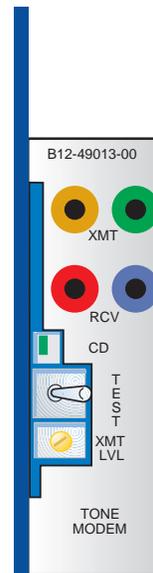


# 49013

## 202 TONE MODEM

### SUBASSEMBLY



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#### About this Practice:

This practice has been reissued to:

- Incorporate the Checkout Procedure into the **Installation** section.
- Document change to B12 version.
- Add microcontroller to **Circuit Description** section.
- Update Figs. 1, 2, and **Technical Specifications** table.

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

**Issue date: December 1997**

UPDATED

#### 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.

# ORDERING INFORMATION

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**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
B12-49013-00	202 Tone Modem Subassembly

## GENERAL DESCRIPTION

The Dantel 49013 202 Tone Modem Subassembly is used in support of Dantel's 460 Alarm and Control System. It converts digital data into frequency shifted tones and enters it into a data transmission system.

It also receives frequency shifted tones from a transmission system and converts them into digital data. It operates as a Bell 202 full-duplex modem at a data rate of 1200 baud.

## CIRCUIT DESCRIPTION

The 49013 202 Tone Modem Subassembly functional schematic is shown in Fig. 1. The subassembly consists of:

- ◆ Transmit (TX) transformer
- ◆ Receive (RX) transformer
- ◆ Signal level pads
- ◆ Input/output buffers
- ◆ An FSK modem IC
- ◆ A Microcontroller 87C51
- ◆ A frequency control crystal
- ◆ Front panel test switch
- ◆ An LED driver
- ◆ Input power protection

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# CIRCUIT DESCRIPTION

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## Input

Input (RX) to the subassembly appears at pins 2 and 4 on connector P5.

The incoming signal passes the RX transformer (600/600 ohm), a selectable pad (0 or -20 dB) is buffered by and then applied through an integrated circuit to the RXD, CTS (Clear To Send), and DCD (Data Carrier Detect) outputs.

The LED CD on the front panel lights to indicate that there is carrier detection.

Monitor the input signal at the front panel through the line side RCV test points.

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## Output

Output (TX) from the subassembly is at pins 3 and 5 on connector P5.

The data output signal is introduced at DTR (Data Terminal Ready), RTS (Request To Send), and TXD.

The signal is routed through an integrated circuit to feed a buffer that passes the signal to a selectable pad (0 or -20 dB) and the coupling transformer.

To adjust the output signal level from -1 to -40 dBm, use the potentiometer, XMT LVL (R9) on the front panel.

Monitor the output signal at the front panel through the XMT test points.

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## FSK Modem IC

This integrated circuit is the central component of the 49013 subassembly. It handles all data functions such as modulation, demodulation, and filtering. Internal clocking is controlled by an externally connected crystal for stability.

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## 87C51 Microcontroller

This integrated circuit is used to initialize and control the modem chip.

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## Front panel test switch

This switch (TEST) grounds the RTS lead, causing data carrier transmission.

It is used to turn on the DCD (Data Carrier Detect) of the opposing (distant end) of the modem. As a result, each of the modems is used to verify the presence of the data carrier. This allows level adjustment without the presence of data.

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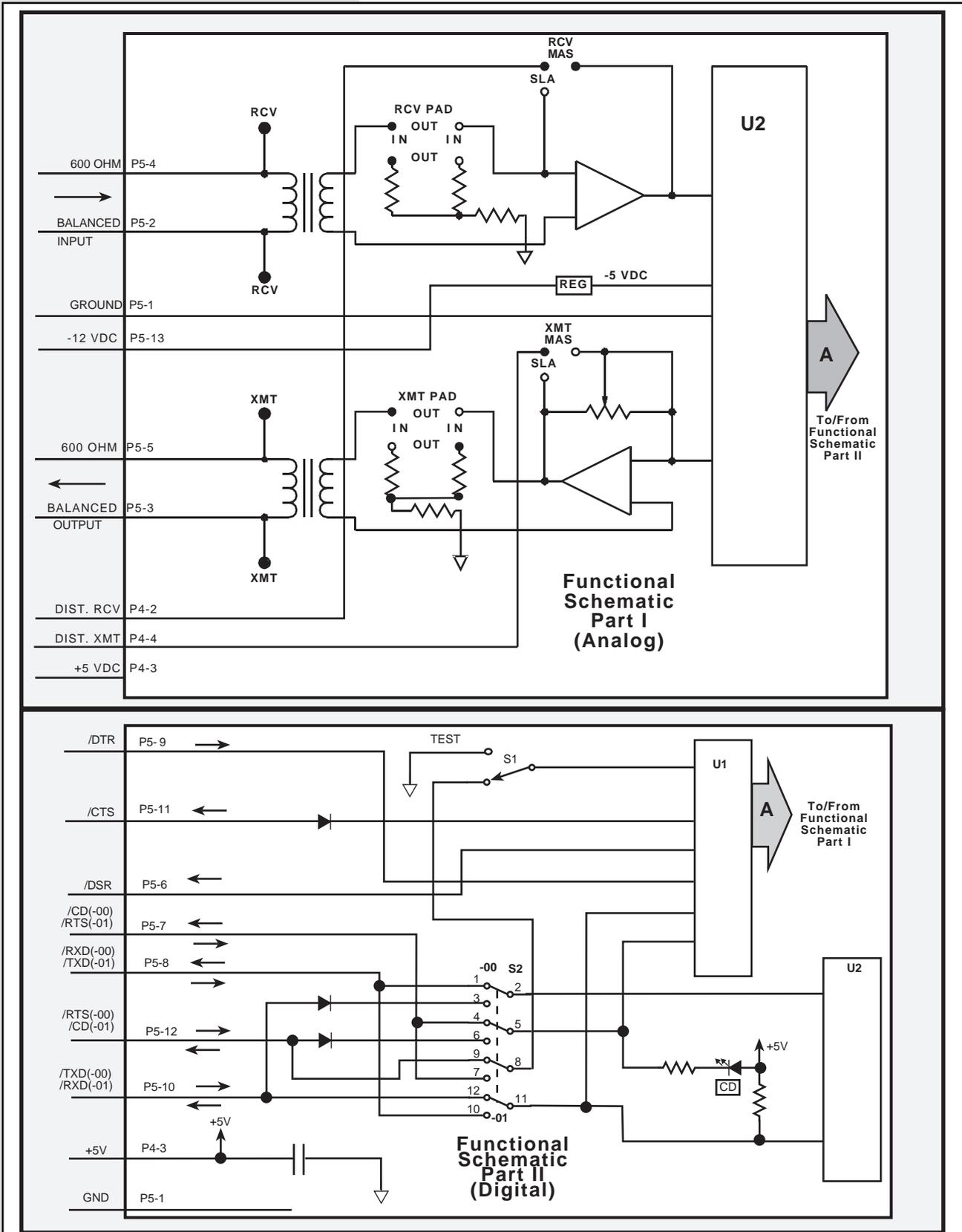
## Switch S2

Switch S2 reverses the RXD, DCD, RTS, and TXD leads.

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# CIRCUIT DESCRIPTION

FIG. 1 - FUNCTIONAL SCHEMATIC, 49013



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# INSTALLATION

Follow these steps to install the 49013 202 Tone Modem Subassembly:

## 1. Switch and Straps

Refer to Table A and Fig. 2 for the proper switch and strap options. Set the switches and straps for the options you want.

FIG. 2 - SWITCH AND STRAP LOCATION, 49013

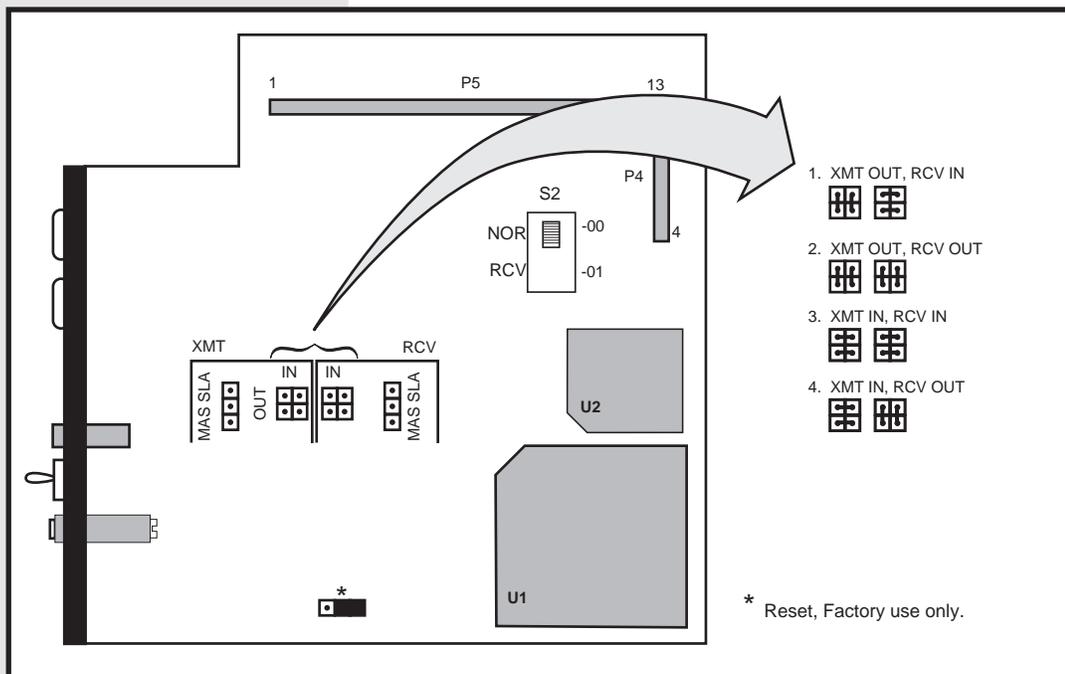


TABLE A - STRAP OPTIONS

OPTION	INSTALL STRAP
<b>MODE</b>	
Master Modem in Master/Slave system	XMT MAS and RCV MAS
Slave Modem in Master/Slave system	XMT SLA and RCV SLA
Single Modem (no Master/Slave) Store straps in non-operative position or remove.	XMT and RCV open (no straps)
<b>RCV PAD</b>	
RCV Pad IN (input level between 0 and -20 dBm)	Jumpers parallel to P5 (See Fig. 2)
RCV Pad OUT (input level between -20 and -40 dBm)	Jumpers perpendicular to P5 (See Fig. 2)
<b>XMT PAD</b>	
XMT Pad IN (output adjustable from -20 to -40 dBm)	Jumpers parallel to P5 (See Fig. 2)
XMT Pad OUT (output adjustable from -1 to -20 dBm)	Jumpers perpendicular to P5 (See Fig. 2)

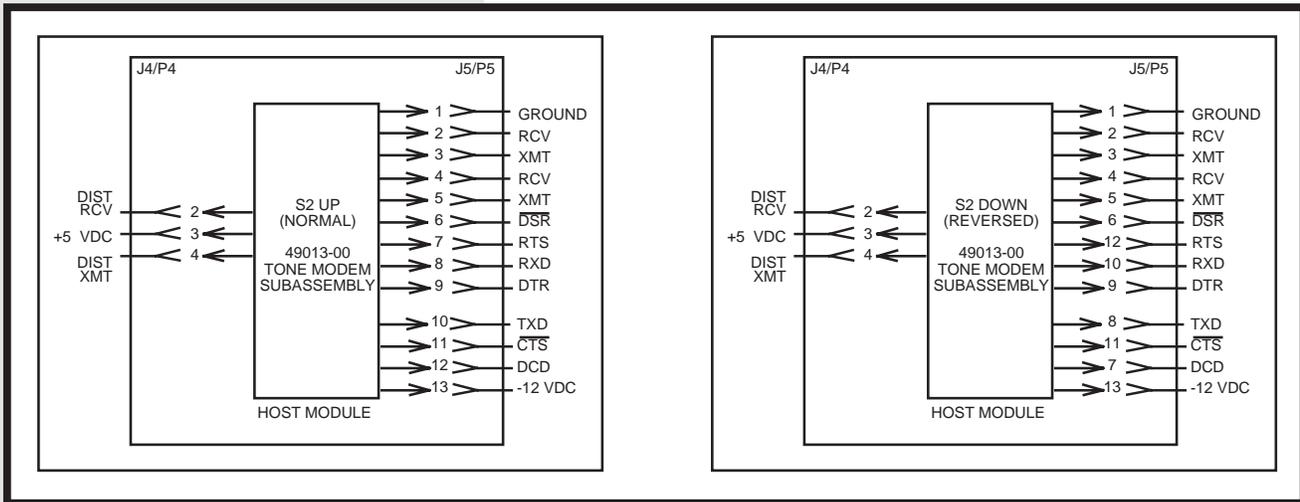
**Note:** Switch S2 reverses the TXD, RXD, DCD, and RTS leads. Refer to Fig. 3.

CONTINUED . . .

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# INSTALLATION

FIG. 3 - PIN CONNECTOR DESIGNATIONS, 49013



## 2. Install in System

If it is necessary to install the subassembly on a host module, refer to the documentation on the host module for the location of the subassembly and follow these steps:

- ◆ Remove the hole plug from the host module's front panel.
- ◆ Remove the screws from the three standoffs for the subassembly.
- ◆ If a subassembly is already installed, remove it.
- ◆ To place the 49013 subassembly, insert P4 and P5 into the connectors on the host module (see Fig. 2).
- ◆ Make sure each connector pin goes straight into the socket.
- ◆ Make sure the subassembly fits tightly on the standoffs and the front panel is straight in the host module's front panel opening.
- ◆ Replace the three screws in the standoffs.

CONTINUED . . .

# INSTALLATION

## 3. Checkout

Before you can check the operation of the 49013 202 Tone Modem Subassembly, you must first mount it on a host module and install it in a system. The modem must be connected to another modem at the other end of the communications line.

1. Apply power to the host modules with modems installed.
2. Place the front panel switch in the TEST position.
3. Verify that the front panel CD (Carrier Detect) LED at the distant end indicates data transmission activity.
4. With a dB meter (bridging), check the signal level at the XMT test points.
5. Adjust the XMT LVL to obtain the level required for the application.
6. When receiving data, check the incoming signal level at the RCV test points on the front panel with a dB meter (bridging). The signal level should be 0 to -40 dBm, depending on the application. There is no field adjustment for this circuit.

## Master/Slave Mode

When using the 49013 subassemblies in the Master/Slave mode of operation, use the following procedure to align the XMT levels. Refer to Fig. 4.

1. Set the 600 ohm dB meter for bridging and connect the meter to the XMT jacks of the 49013 subassembly that is operating as the master (location 1).

The meter should remain connected at this location for the entire alignment procedure.

- ◆ Turn the test switch ON and set the system level as required.
- ◆ When the XMT level of the master is set, turn the test switch OFF.

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**NOTE:** *To ensure proper settings of the levels, terminate the XMT line (pins 53 and 54 on the master) with 600 ohms when performing this alignment.*

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2. Proceed to location 2 (in the same equipment rack) and turn the test switch ON.
3. Adjust the XMT level at the slave front panel for the required system level (as measured by the master).

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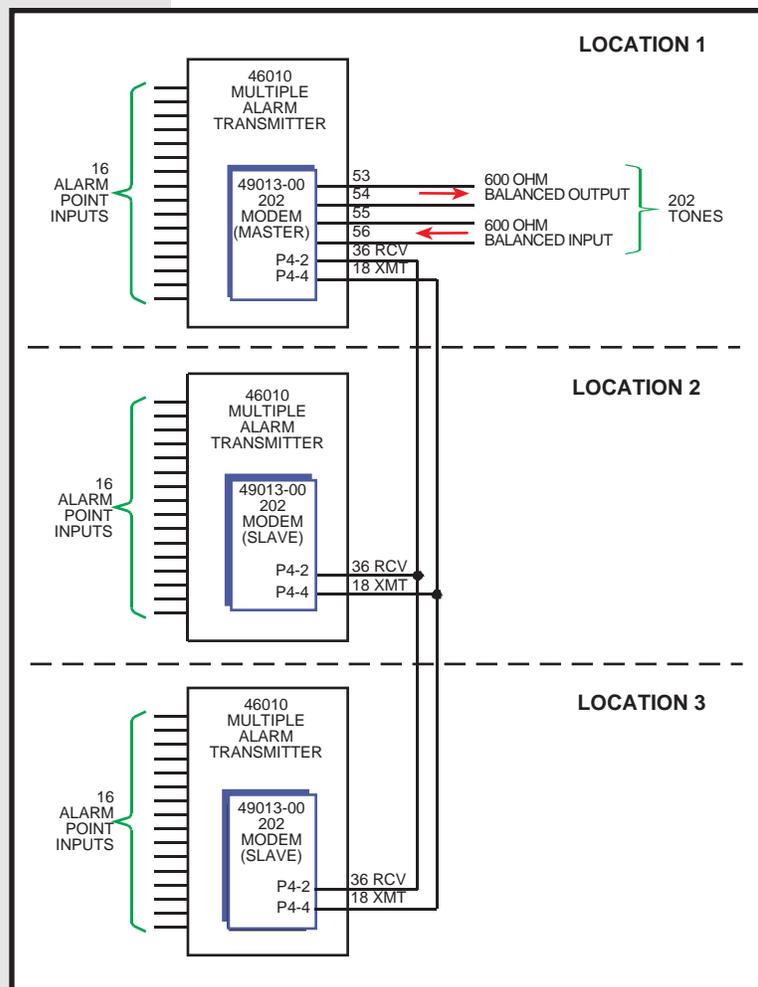
# INSTALLATION

4. Repeat steps 2 and 3 for the other slave locations.
5. After all slaves have been aligned, remove the level meter.

This completes the alignment procedure.

**NOTE:** Do not check the XMT levels at the slave location. These will be 9 dB below the system level when terminated at the slave XMT test jacks. Using the slave XMT test points to try and set the same level as the master will magnify and distort the signal above a maximum level of -1 dB.

FIG. 4 - 49013 MODEMS IN MASTER/SLAVE OPERATION



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# OPERATION

The 49013 202 Tone Modem Subassembly starts normal operation as soon as power is applied by way of the host module. Place the front panel switch in the TEST position as required to verify that the data transmission circuits are functioning.

The green LED labeled CD (Carrier Detect) on the front panel of the 49013 indicates that received data carrier is active.

# TECHNICAL SPECIFICATIONS

DESCRIPTION	VALUE
Input Voltage	-12 and +5 VDC (from host module)
Nominal Current (Add to host module's specs)	11 mA @ -24 VDC 6 mA @ -48 VDC
Heat Dissipation (Add to host module's specs)	0.99 Btu/Hr @ -24 VDC 0.98 Btu/Hr @ -48 VDC
Data Rate	1200 baud
Input Level Range	0 to -20 dBm/ -20 to -40 dBm
Output Level Range	-1 to -20 dBm/ -20 to -40 dBm
Operating Frequencies Mark Space	1200 Hz 2200 Hz
Operating Temperature Range	0° to 55° C.
Physical Dimensions	2.6" x 2.8" x 0.8"
Weight	1.75 ounces

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# 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**

