135 mA	120 mA	85 mA	80 mA
Heat Dissipation (max)	@ -21 VDC	@ -24 VDC	@ -48 VDC	@ -56 VDC
	9.7 Btu/Hr	9.9 Btu/Hr	14.0 Btu/Hr	15.3 Btu/Hr
AUDIO PORT LEVELS (600 OHMS)				
XMT Carrier Level	-35 dBm min. to +7 dBm max.			
RCV Carrier Level	-40 dBm min. to 0 dBm max.			
RCV Path Gain	24 dB			
RCV Path Attenuation	26 dB			
DIGITAL INTERFACES				
TTL/CMOS				
Input Voltage	0 to 1 V = Low; 3.4 to 5 V = High			
Output Current	16 mA Sink, Open Drain (high out)			
RS-232 Receivers				
Input High Voltage	+3 to +25 V			
Input Low Voltage	-3 to -25 V			
RS-232 Drivers				
Output High Voltage	10.5 V typical; 9 V min. w/3K ohm load			
Output Low Voltage	9.5 V typical w/ no load; 8 V min. w/ 3K ohm load			
Short Circuit Current	±45 mA max.			
Output Resistance	300 ohms min.			
Max. Load Resistance	3K ohms			
RS-422 and RS-485 Receivers				
Differential Input	±0.2 V threshold, voltage referenced to inverting input			
Common Mode Input	±12 V max., voltage referenced to ground			
RS-422 and RS-485 Drivers				
Differential Output Voltage	±4 V max., no load; ±1.5 V min., 54 ohm load, ref. @ inverting output			
Short Circuit Current	+150 mA, Vo = Vcc; -150 mA, Vo = 0			
Max. Load Resistance	54 ohms			
ALB AND DLB INPUTS				
Operating Voltage	0 to 1 V			
Disable Voltage	3.4 to 5 V or open			
PHYSICAL FEATURES				
Weight	9 ounces			
Dimensions	1.4" x 6.0" x 5.6"			
Operating Temperature Range	0° to 55° C.			

NOTES

WARRANTY

LIMITED WARRANTY

The Seller warrants that the standard hardware products sold will be free from defects in material and workmanship and perform to the Seller's applicable published specifications for a period of 18 months for hardware, and 3 months for software, from the date of the original invoice. The liability of the Seller hereunder shall be limited to replacing or repairing, at its option, any defective products which are returned F.O.B. to the Seller's plant, (or, at the Seller's option, refunding the purchase price of such products). In no case are products to be returned without first obtaining permission and a customer return authorization number from the Seller. In no event shall the Seller be liable for any consequential or incidental damages.

Equipment or parts which have been subject to abuse, misuse, accident, alteration, neglect, unauthorized repair or installation are not covered by warranty. The Seller shall make the final determination as to the existence and cause of any alleged defect. No warranty is made with respect to custom equipment or products produced to the Buyer's specifications except as specifically stated in writing by the Seller in the contract for such custom equipment.

This warranty is the only warranty made by the Seller with respect to the goods delivered hereunder, and may be modified or amended only by a written instrument signed by a duly authorized officer of the Seller and accepted by the Buyer.

Warranty and remedies on products not manufactured by the Seller are in accordance with warranty of the respective manufacturer. THE SELLER MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED; AND ALL IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE AFORESAID OBLIGATIONS IS HEREBY DISCLAIMED BY THE SELLER.

IN CASE OF DIFFICULTY

If you experience difficulty with this equipment, check the following, as appropriate:

1. **Switch settings**
2. **Signal levels**
3. **Software configuration**
4. **Connections between Dantel's equipment and your equipment.**

If there is still a problem, substitute equipment that is known to be good. For additional assistance, call Dantel's Technical Field Service Department weekdays, 6 A.M. to 5 P.M. pacific time:

1-800-4DANTEL (1-800-432-6835).

If a thorough checkout shows a piece of equipment has malfunctioned, you may return it to the factory. For repairs and emergency replacements, obtain a Return Material Authorization (RMA) number from the Customer Service Representative at **1-800-4DANTEL** (1-800-432-6835).

To ensure expedient processing of your order, provide a purchase order number and shipping and billing information when requesting an RMA number. Also, when the units are returned to Dantel, include a description of the failure symptoms for each unit returned. Send defective equipment to:

Dantel, Inc. • 2991 North Argyle Avenue • Fresno, California 93727-1388

Dantel

P.O. Box 55013 • Fresno, CA 93747-5013 Phone (209) 292-1111 Fax (209) 292-9355 http://www.dantel.com