44124
DATA CHANNEL TERMINATION MODULE

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About this Practice:

This practice has been reissued to:

- Update Fig. 3.

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

UPDATED

Issue date: July 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.

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
B11-44124-00	Data Channel Termination

GENERAL DESCRIPTION

The 44124 Data Channel Termination Module (DCTM) is used to interface a metallic four-wire voice band/data channel line to a two-wire or four-wire modem when gain and equalization control are required.

The 44124 DCTM provides:

- ♦ Data channel line conditioning that includes:
  - • Impedance matching
  - • Selectable gain and attenuation control
  - • Adjustable 309B-type post equalization
- ♦ A loopback capability that can be activated manually or by a 2713 Hz tone
- ♦ Front panel LED indicators

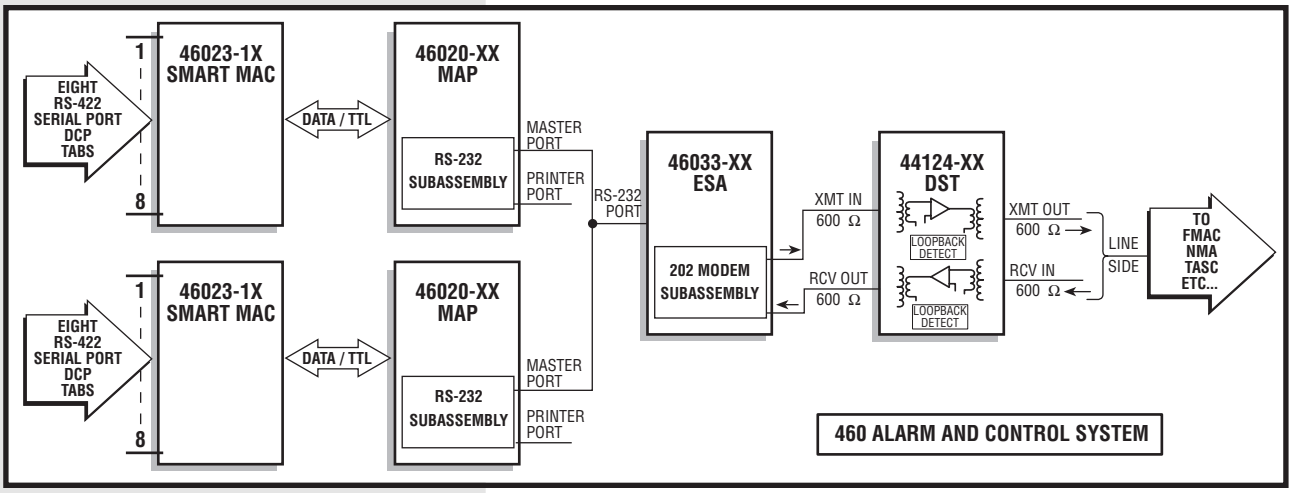
The 44124 DCTM is a plug-in printed circuit module that fits into any Dantel 400-type or similar equipment housing. It operates on -21 to -56 VDC input power.

APPLICATION INFORMATION

The 44124 is most often used in Dantel's 460 Alarm and Control System to interface mismatched data communication lines between the 46033 E-System Adapter and a distant Alarm Center. Refer to Fig. 1.

APPLICATION INFORMATION

FIG. 1 - EXAMPLE APPLICATION, 44124



CIRCUIT DESCRIPTION

A functional schematic for the 44124 Data Channel Termination Module is shown in Fig. 2. Here is a brief description of each of the functional parts of the circuit:

Impedance Matching Transformers

Two of the impedance matching transformers (T1 and T3) provide a switch selectable impedance of 150, 600, or 1200 ohms (set with switch 6). The module line conditioning circuit couples the line side receive and trasmit signals.

The drop side transformers provide a switch selectable application of two-wire or four-wire lines (select with switch S10). Drop side transformer impedance is fixed at 600 ohms.

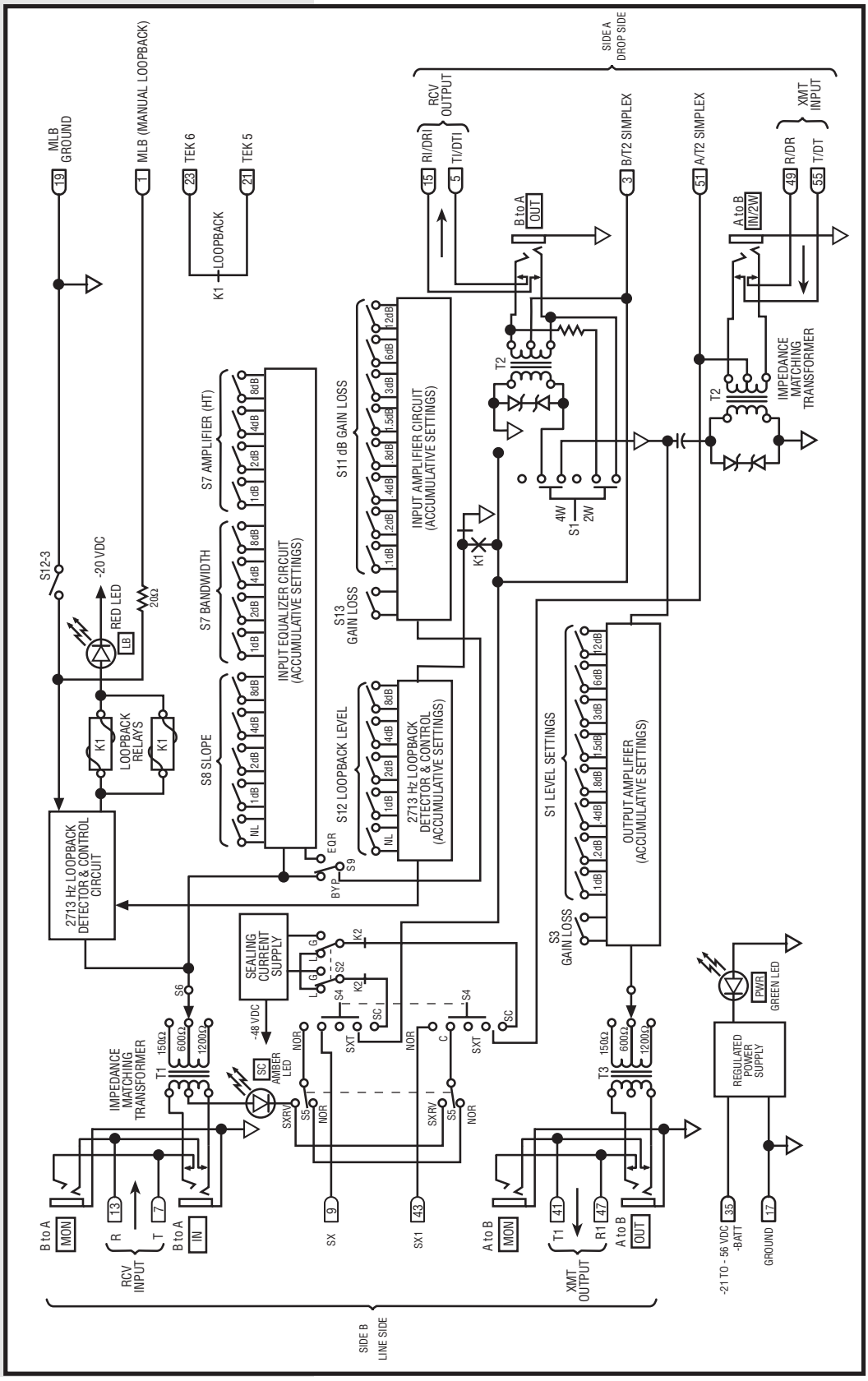
Input Equalizer Circuit

The input equalizer circuit receives an incoming signal from the impedance matching transformer (T1). The circuit adjusts slope, bandwidth, and amplitude before the signal reaches the input amplifier.

Set slope equalization with switches S8-1 to S8-5

- Switch S8-1 sets the equalizer slope cable to loaded or nonloaded.
- Switches S8-2 to S8-5 have assigned values that determines the total slope figure.

FIG. 2 - FUNCTIONAL SCHEMATIC, 44124



Set signal amplitude (height or HT) with switches S7-1 to S7-4. Each switch has an assigned value that determines the total signal amplitude.

Set equalizer height (HT) with switches S7-5 to S7-8. Each switch has an assigned value that determines the total bandwidth.

You can bypass the input equalizer by setting switch S9 to BYP.

Input Amplifier

The input amplifier supplies up to 24 dB of gain or loss in 0.1 dB increments.

- Set the amplification level with switches S11-1 to S11-8.
- Set the amplification as a gain or loss with switch S13.

Loopback and Control Circuit

The loopback and control circuit breaks the drop side receive and transmit paths, then connects the output of the receive path to the input of the transmit path. The loopback and control circuit is enabled in two ways. These are listed on the next page.

- The tone detector receives a 2713 Hz signal for at least 1.8 seconds. Tone detection provides remote testing of the facility and its active components.

  A guard circuit prevents signal frequencies near 2713 Hz from enabling the loopback feature.

- Set switch S12-3 to ON, or connect pin 1 to pin 19 (ground).

Set loopback amplifier gain to 0, 8, or 16 dB with switches S12-4 and S12-5.

When the loopback and control circuit activates, the TEK 5 and 6 connection leads open and relay K2 removes the sealing current.

The loopback and control circuit is disabled in two ways:

- Set switch S12-2 to ON.
- The circuit times out after 4 or 20 minutes. Set switch S12-1 to ON for a 4 minute timeout, and OFF for a 20 minute timeout.

At the end of the timeout cycle, relay K1 is released and the loopback and control circuit is disabled. Receive and transmit paths reset to normal. A second 2713 Hz tone also resets the paths.

Output Amplifier

The output amplifier supplies up to 24 dB of gain or loss in 0.1 dB increments. Set the amplification level with switches S1 and S3. The amplified output signal couples to connector pins 41 and 47 and the XMT OUT jack contacts.

CIRCUIT DESCRIPTION

Sealing Current Supply

Select the sealing current supply source with switch S2. The source can be the facility side simplex leads from transformers T1 and T3 or an on-board source.

Select the sealing current supply mode with switch S4. The mode can connect simplex leads to pins 9 and 43 or to the drop side A and B simplex leads.

A front panel LED indicates that sealing current is flowing. An unlit LED indicates improper switching or reversed simplex lead polarity. Set simplex lead polarity with switch S5.

Regulated Power Supply

The regulated power supply furnishes all 44124 DCTM power requirements. It supplies sealing current when the source is -48 VDC.

INSTALLATION

Installation consists of setting the switches, wiring for alarm acknowledgment, and installing the module in the shelf.

1. Set the switches.

To set switch options, refer to Fig. 3 and Table A.

2. Wire for alarm acknowledgment, if necessary.

Refer to Fig. 4 for module connector pin wiring assignments.

3. Install the module in the proper slot in the equipment shelf.

UPDATED

FIG. 3 - SWITCH LOCATIONS, 44124

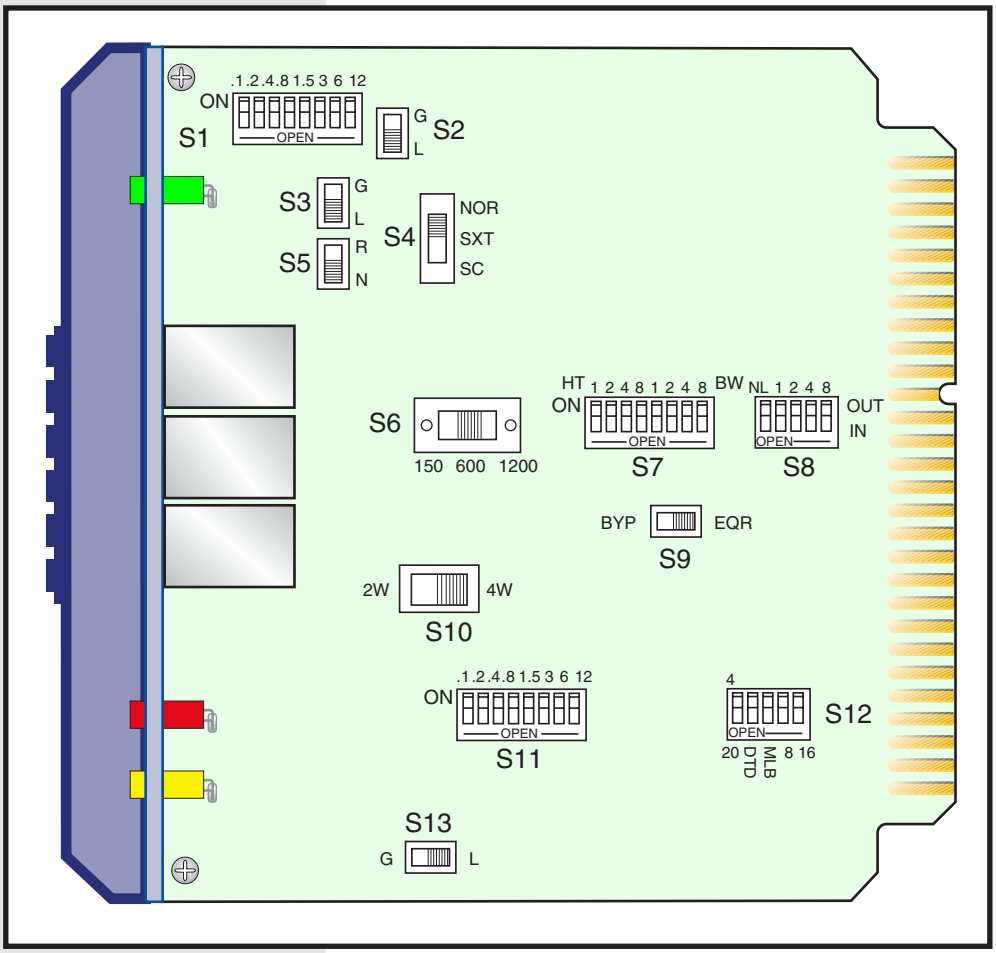


TABLE A - SWITCH OPTIONS, 44124

FUNCTION	OPTION	SWITCH	POSITION
Line Impedance	150 ohms 600 ohms 1200 ohms	S6 S6 S6	150 600* 1200
2W/4W Drop Select	Two-Wire Four-Wire	S10 S10	2W 4W*
2713 Hz Loopback	Enable Disable	S12-2 S12-2	DTD* ---
2713 Hz Loopback Timeout	4 Minutes 20 Minutes	S12-1 S12-1	4* 20
Manual Loopback	Enabled Disabled	S12-3 S12-3	ON OFF*

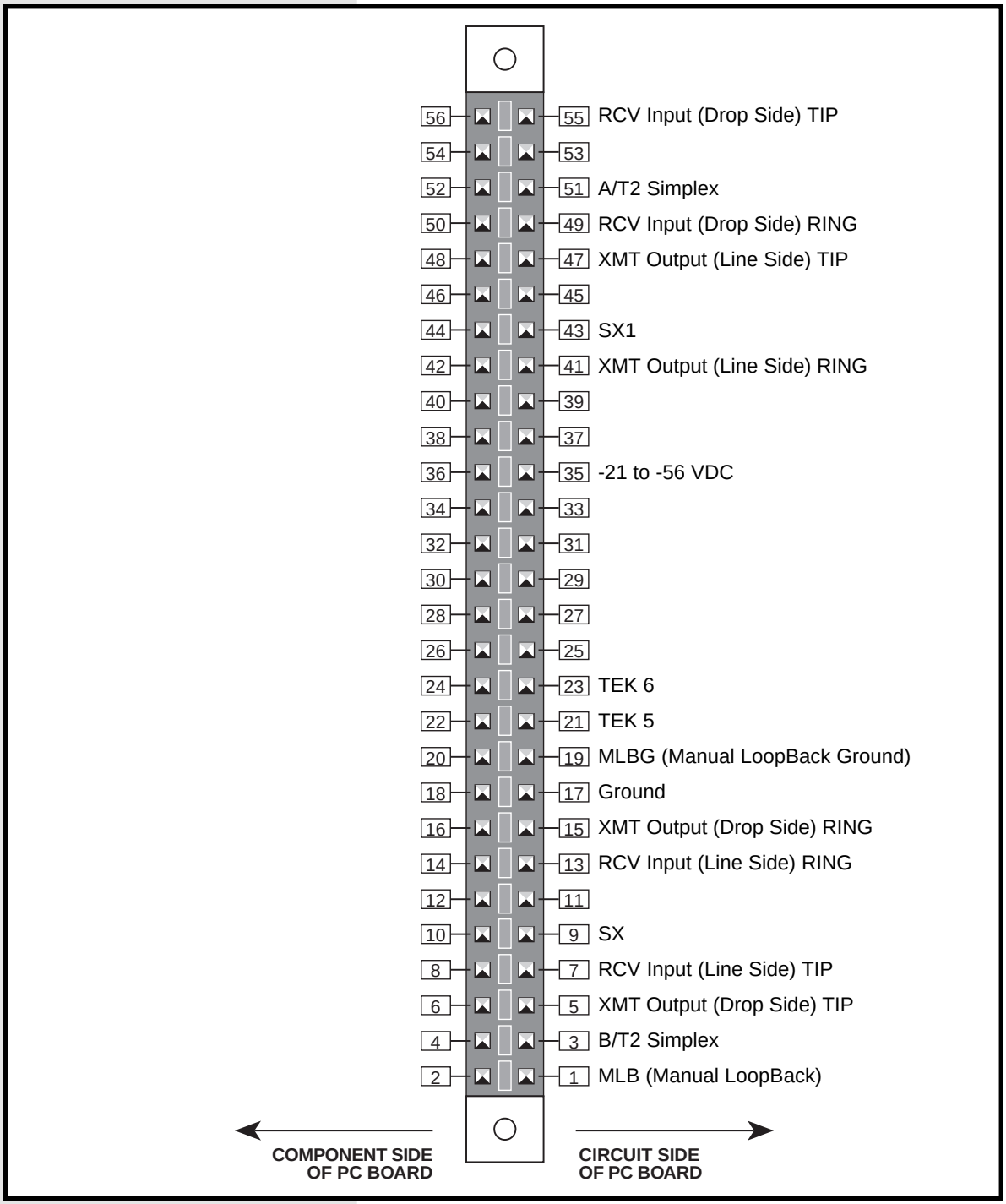
* Default Settings Indicated

CONTINUED . . .

TABLE A (CONTINUED) - SWITCH OPTIONS, 44124

FUNCTION	OPTION	SWITCH	POSITION
Loopback Gain	0 dB 8 dB 16 dB	S12-4 & 5 S12-4 S12-5 S12-4 S12-5	OFF* ON OFF OFF ON
Simplex Mode	Local Termination Bypass Loop	S4 S4 S4	NOR* SXT SC
Simplex Polarity	Normal Reversed	S5 S5	N* R
Sealing Current	Source Sink	S2 S2	G L*
Input Equalizer	Equalize Bypass	S9 S9	EQR* BYP
Equalizer Slope Cable Select	Loaded Nonloaded	S8-1 S8-1	--- NL*
Input Level Gain /Loss Select	Gain Loss	S13 S13	G L*
Input Level (dB, accumulative) * default is all off	0.1 0.2 0.4 0.8 1.5 3.0 6.0 12.0	S11-1 S11-2 S11-3 S11-4 S11-5 S11-6 S11-7 S11-8	ON ON ON ON ON ON ON ON
Output Level Gain /Loss Effect	Gain Loss	S3 S3	G L*
Output Level (dB, accumulative) * default is all off	0.1 0.2 0.4 0.8 1.5 3.0 6.0 12.0	S1-1 S1-2 S1-3 S1-4 S1-5 S1-6 S1-7 S1-8	ON ON ON ON ON ON ON ON
* Default Settings Indicated			

FIG. 4 - PIN DESIGNATIONS, 44124



CHECKOUT

Use the following equipment to test the 44124 DCTM:

- A Dantel A15-00440-00 56-pin extender card or equivalent.
- A Hewlett-Packard 3551 or equivalent voice frequency generator.
- Test cables.

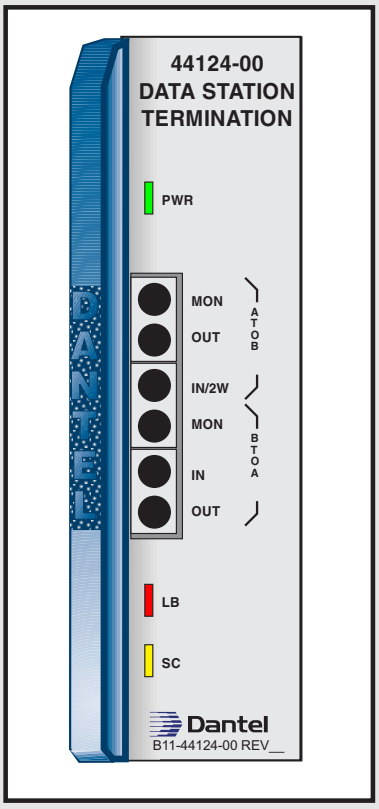
1. Mount the 44124 DCTM into the extender card.

1. Plug the card into the appropriately wired slot.
2. Set all the gain and equalization switches to OFF.

2. Use the transmission test set to record cable losses.

1. Have the distant end transmit a tone at a level of 0 dBmO.
2. Use the transmission test set programmed for bridged input level measurement. Insert the test cord into the RCV MON jack (refer to Fig. 5 for a 44124 DCTM front panel view). Record the cable losses (in dB) at the receive line end for the 404 Hz, 1004 Hz, 2504 Hz, and 3204 Hz frequencies.

FIG. 5 - FRONT PANEL VIEW



3. Determine measurements and set switches.

1. Determine the difference (in dB) between cable loss measurements at 404 Hz and 1004 Hz (the LF slope of the cable).

   If the LF slope is equal to or greater than 3.0 dB, set S8-1 ON (nonloaded cable). Set LF slope (SL) settings of switches S8-2 to S8-5 using the Nonloaded Cable column of Table B.

   If the LF slope is less than 3.0 dB, set S8-1 to OFF (loaded cable). Set LF slope (SL) settings of switches S8-2 to S8-5 using the Loaded Cable column of Table B.
2. Determine the difference (in dB) between cable loss measurements at 1004 Hz and 3204 Hz (the height for the cable).
3. Set height with switches S7-1 to S7-4. Refer to Table C.
4. Determine the difference (in dB) between cable loss measurements at 1004 Hz and 2504 Hz (the difference of the cable).
5. Set bandwidth with switches S7-5 to S7-8. Refer to Tables D and E.

4. Set gain or loss.

1. Set the input (receive) gain or loss as follows (Refer to Table A and Fig. 3):

   • Set the level meter to 600 ohms.

   • Plug the test cord into the RCV OUT jack (Refer to Fig. 5).

   • Have the far end transmit a 1004 Hz tone at 0 dBmO.

   • Set switch S13 for gain or loss.

CONTINUED . . .

- Set switches S11-1 to S11-8 for the required level.

2. Set the output (transmit) gain or loss as follows (Refer to Table A and Fig. 3):

- Set transmission to 600 ohms impedance.
- Plug the test cord into the IN/2W jack (Refer to Fig. 5).
- Send a 1004 Hz tone at 0 dBmO.
- Have the person at the far end measure the received level.
- Set switch S3 to gain or loss.
- Set switches S1-1 to 1-8 for the required far end receive level.

5. The procedure is complete.

- ♦ Unplug all test cords.
- ♦ Remove the module from the extender card.
- ♦ Plug the module into its proper slot in the shelf or housing.

TABLE B - LF SLOPE (SL) SETTINGS FOR LOADED AND NONLOADED CABLES

LOSS AT 1004 HZ WITH 404 HZ FOR REFERENCE LOW FREQUENCY SLOPE (LFSL)						
Loaded Cable (dB values)	Nonloaded Cable (dB values)	Reference Total	S8-2(1)	S8-3(2)	S8-4(4)	S8-5(8)
0.00	0.00	0	ON(OUT)	ON	ON	ON
0.35	0.50	1	OFF(IN)	ON	ON	ON
0.85	1.00	2	ON	OFF	ON	ON
1.35	1.35	3	OFF	OFF	ON	ON
1.65	1.80	4	ON	ON	OFF	ON
1.90	2.10	5	OFF	ON	OFF	ON
2.05	2.60	6	ON	OFF	OFF	ON
2.20	2.90	7	OFF	OFF	OFF	ON
2.35	3.10	8	ON	ON	ON	OFF
2.50	3.25	9	OFF	ON	ON	OFF
2.60	3.60	10	ON	OFF	ON	OFF
2.65	4.00	11	OFF	OFF	ON	OFF
2.70	4.15	12	ON	ON	OFF	OFF
2.75	4.30	13	OFF	ON	OFF	OFF
2.80	4.45	14	ON	OFF	OFF	OFF
2.85	4.60	15	OFF	OFF	OFF	OFF

NOTE: *If the calculated values of Slope (SL) fall between settings, use the lower setting indicated by the table.*

TABLE C - HEIGHT (HT) SETTINGS FOR 3204 HZ LOSS

LOSS AT 3204 HZ WITH 1004 HZ FOR REFERENCE HT SETTING SWITCH					
Calculated Loss (dB values)	Reference Total	S7-1(1)	S7-2(2)	S7-3(4)	S7-4(8)
0.00	OFF	OFF	OFF	OFF	OFF
0.35	1	ON	OFF	OFF	OFF
1.05	2	OFF	ON	OFF	OFF
1.75	3	ON	ON	OFF	OFF
2.45	4	OFF	OFF	ON	OFF
3.15	5	ON	OFF	ON	OFF
3.85	6	OFF	ON	ON	OFF
4.55	7	ON	ON	ON	OFF
5.25	8	OFF	OFF	OFF	ON
5.95	9	ON	OFF	OFF	ON
6.65	10	OFF	ON	OFF	ON
7.35	11	ON	ON	OFF	ON
8.05	12	OFF	OFF	ON	ON
8.75	13	ON	OFF	ON	ON
9.45	14	OFF	ON	ON	ON
10.15	15	ON	ON	ON	ON

NOTE: *If the calculated values of Height (HT) fall between settings, use the lower setting indicated by the table.*

TABLE D - BANDWIDTH (BW) SETTINGS FOR 2504 LOSS

LOSS AT 2504 HZ WITH 1004 HZ FOR REFERENCE BW SETTING SWITCH				
Reference Total	S7-5(1)	S7-6(2)	S7-7(4)	S7-8(8)
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

NOTE: *If the calculated values of Bandwidth (BW) fall between settings, use the lower setting indicated by the table.*

TABLE E - BANDWIDTH (BW) SETTINGS FOR 2504 HZ LOSS

LOSS AT 2504 HZ WITH 1004 HZ FOR REFERENCE
ACCUMULATIVE SWITCH SETTINGS S7-5 THROUGH S7-8

INSTRUCTIONS: Go down the left hand column to find the number (1 through 15) that matches the reference total amplitude (HT) setting from Table D. Follow that row across until a figure is reached that corresponds to or is greater than the measured bandwidth (BW) ("Checkout" section step number 10). If the BW falls between two numbers on the table, use the lesser number. Follow that column to the top where it is headed by a number from 1 through 15. That is the reference total bandwidth (BW) settings for switches S7-5 through S7-8 as given in Table E.

Total BW Level to be Set		REFERENCE TOTAL BANDWIDTH (BW)															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Reference Total Amplitude Setting from CHECKOUT Section and Table D (HT)	1	0.00	0.04	0.05	0.07	0.08	0.11	0.15	0.23	0.27	0.30	0.33	0.35	0.39	0.41	0.43	0.44
	2	0.00	0.08	0.10	0.13	0.16	0.22	0.30	0.46	0.55	0.60	0.67	0.70	0.77	0.83	0.87	0.88
	3	0.00	0.12	0.16	0.20	0.25	0.33	0.46	0.69	0.82	0.90	1.00	1.06	1.16	1.24	1.30	1.32
	4	0.00	0.16	0.21	0.27	0.33	0.44	0.61	0.92	1.09	1.20	1.33	1.41	1.55	1.65	1.73	1.76
	5	0.00	0.20	0.26	0.33	0.41	0.55	0.76	1.15	1.37	1.50	1.67	1.76	1.93	2.06	2.17	2.20
	6	0.00	0.24	0.31	0.40	0.49	0.66	0.91	1.38	1.64	1.80	2.00	2.11	2.32	2.48	2.60	2.64
	7	0.00	0.28	0.36	0.47	0.57	0.77	1.06	1.61	1.91	2.10	2.33	2.46	2.71	2.90	3.03	3.08
	8	0.00	0.32	0.42	0.53	0.66	0.89	1.22	1.84	2.19	2.40	2.67	2.82	3.09	3.30	3.47	3.52
	9	0.00	0.36	0.47	0.60	0.74	1.00	1.37	2.07	2.46	2.70	3.00	3.17	3.48	3.72	3.90	3.96
	10	0.00	0.40	0.52	0.67	0.82	1.11	1.52	2.30	2.73	3.00	3.33	3.52	3.87	4.13	4.33	4.40
	11	0.00	0.44	0.57	0.73	0.90	1.22	1.67	2.53	3.01	3.30	3.67	3.87	4.25	4.55	4.77	4.84
	12	0.00	0.48	0.62	0.80	0.98	1.33	1.82	2.76	3.28	3.60	4.00	4.22	4.64	4.96	5.20	5.28
	13	0.00	0.52	0.68	0.87	1.07	1.44	1.98	2.99	3.55	3.90	4.33	4.58	5.03	5.37	5.63	5.72
	14	0.00	0.56	0.73	0.93	1.15	1.55	2.13	3.22	3.83	4.20	4.67	4.93	5.41	5.79	6.07	6.16
	15	0.00	0.60	0.78	1.00	1.23	1.66	2.28	3.45	4.10	4.50	5.00	5.28	5.80	6.20	6.50	6.60

OPERATION

The 44124 Data Channel Termination Module operates when you apply power. For the most part, operation of the 44124 DCTM consists of observing the front panel LEDs or manually enabling or disabling the loopback circuit.

You can manually enable the loopback circuit in two ways:

- Set switch S12-3 to ON.

  or

- Interconnect edge connector pins 1 and 19 (ground).

The front panel of the 44124 DCTM has three LEDs (refer to Fig. 5):

- The green LED indicates applied power to the module.
- The red LED indicates loopback and control circuit activity.
- The amber LED indicates applied sealing current to the system.

TECHNICAL SPECIFICATIONS

DESCRIPTION		VALUE	
Input Voltage		-21 to -56 VDC	
INPUT CURRENT (maximum)		**-24 VDC**	**-48 VDC**
	Loopback Non-active (relays K1 & K2 not energized)	35 mA	50 mA
	Loopback Non-active (sealing current being generated)	58 mA	75 mA
	Loopback Active (no sealing current being generated)	65 mA	85 mA
HEAT DISSIPATION (maximum)		**-24 VDC**	**-48 VDC**
	Loopback Non-active (relays K1 & K2 not energized)	2.9 Btu/Hr	8.2 Btu/Hr
	Loopback Non-active (sealing current being generated)	4.8 Btu/Hr	12.3 Btu/Hr
	Loopback Active (no sealing current being generated)	5.4 Btu/Hr	14.0 Btu/Hr
Gain		± 24 dB	
Equalization		309B-type for 19, 22, 24, 25 and 26 gauge loaded/nonloaded cable	
Line Impedance		150/600/1200 ohms	
DROP IMPEDANCE			
	Two-Wire	600 ohms	
	Four-Wire	600 ohms	
Longitudinal Balance		Greater than 60 dB	
Frequency Response		± 0.5 dB @ 300 to 3400 Hz	
OUTPUT LEVEL (maximum)			
	Two-Wire	+2 dBm	
	Four-Wire	+8 dBm	
Harmonic Distortion		Less than 1%	
Return Loss		Greater than 20 dB	
Trans-hybrid Loss		Greater than 36 dB	
Temperature Range		0 to 55 degrees C.	
Dimensions		1.4" W x 6.0" D x 5.6	
Weight		8.4 ounces	

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