

**10A UNIT, DATA INTERFACE  
DESCRIPTION AND INSTALLATION  
"OMNIPORT" \* NETWORK CHANNEL TERMINATING EQUIPMENT**

	PAGE		PAGE
1. GENERAL . . . . .	1	3. 10A Unit Switch Controls . . . . .	11
2. UNIT DESCRIPTION . . . . .	2	4. Equalizer Performance Curves . . . . .	13
A. Unit Impedance . . . . .	2	5. Typical Applications of 10A Unit . . . . .	14
B. Maintenance Feature . . . . .	2	6. 10A Unit Connection Facilities . . . . .	15
C. Sealing Current . . . . .	2	7. Gain and Equalizer Adjusting Arrangements . . . . .	19
D. Monitor Jacks . . . . .	2	8. Customer Connector Pin Numbers . . . . .	20
E. Identification Leads . . . . .	2	9. 50-Pin Connector Strain Relief Bracket . . . . .	21
F. Unit Controls . . . . .	3		
G. Equalization . . . . .	3	<b>Tables</b>	
3. APPLICATION . . . . .	3	A. 10A Unit Specifications . . . . .	9
4. INSTALLATION . . . . .	3	B. 10A Unit Equalizer Performance . . . . .	12
A. Location Selection . . . . .	3	C. Lead Designations and Functions . . . . .	16
B. Network Connections . . . . .	4	D. Power Cord Connections . . . . .	18
C. Power Connections . . . . .	4	E. Gain and Equalization Factors . . . . .	18
D. Switch Settings . . . . .	4		
E. Customer Connections . . . . .	5	<b>1. GENERAL</b>	
5. MAINTENANCE . . . . .	6	1.01 This practice provides description, application, and installation information for the self-contained OMNIPORT Network Channel Terminating Equipment (NCTE) 10A Unit, Data Interface. A general description of OMNIPORT NCTE is given in AT&T Practice 332-620-100.	
<b>Figures</b>		1.02 When this practice is reissued, the reason(s) for reissue will be listed in this paragraph.	
1. 10A Unit, Data Interface . . . . .	7		
2. Block Diagram of 10A Unit . . . . .	8		

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**1.03** The 10A Unit is part of the OMNIPORT NCTE family of customer premises equipment (both mountings and circuit packs) for voice-frequency special services, maintenance, analog data, and digital services.

**2. UNIT DESCRIPTION**

**2.01** The self-contained 10A Unit (Fig. 1) consists of a formed metal base with a permanently mounted printed wiring board and molded plastic cover. The unit is 2-3/8 inches high, 6 inches wide, 10-1/4 inches long, and weighs approximately 2 pounds. Keyhole slots are provided on the unit base for wall mounting, or the unit can be mounted on a desk or shelf. The cover is designed to support a telephone set and modem when desk or shelf mounted.

**2.02** The 10A Unit is a switch selectable 2-4 or 4-4 wire data interface with a maintenance loopback feature for use on private line voice-frequency data circuits. It provides -20 to +26.5 dB of gain in 0.1-dB steps in both directions of transmission. This unit also provides 0 to 15 dB of 2804-Hz post-equalization in 1-dB steps in the receive (from the network) direction. A block diagram of the 10A Unit is shown in Fig. 2 and the unit specifications are summarized in Table A. The 10A Unit is functionally equivalent to a BPT62 data interface unit permanently mounted in a 146B single-circuit mounting.

**2.03** The unit can be powered by either -48 volts dc or by 24 volts ac. An 11BR power supply kit can be used to provide -48 volts dc power, or an 11BS power supply kit can be used to provide 24 volts ac to the unit. These power supply kits consist of receptacle-mounted power supplies and 6-foot power cords.

**A. Unit Impedance**

**2.04** This unit provides a 600-ohm impedance to the customer equipment and a switch selectable 150-, 600-, or 1200-ohm impedance to the network facility. The 600- and 1200-ohm impedances are used to match nonloaded and loaded cable, respectively. The 150-ohm impedance is used to provide mismatch equalization on nonloaded cable.

**B. Maintenance Feature**

**2.05** The maintenance feature is remotely activated by applying a 2713-Hz tone to the unit for at least 2 seconds. When the tone is removed, the

maintenance feature will activate causing the unit to disconnect the customer equipment from the circuit and provide a loopback connection to the network facility. A switch selectable gain of 0, 8, or 16 dB is inserted in the loopback path to provide standard signal levels to the transmit (to the network) path. A BUSY indicator will light while the maintenance feature is activated. The maintenance feature can be deactivated either by applying a 2713-Hz tone to the unit for at least 1 second, or by allowing the feature to automatically time out after 20 minutes.

**2.06** In the 2-4 wire configuration, the maintenance feature internally terminates and tests the compromise canceler as part of the loopback connection.

**2.07** The maintenance feature can be locally activated by connecting the MLB (manual loopback) lead to the MLBG (manual loopback return) lead. The unit will remain in the loopback condition as long as the MLB and MLBG leads are connected together.

**2.08** A contact opening is provided between the TEK5 and TEK6 leads when the maintenance feature is activated as a "maintenance busy" indication to the customer equipment.

**C. Sealing Current**

**2.09** A switch selectable sealing current option connects the SXT and SXR leads together to provide a return path for sealing current applied at the far end of the circuit. The SXT and SXR leads are also available on wire wrap pins to allow connection to a local sealing current source, if desired. If the maintenance feature is activated while the sealing current option is selected, the sealing current path will be opened as a central office indication that the unit is in the maintenance mode.

**D. Monitor Jacks**

**2.10** Two 310-type monitor jacks, TRANS MON and REC MON, are located on the printed wiring board. These jacks provide test access to the customer side of the unit.

**E. Identification Leads**

**2.11** This unit contains two identification leads (ID1 and ID2) for use by the telephone compa-

ny. These leads are available for insertion of a component on the printed wiring board to allow positive identification of a particular unit.

#### F. Unit Controls

**2.12** The unit switch controls are shown in Fig. 3 and are described in the following paragraphs.

**2.13** **BUSY:** This indicator is visible through the window on the front of the unit cover and will light when the unit is in the maintenance mode.

**2.14** **2W;4W:** This switch selects the customer-side interface. Set the switch in the 2W position to provide a 2-wire customer interface or in the 4W position to provide a 4-wire customer interface.

**2.15** **150;600;1200:** This switch selects the network side output impedance. Set the switch in the 600 position to match nonloaded cable or in the 1200 position to match loaded cable. Set the switch in the 150 position to provide mismatch equalization.

**2.16** **SC:** This option provides a sealing current return path when the switch is in the ON position.

**2.17** **0;8;16:** This switch selects the amount of gain provided in the loopback path. Set the switch in the 0, 8, or 16 position to provide 0, 8, or 16 dB of loopback gain.

**2.18** **TRANS GAIN and REC GAIN:** The TRANS GAIN and REC GAIN switches (.1, .2, .4, .8, 1, 2, 4, 8, 10, and -20) control -20 to +26.5 dB of gain in 0.1-dB steps in the transmit and receive directions, respectively. Set the switches so the sum of the switches in the ON position equals the desired gain or loss.

**Note:** The -20 switch provides 20 dB of loss. For example, if 8 dB of loss is required, set the -20, 10, and 2 switches in the ON position.

**2.19** **REC EQ:** These switches (1, 2, 4, and 8) control 0 to 15 dB of post-equalization in 1-dB steps in the receive (from the network) direction. Set the switches so the sum of the switches in the ON position equals the desired equalization.

#### G. Equalization

**2.20** The 10A Unit provides 0 to 15 dB of slope equalization in 1-dB steps in the receive (from the network) direction. For ease of equalizer adjustment, the markings on the EQ switches indicate the amount of 2804-Hz equalization supplied when the switches are in the ON position. For example, if 3 dB of 2804-Hz equalization is required, set switches 1 and 2 in the ON position. Equalizer performance is shown in Table B and by the frequency response curves in Fig. 4.

**2.21** The gain and equalizer settings are independent of each other. As shown in Fig. 4, the equalizer setting has little effect on the unit gain at 1 kHz while providing additional gain at 2800 Hz and introducing loss at 400 Hz.

**2.22** When the 150-ohm output impedance option is used to provide mismatch equalization, the unit gain should be set using the unknown facility procedure of paragraphs 4.15 and 4.16 (disregard Steps 7 and 8 of the procedure which adjust the active equalizer).

### 3. APPLICATION

**3.01** The 10A Unit is a self-contained 2-4 or 4-4 wire data interface for use on 4-wire voice-frequency private line data circuits. This unit can be used as a replacement for 829 data auxiliary sets. This unit can also be used as a 2-4 or 4-4 wire terminal repeater for voice-frequency special services applications. Typical applications of the unit are shown in Fig. 5.

### 4. INSTALLATION

**4.01** Connection facilities for the unit are shown in Fig. 6 and consist of a 16-position terminal strip, a 50-position miniature ribbon plug, an 8-pin modular jack, and four wire wrap pins. The terminal strip terminates network, power, and customer equipment leads. The 50-position plug and 8-pin jack provide alternate methods of connecting customer equipment leads. Four wire wrap pins provide access to the simplex (SX) and manual loopback leads.

#### A. Location Selection

**4.02** The mounting location must be selected to provide access to a 3-pronged, 60-Hz, 117-volt

ac outlet. The power supply kits used with this unit include a 6-foot power cord. If necessary, this cord may be replaced with a cord up to 15 feet long (see paragraph 4.08).

**Table Mounting**

**4.03** To mount this unit on a horizontal surface, such as a desk or table:

- Place unit in desired location.
- Remove cover.
- Connect network and power leads (paragraphs 4.07 through 4.09).
- Set unit switch controls (paragraphs 4.10 through 4.16).
- Connect customer equipment leads (paragraphs 4.17 through 4.19).
- Mark type of service on label at rear of cover.
- Replace cover.

**4.04** The unit cover is designed to allow a standard telephone set and modem to be placed on top of the unit.

**Wall Mounting**

**4.05** Keyhole slots are provided in the base of this unit for wall mounting. Use the keyhole slots at the front of the base to mount the unit vertically, or use the keyhole slots along the length of the base to mount the unit lengthwise.

**4.06** To mount this unit on a wall:

- Remove cover.
- Use base as a template to locate the required screw holes.
- Drill pilot holes for mounting screws.
- Install mounting screws (wood screws are provided). Leave screws extended from wall far enough to engage keyhole slots in unit base.

- Slip keyhole slots over screws and tighten screws until snug.
- Connect network and power leads (paragraphs 4.07 through 4.09).
- Set unit switch controls (paragraphs 4.10 through 4.16).
- Connect customer equipment leads (paragraphs 4.17 through 4.19).
- Mark type of service on label at rear of cover.
- Replace cover.

**B. Network Connections**

**4.07** Connect the network leads to the unit using the appropriate terminals of the terminal strip and wire wrap pins shown in Fig. 6. Refer to Table C for lead functions, designations, and connector appearances.

**C. Power Connections**

**4.08** The unit can be powered by either -48 volts dc or by 24 volts ac. An 11BR power supply kit can be used to supply -48 volts dc to the unit, or an 11BS power supply kit can be used to provide 24 volts ac. These power supply kits include a 6-foot power cord; if a longer cord is required, 22- or 24-gauge plastic-insulated inside telephone wire can be used to make a cord up to 15 feet long.

**4.09** Connect the power supply to the unit as indicated in Table D.

**D. Switch Settings**

**4.10** Set the unit controls as required for proper circuit operation. For convenience, the GAIN and EQ switch markings indicate the amount of gain and equalization supplied when the switches are placed in the ON position. Paragraphs 4.11 through 4.16 provide information on setting the GAIN and EQ switches.

**4.11** The gain and equalization to be provided can be determined by two methods. One method is used when the facility length and gauge are known. The other method is used when the facility length and gauge are not known, if 150-ohm mismatch

equalization is provided, or if the circuit fails to meet transmission requirements using the known facility method.

#### Known Facility

**4.12** When the length and gauge of the facility are known, gain and equalization values can be obtained from the Work Order Record and Details (WORD) document, the circuit layout record (CLR) card, or by using the gain and equalization factors in Table E.

**4.13** The necessary gain can be calculated by multiplying the length of cable, in miles or kilofeet, by the appropriate gain factor. For mixed gauge cables, the sum of the values calculated for each gauge will equal the required gain.

**4.14** Equalization required for nonloaded cable can be calculated by multiplying the length of cable, in kilofeet, by the equalization factor (0.25). If values between two available switch settings are obtained, use the lower value setting.

**Example:** Fifteen (15) kft of nonloaded cable has a calculated equalization value of 3.75 dB (15 kft X 0.25 = 3.75 dB). An EQ switch setting of 3 should be used (i.e., switches 1 and 2 in the ON position).

#### Unknown Facility

**4.15** The following procedure is for use when the length and gauge of the facility are not known, if 150-ohm mismatch equalization is provided, or if transmission requirements are not met using the known facility procedure. Test equipment required for the following procedure includes a 600-ohm oscillator and a 600-ohm detector. Equipment connections are shown in Fig. 7.

**Note 1:** To obtain accurate GAIN and EQ switch settings, customer equipment can not be connected to the unit during the following procedure.

**Note 2:** If 150-ohm mismatch equalization is provided, disregard Steps 7 and 8, which adjust the active equalizer.

**4.16** Set the GAIN and EQ switches as follows:

1. Connect 600-ohm oscillator to the TRANS MON jack. Adjust oscillator to provide a 1004-Hz, 0-dBm signal.
2. Connect detector at far end of facility to measure 1004-Hz tone.
3. Adjust TRANS GAIN switches to provide the desired level at far end.
4. Connect oscillator at far end of facility. Adjust oscillator to provide a 1004-Hz, 0-dBm signal.
5. Connect detector at customer side of unit to measure 1004-Hz tone as follows:
  - (a) **Two-Wire Interface:** Remove oscillator from TRANS MON jack and connect detector at TRANS MON jack.
  - (b) **Four-Wire Interface:** Connect detector at REC MON jack.
6. Adjust REC GAIN switches to provide desired level at detector.
7. Adjust oscillator at far end of facility to provide a 2804-Hz, 0-dBm signal.
8. Adjust EQ switches to provide a 2804-Hz level equal to, or slightly less than, 1004-Hz level set in Step 6.
9. Remove test equipment.

#### E. Customer Connections

**4.17** Connections to customer equipment can be made on the terminal strip, the 50-position miniature ribbon plug, or the 8-pin modular jack. Figure 8 shows the pin numbering for the 8-pin jack and 50-position plug. Refer to Table C for lead functions, designations, and connector appearances.

**4.18** If the 50-position plug is used for customer connections, install strain relief bracket (Fig. 9) before connecting 50-position jack to the plug. The strain relief bracket is included in the parts packet provided.

- Mount bracket to left of 50-position plug using the 4-40 x 5/8 inch screw provided (bracket will cover opening to 8-pin modular jack).
- Connect 50-position jack to plug and tighten screw on end of jack until snug.
- Tie cable to strain relief bracket with a cable tie.

4.19 Restrain the leads to the terminal strip and wire wrap pins with a cable tie as shown in Fig. 6.

## 5. MAINTENANCE

5.01 This unit requires no routine maintenance. If a unit is faulty, replace it with a spare and send the defective unit to the nearest AT&T Service Center for repair.

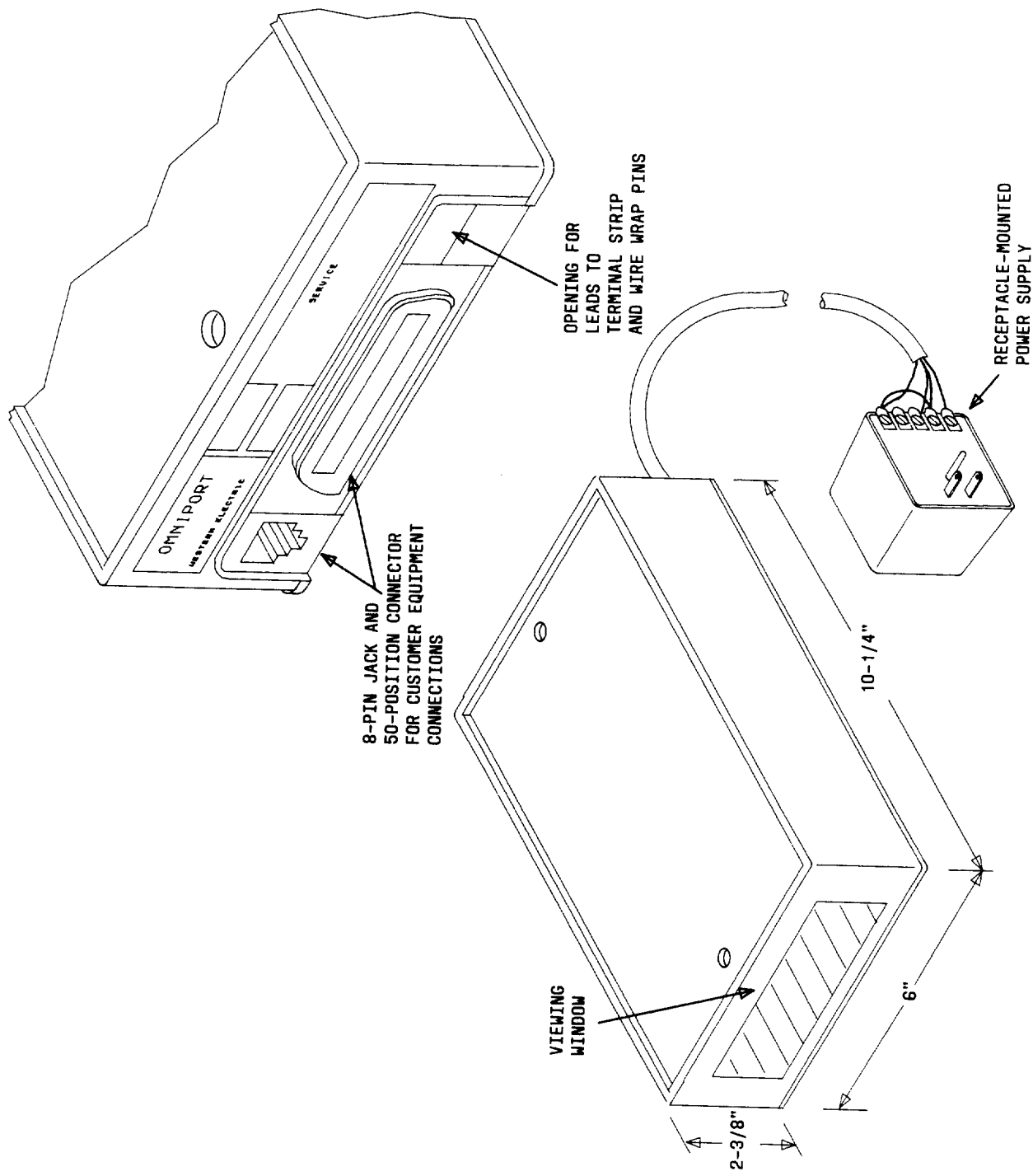


Fig. 1 — 10A Unit, Data Interface

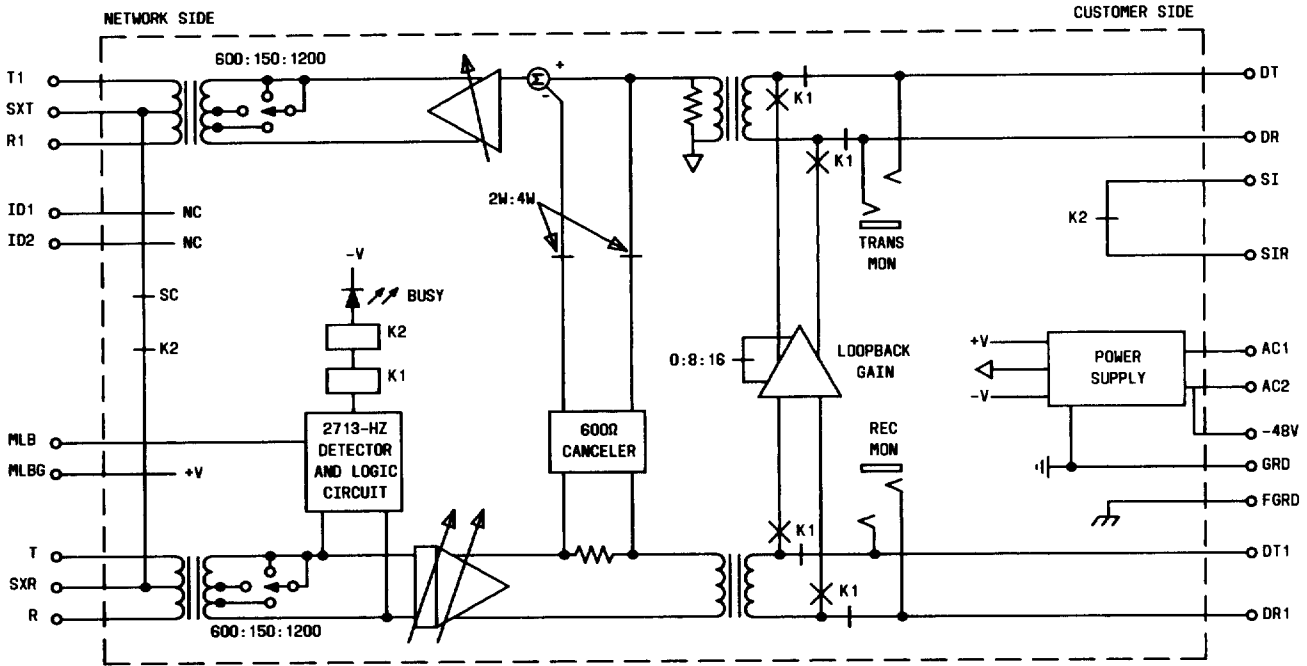


Fig. 2—Block Diagram of 10A Unit



**TABLE A**  
**10A UNIT SPECIFICATIONS**

FEATURE	PERFORMANCE
<u>GENERAL</u>	
CLEI CODE	NCDI031AAA
DIMENSIONS (H, W, D in Inches)	2 $\frac{3}{8}$ × 6 × 10 $\frac{1}{4}$
WEIGHT	2 pounds
TEMPERATURE	
Operating	0° C to 50° C
Storage	-40° C to 66° C
HUMIDITY	5 Percent to 95 Percent Relative
<u>POWER INPUT REQUIREMENTS</u>	
VOLTAGE	-48 volts dc or 24 volts ac (Printed Wiring Board is Fused)
CURRENT DRAIN	
Typical	40 mA
Typical With Maintenance Feature Activated	80 mA
<u>TRANSMISSION</u>	
INTERFACE	2W-4W or 4W-4W
IMPEDANCE	
Customer Side	600 Ohms
Network Side	600/1200 Ohms (for Nonloaded and Loaded Cable) 150 Ohms (for Mismatch Equalization of Nonloaded Cable)
GAIN/ATTENUATION	
Transmit	-20.0 to +26.5 dB (Switch Selectable in 0.1 dB Steps)
Receive	-20.0 to +26.5 dB (Switch Selectable in 0.1 dB Steps)
EQUALIZATION	
Receive (Post)	0 to 15 dB Slope (Switch Selectable in 1 dB Steps)
RETURN LOSS	
Customer Side	
ERL	2-4 Wire Greater Than 20 dB
SRL	Greater Than 27 dB
ERL	4-4 Wire Greater Than 29 dB
SRL	Greater Than 31 dB
Network Side	
ERL	Greater Than 31 dB
SRL	Greater Than 32 dB (150, 600, or 1200 Ohms)
TRANSHYBRID LOSS	30 dB Minimum into 600 Ohms
LONGITUDINAL BALANCE	
(200 to 3000 Hz)	
Customer Side	Greater Than 60 dB
Network Side	Greater Than 60 dB

TABLE A (Contd)

10A UNIT SPECIFICATIONS

FEATURE	PERFORMANCE
<u>TRANSMISSION (Contd)</u>	
IDLE CHANNEL NOISE	Less Than 5 dBrnC
ENVELOPE DELAY DISTORTION	$\pm 100 \mu\text{sec}$ (200 to 4000 Hz Referenced to 1 kHz)
PEAK-TO-AVERAGE RATIO (PAR)	98 or Greater
MAXIMUM SIGNAL LEVELS Input Output	+12 dBm +12 dBm
CROSSTALK	Greater Than 90 dB (Between Adjacent Circuit Packs)
<u>MAINTENANCE FEATURE</u>	
TYPE	20-Minute Transmission Loopback With 0, +8, or +16 dB of Gain
TONE DETECTOR	2713 $\pm 7$ Hz Tone, -30 dBm to 0 dBm (10 dB or Greater Signal-to-Noise Ratio)
REMOTE ACTIVATION	Activates After Removal of a 2-Second or Longer 2713 $\pm 7$ Hz Tone
REMOTE DEACTIVATION	Deactivates After Receiving 2713 $\pm 7$ Hz Tone for 1 Second or Will Time Out After 20 Minutes
LOCAL ACTIVATION	Activates When MLB and MLBG Leads Are Connected Together. (Will Remain Activated Until Connection Is Removed.)
CUSTOMER BUSY	TEK5 and TEK6 Leads are Open

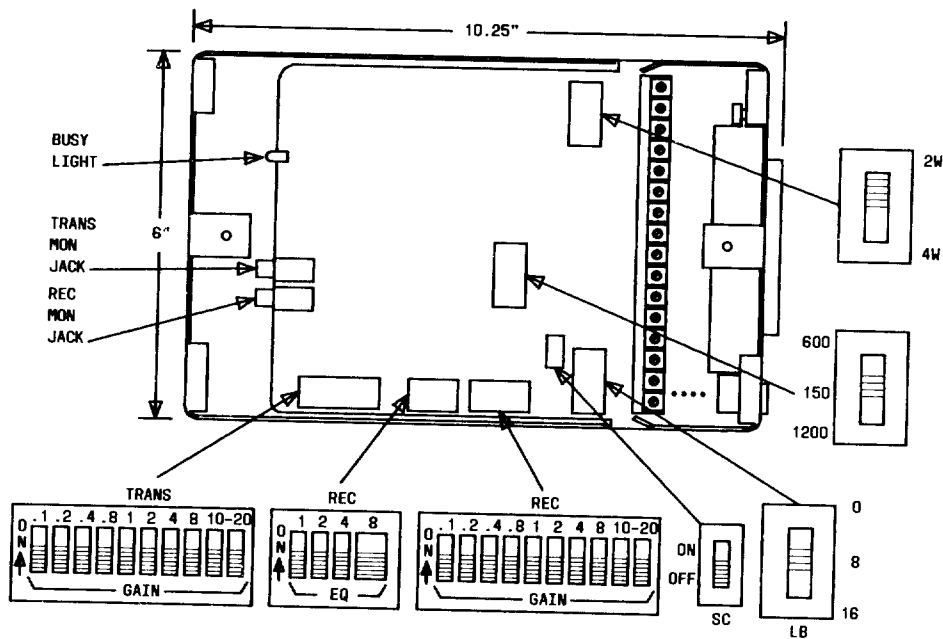


Fig. 3—10A Unit Switch Controls

**TABLE B**

**10A UNIT EQUALIZER PERFORMANCE**

**EQUALIZER GAIN CONTRIBUTION IN DB**

EQ SWITCH SETTING	FREQUENCY (HZ)						
	100	200	400	1000	2000	2800	4000
0	- 0.55	- 0.33	-0.16	0.00	-0.05	-0.24	-0.35
1	- 0.89	- 0.67	-0.48	-0.15	0.42	0.73	0.55
2	- 1.28	- 1.05	-0.82	-0.28	0.94	1.67	1.42
3	- 1.79	- 1.54	-1.26	-0.40	1.60	2.71	2.42
4	- 2.24	- 1.98	-1.64	-0.46	2.16	3.51	3.19
5	- 3.02	- 2.73	-2.27	-0.46	3.04	4.66	4.31
6	- 3.97	- 3.62	-2.97	-0.34	3.98	5.79	5.42
7	- 5.41	- 4.92	-3.88	0.00	5.13	7.10	6.71
8	- 7.51	- 6.90	-5.43	-0.19	5.50	7.81	9.75
9	- 7.86	- 7.24	-5.74	-0.33	5.97	8.77	10.64
10	- 8.24	- 7.61	-6.09	-0.47	6.49	9.71	11.52
11	- 8.75	- 8.11	-6.53	-0.59	7.16	10.76	12.53
12	- 9.20	- 8.55	-6.90	-0.65	7.72	11.56	13.30
13	- 9.96	- 9.28	-7.52	-0.64	8.60	12.72	14.42
14	-10.92	-10.18	-8.23	-0.54	9.54	13.85	15.53
15	-12.33	-11.47	-9.13	-0.19	10.70	15.16	16.82

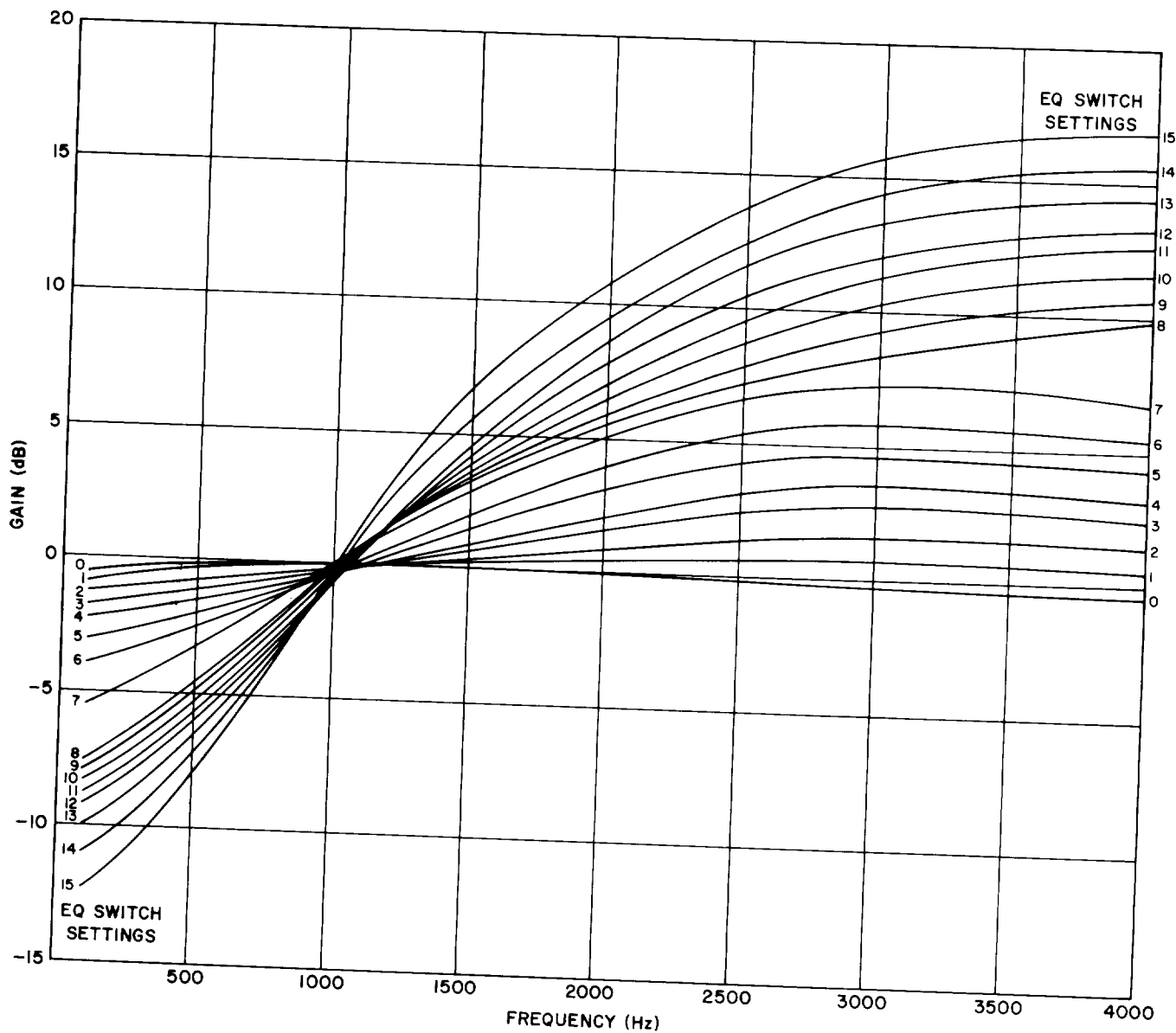
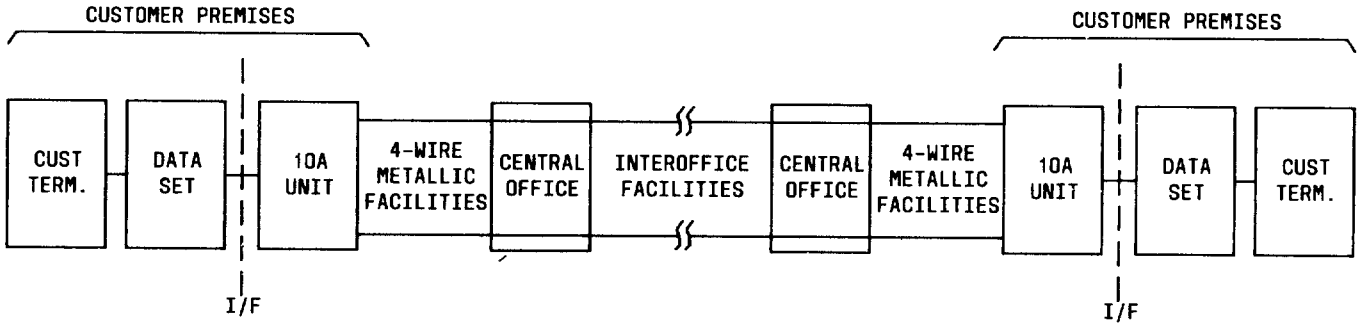
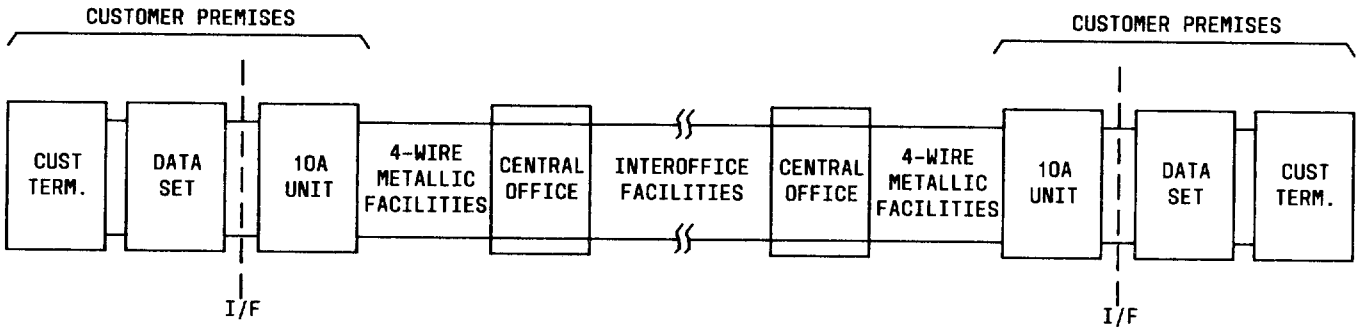


Fig. 4—Equalizer Performance Curves



(A) 4-WIRE POINT-TO-POINT  
PRIVATE LINE DATA CIRCUIT  
WITH 2-WIRE CUSTOMER INTERFACE



(B) 4-WIRE POINT-TO-POINT  
PRIVATE LINE DATA CIRCUIT  
WITH 4-WIRE CUSTOMER INTERFACE

Fig. 5—Typical Applications of 10A Unit

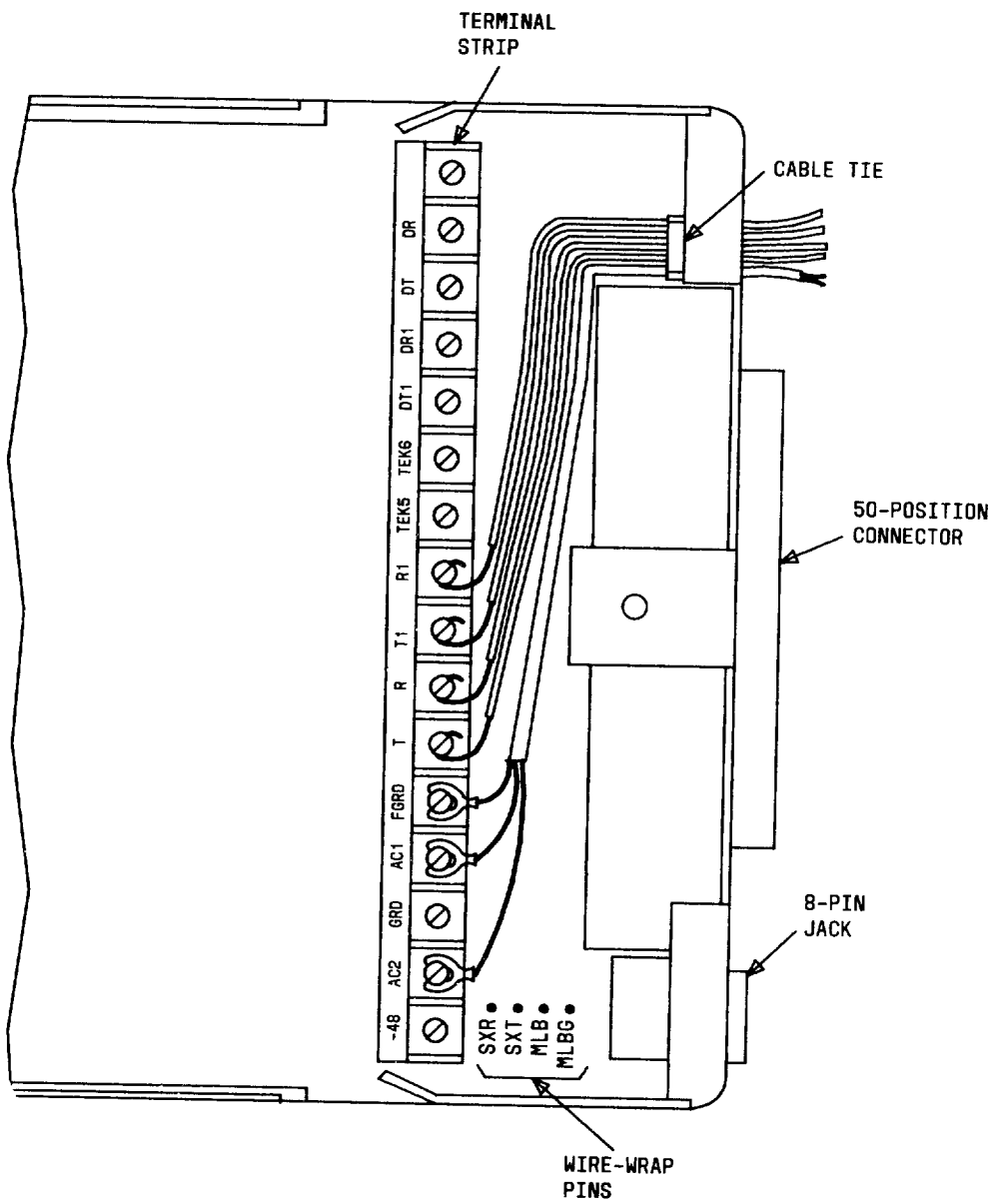


Fig. 6—10A Unit Connection Facilities

TABLE C					
LEAD DESIGNATIONS AND FUNCTIONS					
LEAD DESIGNATION	50-POSITION CONNECTOR	8-PIN JACK	TERMINAL STRIP	WIRE-WRAP PINS	LEAD FUNCTIONS
	PIN	PIN	DESIG	DESIG	
<b>CUSTOMER LEADS</b>					
DT	29	2	DT		Data tip lead toward the customer
DR	4	1	DR		Data ring lead toward the customer (The DT and DR leads are the transmit and receive pair for 2-wire services or the transmit input pair for 4-wire services)
DT1	30	7	DT1		Data tip 1 lead toward the customer
DR1	5	8	DR1		Data ring 1 lead toward the customer (The DT1 and DR1 leads are the receive output pair for 4-wire services)
TEK5	28	3	TEK5		Status indicator toward the customer
TEK6	3	6	TEK6		Status indicator return toward the customer
<b>NETWORK LEADS</b>					
T1			T1		Tip 1 lead toward the network
R1			R1		Ring 1 lead toward the network (The T1 and R1 leads are the transmit and receive pair for 2-wire services or the transmit output pair for 4-wire services)
T			T		Tip lead toward the network
R			R		Ring lead toward the network (The T and R leads are the receive input pair for 4-wire services)
SXT	31			SXT	Transmit simplex lead (network side)
SXR	6			SXR	Receive simplex lead (network side)
MLB	33			MLB	Manual loopback lead
MLBG	8			MLBG	Manual loopback return lead
ID1	1				Identification lead 1
ID2	26				Identification lead 2



TABLE C (Contd)

LEAD DESIGNATIONS AND FUNCTIONS

LEAD DESIGNATION	50-POSITION CONNECTOR	8-PIN JACK	TERMINAL STRIP	WIRE-WRAP PINS	LEAD FUNCTIONS
	PIN	PIN	DESIG	DESIG	
POWER LEADS					
-48V			-48V		-48 Volt power supply input
AC2			AC2		24 Volt ac power lead two
GRD			GRD		Ground return for -48 volt dc and 24 volt ac power supplies
AC1			AC1		24 Volt ac power lead one
FGRD			FGRD		Frame ground

TABLE D				
POWER CORD CONNECTIONS				
POWER CORD LEAD COLOR	-48 VOLT DC APPLICATION		24 VOLT AC APPLICATION	
	POWER SUPPLY TERMINAL	MOUNTING TERMINAL	POWER SUPPLY TERMINAL	MOUNTING TERMINAL
Red	-48V	-48V	1	AC1
Black	*	*	3	AC2
White	COM†	GRD	4(GRD)	GRD‡
Green	ACGND†	FGRD	*	FGRD‡

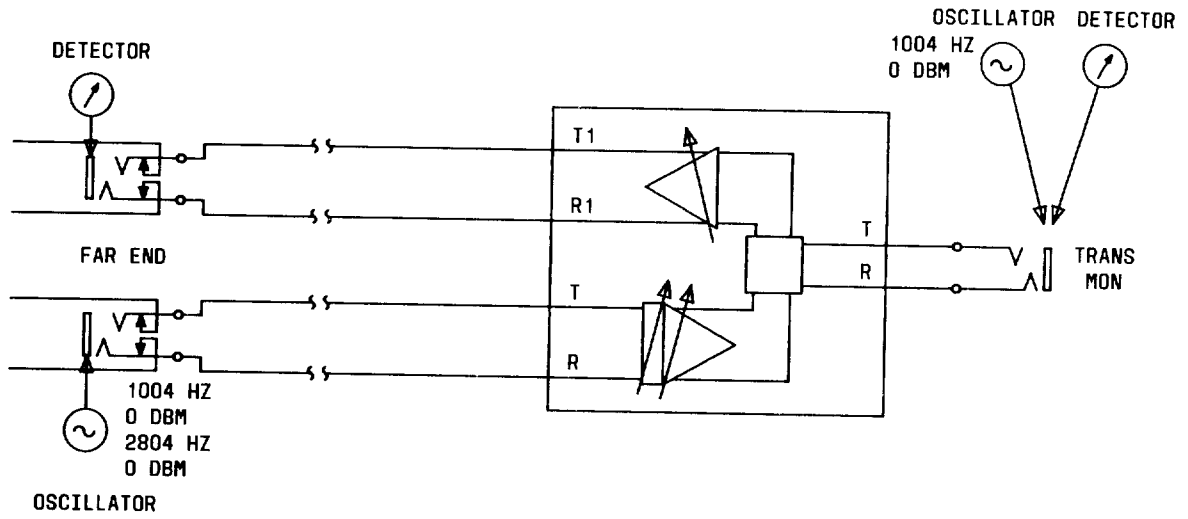
\* Cut off unused power lead at both ends of cord.

† Power supply COM and ACGND terminals are to be strapped together. The cord provided in the 11BR power supply kit includes a strap between the white and green conductors for this purpose. If a locally made power cord is used, ensure that the COM and ACGND terminals are strapped together.

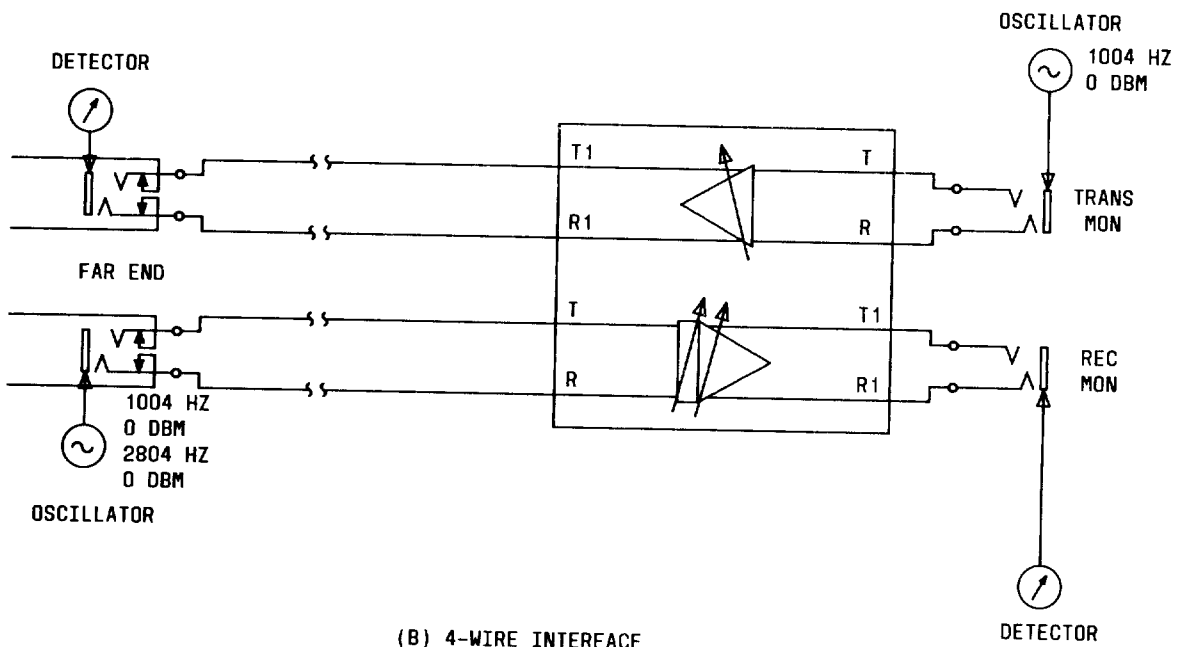
‡ Mounting terminals GRD and FGRD are to be strapped together. The cord provided in the 11BS power supply kit includes a strap between the white and green conductors for this purpose. If a locally made power cord is used, ensure that the GRD and FGRD terminals are strapped together.

TABLE E			
GAIN AND EQUALIZATION FACTORS			
CABLE TYPE	1-KHZ GAIN REQUIRED PER KFT	1-KHZ GAIN REQUIRED PER MILE	EQUALIZATION REQUIRED PER KFT (NOTE)
H88 LOADED CABLE			
22 Gauge	0.15 dB	0.8 dB	0.0 dB
24 Gauge	0.23 dB	1.2 dB	0.0 dB
26 Gauge	0.34 dB	1.8 dB	0.0 dB
D66 LOADED CABLE			
22 Gauge	0.15 dB	0.8 dB	0.0 dB
24 Gauge	0.23 dB	1.2 dB	0.0 dB
NONLOADED CABLE			
22 Gauge	0.34 dB	1.8 dB	0.25 dB
24 Gauge	0.44 dB	2.3 dB	0.25 dB
26 Gauge	0.54 dB	2.9 dB	0.25 dB

**Note:** For equalizer settings, see paragraph 4.14.



(A) 2-WIRE INTERFACE



(B) 4-WIRE INTERFACE

Fig. 7—Gain and Equalizer Adjusting Arrangements

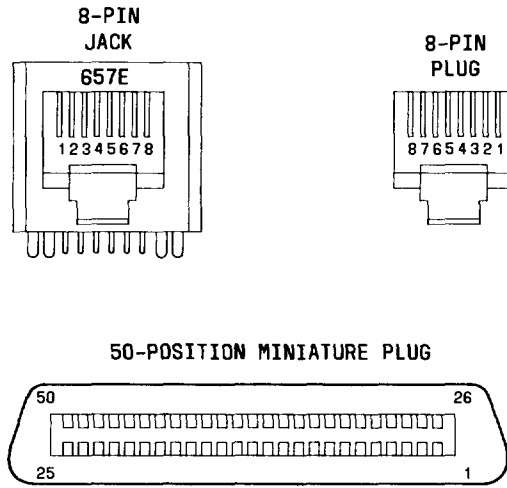


Fig. 8—Customer Connector Pin Numbers

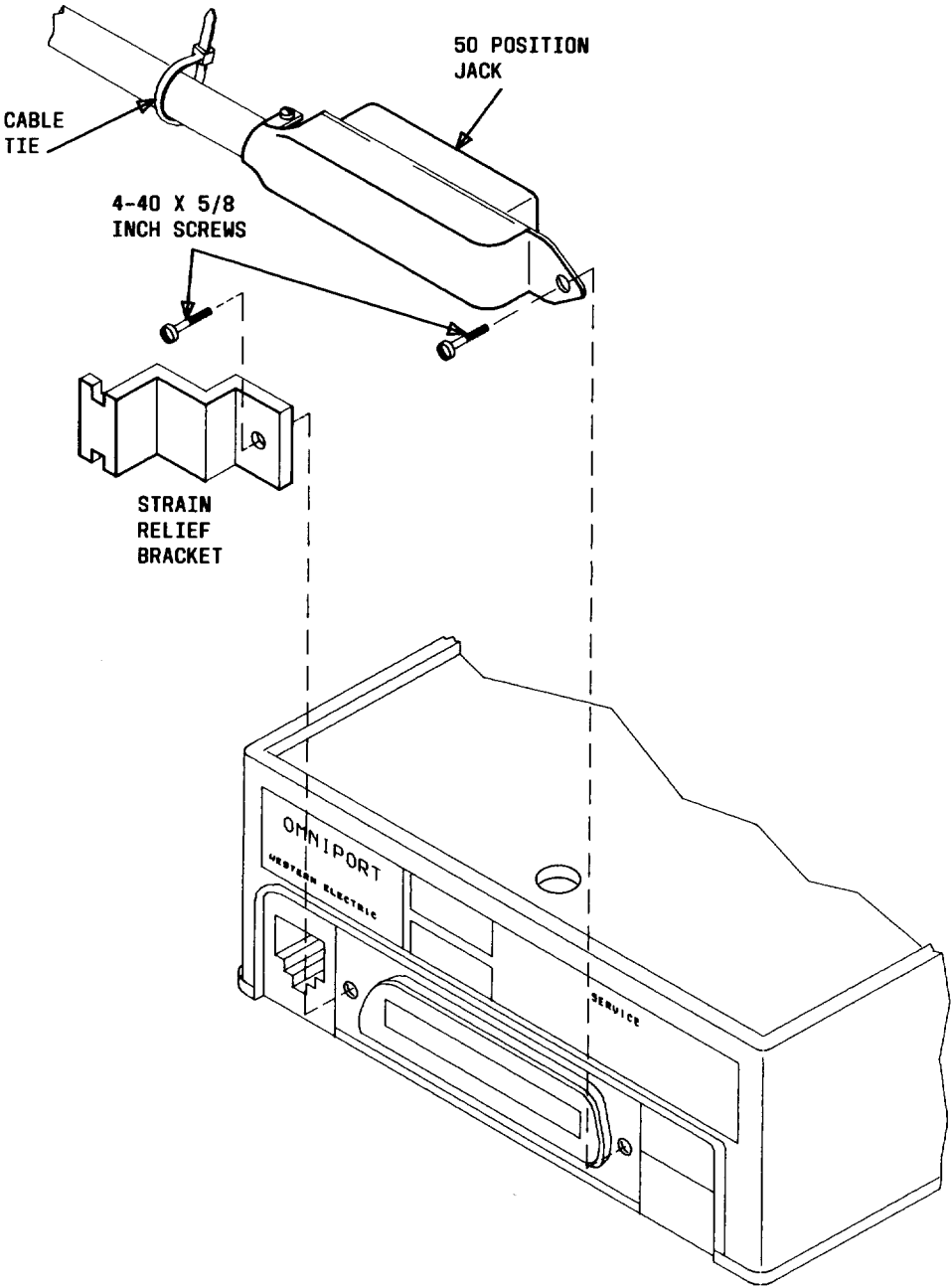


Fig. 9—50-Pin Connector Strain Relief Bracket