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4W TRANSMISSION LINE AMPLIFIERS
MODELS TLA5425 AND TLA5426
(*CLEI™ Code: VR44BP58AA - TLA5425)
(*CLEI™ Code: V444BP68AA - TLA5426)

CONTENTS

1. GENERAL

1.01 Teltrend's Transmission Line Amplifiers, Models TLA5425 and TLA5426, provide a termination betweeen a 4-wire facility and the 4-wire equipment at a customer premise. The receive and transmit channel level adjustment is accomplished via front-panel prescription-selectable gain switches. The TLA5425 and TLA5426 are also equipped with receive channel post-equalization (309B equivalent) with switch-selectable Slope, Height and Bandwidth settings for equalizing cable response of loaded and/or nonloaded cable facilities. The TLA5425 and TLA5426 are identical with the exception that the TLA5426 is equipped with front-panel bantam jack whereas the TLA5425 is not.

1.02 This practice is being reprinted to provide an editorial update and to show the new location of the HT, BW and SLOPE switches due to an Engineering design change. Whenever this practice is reissued, the reason for reissue will be stated in this paragraph.

1.03 Features of Teltrend's TLA5425 and TLA5426 are as follows:

- Front-panel, prescription-selectable RCV and XMT GAIN controls for proper level coordination
- Receive path post-equaliation adjustment (309B equiv.). Performance settings are in accordance with Bell System Practice (BSP) 332-912-222 specifications
- Compatible with loaded and/or nonloaded cable facilities

- Switch-selectable termination impedance of 150/600/1200 ohms for matching the impedance of the unit to the impedance of the 4-wire facility. Equipment interface impedance is fixed at 600 ohms
- Switch-selectable sealing current supply, sink or off operation with front-panel LED for indicating when sealing current is present
- Operational from a −22 to −56Vdc power source at 40mA maximum
- Pin-compatible with other Teltrend Network Channel Terminating Equipment (NCTE)
- Mounts in one position of a Teltrend Type 550 Mounting Assembly (Type 400 equiv.)
- 7-year warranty

2. APPLICATIONS

2.01 The TLA5425 and TLA5426 provide an interface between a 4-wire facility and 4-wire equipment with a 600-ohm impedance. Integral receive path post-equalization and impedance optioning of the facility-side allow these modules to be used with loaded, nonloaded or a mixture of loaded and nonloaded cable facilities. Front-panel, prescription-

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control (selectable in 0.1dB steps) is provided for proper level coordination between the facility and equipment. In addition, a switch-selectable sealing current supply or sink circuit is provided.

3. FUNCTIONAL OPERATION

3.01 Refer to Figure 1, the TLA5425/26 Block Diagram, as needed while reading the following functional description. This description serves for both units. The only difference between the TLA5425 and TLA5426 is that the TLA5426 also provides bantam jacks for monitoring or direct access to the transmission paths whereas the TLA5425 does not.

Receive Path

3.02 Signals received from the 4-wire facility enter the TLA5425/26 via the RCV IN port, pins 7 and 13 (RT and RR, respectively) and are applied to switch S1. Switch S1 provides for the selection of the termination impedance of the unit (150/600/1200 ohms) that will match the 4-wire facility. This signal is then transformer-coupled to switch S3. S3 provides for the insertion of either no loss (0dB) or 24dB of loss (24dB) to be introduced into the receive path and is typically used in conjunction with the RCV GAIN switches. With S3 in the 0dB position, level adjustment of the RCV GAIN switches provide from 0dB of gain (all RCV GAIN switches OFF) to 24dB of gain (all switches ON). With S3 in the 24dB position, level adjustment of the RCV GAIN switches provide from 24dB of loss (all switches OFF) to 0dB of loss/gain (all switches ON). From S3, the signal is applied to the FLAT/EQL switch.

3.03 The FLAT/EQL switch provides for either bypassing the EQUALIZER circuit (FLAT position) if equalization is not required, or provides access to the HT, BW and SLOPE switches (EQL position) for equalizing cable response characteristics. When in the EQL position, the EQUALIZER (309B equivalent) provides prescription adjustment for the slope, height and bandwidth settings for obtaining the proper response. Equalizer performance settings are in accordance with Bell System Practice (BSP) 332-912-232 specifications.

SLOPE

When interfacing nonloaded cable facilities, the switch-section identified as NL on the SLOPE DIP switch must be placed in the NL (ON) position. When interfacing loaded cable, this switch must be placed in the L (OFF) position. When interfacing a mixture of loaded and nonloaded cable, the predominating cable will be the determining factor of which position this switch will be placed. The remaining switches (labeled on the printed circuit board (PCB) as 1, 2, 4 and 8) are used to adjust the slope of the equalizer as required. For plots of the different slope values, refer to Figures 3a and 3b. Typically, addition of slope gain will usually result in a compensating reduction in the RCV GAIN adjustment.

HT (Height)

The HT switches (labeled on the PCB as 1, 2, 4 and 8) provide bump-type gain at the high frequency end (approx. 2804Hz) of the cable and are used to adjust the amplitude response of the equalizer as required.

BW (Bandwidth)

The BW switches (labeled on the PCB as 1, 2, 4 and 8) provide bump-type gain at the high frequency end (approx. 2804Hz) of the cable and are used to adjust the bandwidth response of the equalizer's amplitude response settings from the HT controls. For plots of the different height values using a bandwidth setting of 3 and 14, refer to Figures 3c and 3d, respectively.

3.04 Since the equalizer is an active device, there will be a 1kHz gain for each of the receive equalizer settings. The 1kHz gain for SLOPE is shown in table form (refer to Figure 3) for both loaded (NL out) and nonloaded (NL in) cable positions as well as the 1kHz gain for each of the HT and BW settings. Therefore, the 1kHz gain for the entire receive amplifier is equal to the sum of the RCV GAIN, SLOPE, HT and BW switch settings.

3.05 From the EQUALIZER, or from the FLAT/EQL switch if the EQUALIZER was bypassed, the signal is applied to the RCV GAIN switches for setting the proper level coordination to interface the 4-wire equipment. The resulting signal is then transformer-coupled onto the 4-wire RCV OUT port, pins 5 and 15.

Transmit Path

3.06 Signals received from the 4-wire equipment enter the TLA5425/26 via the 4W XMT IN port, pins 55 and 49, and are transformer-coupled to switch S4. Switch S4 provides for the insertion of either no loss (0dB) or 24dB or loss (24dB) to be introduced into the transmit path and is typically used in conjunction with the XMT GAIN switches. With S4 in the 0dB position, level adjustment of the XMT GAIN switches provide from 0dB of gain (all XMT GAIN switches OFF) to 24dB of gain (all switches ON). With S4 in the 24dB position, level adjustment of the XMT GAIN switches provide from 24dB of loss

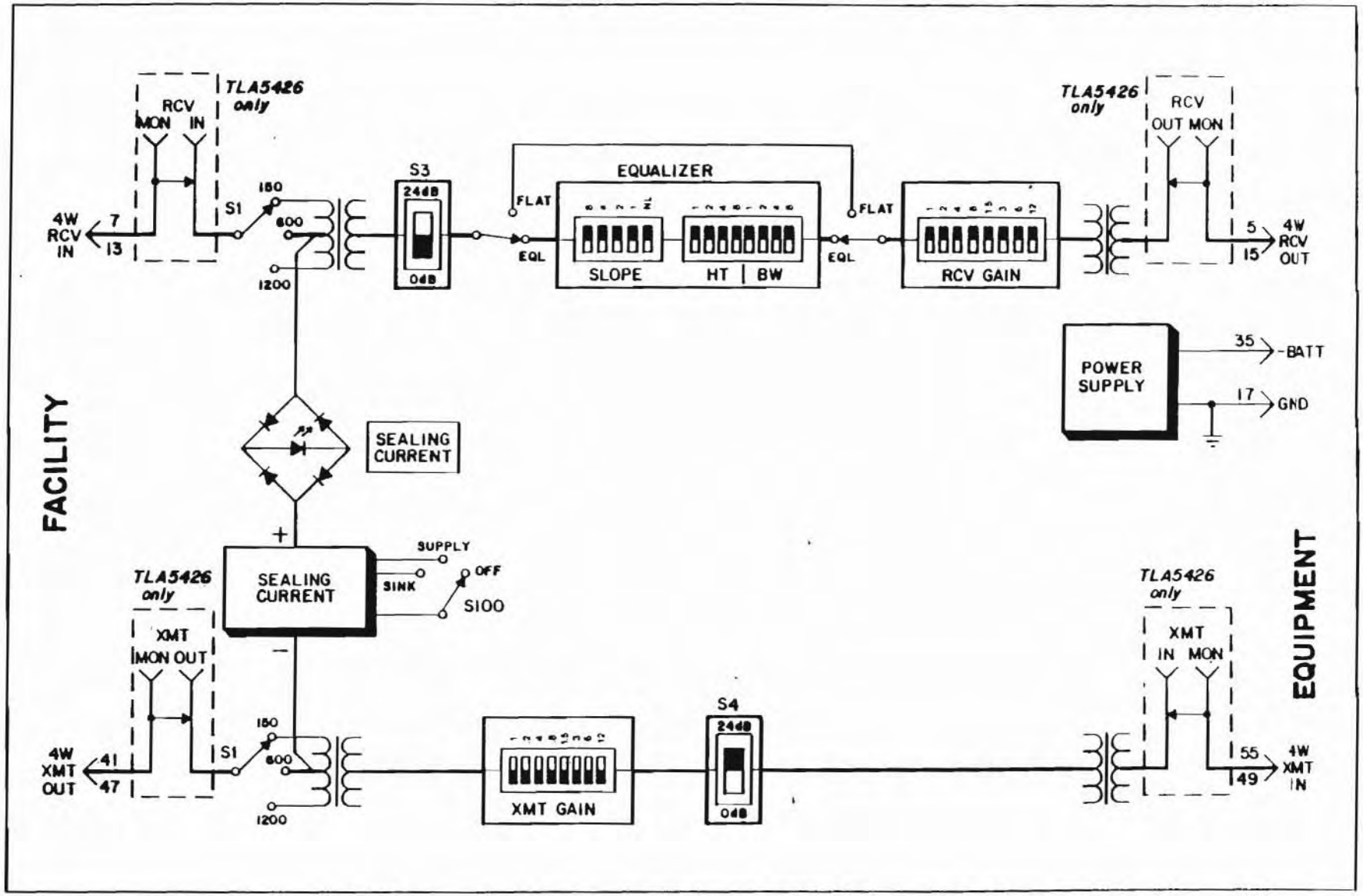


Figure 1. TLA5425/26 Block Diagram

(all switches OFF) to 0dB of loss/gain (all switches ON). From S4, the signal is applied and adjusted with the XMT GAIN switches. The output of the XMT GAIN circuit is then transformer-coupled through switch S1, which is selected for the proper source impedance (150/600/1200 ohms), and out to the 4W XMT OUT port (pins 41 and 47) to the 4-wire facility interface.

Sealing Current

3.07 Sealing current is recommended on all metallic facilities to prevent transmission path noise. Sealing current is a low-value of dc current (approx. 20mA) applied to the 4-wire dry cable pairs on a simplex basis to break down resistance which may build up at nonsoldered cable splices. Continuous application of sealing current prevents degradation of transmission performance.

3.07 The SEALING CURRENT circuit is controlled by option switch S100. With this switch in the SUPPLY position, the TLA5425/26 will supply 20mA of balanced and regulated sealing current. When sealing current is supplied from the distant end, place this switch in the SINK position to provide a 20mA current limited load. When in the OFF position, the internal SEALING CURRENT circuit is disabled.

4. OPTIONS

4.01 The TLA5425 and TLA5426 contain option switches that are used to condition the module for proper application and operation. Refer to Figure 2 for the location and description of each option.

5. INSTALLATION

5.01 Upon receipt of the equipment, visually inspect it for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to Teltrend.

Installer Connections

5.02 Installer connections for the unit are made by wire-wrapping leads onto the appropriate pins of the 56-pin connector of Teltrend's unwired Type 550 Mounting Assembly (Type 400 equivalent) in accordance with Table 1. If installing the unit into Teltrend's USA assembly, these connections are already made via a printed circuit backplane and connections are then accomplished via a 25-pair female connectorized cable mating to the 25-pair male connector of the mounting assembly.

Table 1. Installer Connections

LEAD DESIGNATION		PIN
RCV IN (Tip)	FACILITY	7
RCV IN (Ring)	FACILITY	13
XMT OUT (Tip)	FACILITY	41
XMT OUT (Ring)	FACILITY	47
RCV OUT (Tip)	EQUIP.	5
RCV OUT (Ring)	EQUIP.	15
XMT IN (Tip)	EQUIP.	55
XMT IN (Ring)	EQUIP.	49
-BATT (Power In) (−22 to −56Vdc)	MISC.	35
GND (Ground)	MISC.	17

Power Requirements

5.03 Power for proper operation is a −22 to −56Vdc source at 20mA nominal. If sealing current is to be supplied to the facility's simplex leads, an additional 20mA is required. Teltrend's WPS2005 (115Vac/48Vdc, 250mA wall-mount supply) or MPS2554 (115Vac/48Vdc, 1.5A type-550 module) provide an economical source of power.

6. TESTING AND ALIGNMENT

6.01 The following testing and alignment procedures (shown in Table 2) may be performed after the unit is installed and power is applied. Test equipment required to perform these procedures is as follows:

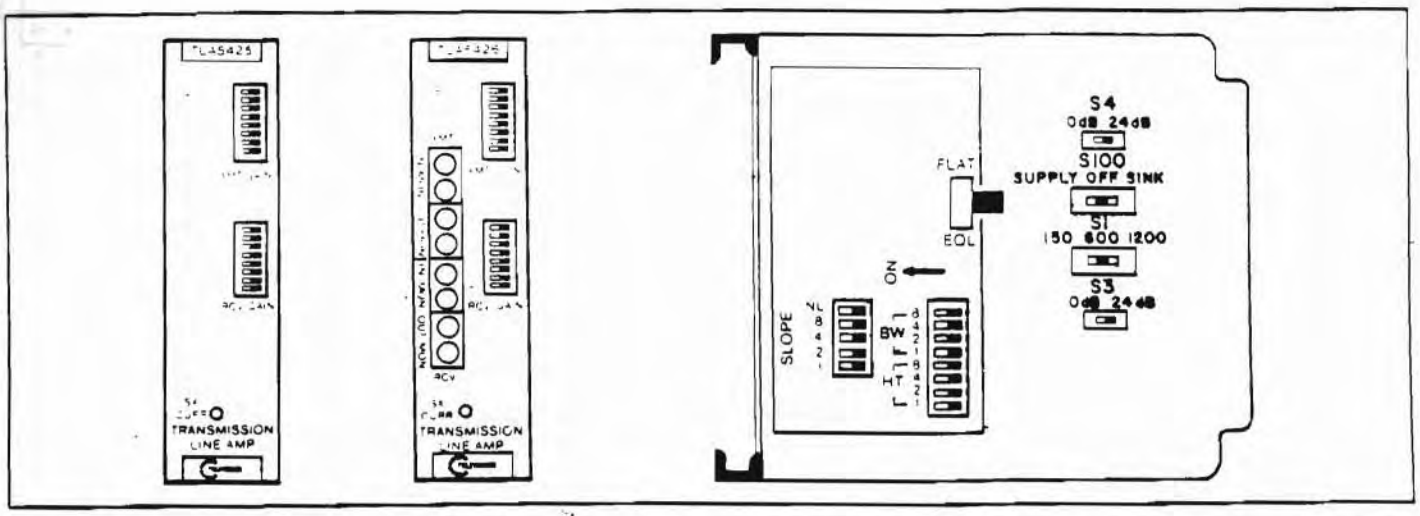
(a) Transmission Measuring Set (TMS), HALCYON 704A2 Wide Band Test Set, HEWLETT PACKARD 3551 Transmission Test Set, or equivalent

(b) Variable Frequency Oscillator (VFO) if not contained within the TMS

6.02 The procedures outlined in this practice are intended only to ascertain proper operation of the unit and to isolate problems to the most probable area. These procedures are not designed to effect repairs or modifications. Tests or repairs beyond those outlined in these procedures are not recommended and may void the warranty.

6.03 If trouble is encountered, verify all installer connections, option settings and alignment adjustments, and verify that the unit is making a positive connection to the mounting assembly. If trouble persists, replace the unit and repeat the procedures outlined.

6.04 If technical assistance is required, contact Teltrend's Customer Service Department by calling (312) 377-1700.



OPTION	POSITION	FUNCTION
S1	150	Selection used when interfacing nonloaded cable with more than 3dB of loss
	600	Selection used when interfacing nonloaded cable with less than 3dB of loss
	1200	Selection used when interfacing loaded cable
S3	0dB	Provides insertion of 0dB of loss/gain into receive path
	24dB	Provides insertion of 24dB of loss into receive path
		NOTE After loss range is selected, level adjustment is accomplished with the RCV GAIN switches
S4	0dB	Provides insertion of 0dB of loss/gain into transmit path
	24dB	Provides insertion of 24dB of loss into transmit path
		NOTE After the loss range is selected, level adjustment is then accomplished with the XMT GAIN switches
S100	SUPPLY	Supplies 20mA of balanced and regulated sealing current from interval supply
	SINK	Provides 20mA current-limited load when sealing current is supplied from distant end
	OFF	Internal sealing current circuit is disabled
SLOPE	NL	When interfacing nonloaded cable, place this switch to the NL (ON) position. When interfacing loaded cable, place this switch to L (OFF)
	1, 2, 4, and 8	Used to adjust the slope response for both loaded and nonloaded cable. Adjust accordingly
HT	1, 2, 4, and 8	Allows adjustment to the height (amplitude) response for both loaded and nonloaded cable. Adjust accordingly
BW	1, 2, 4, and 8	Allows adjustment to the bandwidth response for both loaded and nonloaded cable. Adjust accordingly
FLAT/EQL	FLAT	Provides the flattest frequency response possible with no equalization adjustments
	EQL	Allows Equalization adjustment to be made to both loaded and nonloaded cable as required
XMT GAIN	ON/OFF AS REQUIRED	Provides from 0 to 24dB of gain, selectable in 0.1dB steps, for proper level coordination with the 4-wire facility. This option works in conjunction with S4. With S4 in the 0dB position, level adjustment range is from 0dB of loss/gain (all switches OFF) up to 24dB of gain (all switches ON). With S4 in the 24dB position, level adjustment range is from 24dB of loss (all switches OFF) up to 0dB loss/gain (all switches ON). ON is away from the value silkscreened on the front panel
RCV GAIN	ON/OFF AS REQUIRED	Provides from 0 to 24dB of gain, selectable in 0.1dB steps, for proper level coordination with the 4-wire equipment. This option works in conjunction with S3. With S3 in the 0dB position, level adjustment range is from 0dB of loss/gain (all switches OFF) up to 24dB of gain (all switches ON). With S3 in the 24dB position, level adjustment range is from 24dB of loss (all switches OFF) up to 0dB of loss/gain (all switches ON). ON is away from the value silkscreened on the front panel

Figure 2. TLA5425/26 Option Diagram

Shape Number	Switch Number			
	1	2	4	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

SHAPE NUMBERS
FROM SWITCHES LABELED
1 2 4 8

SLOPE SETTING	1 KHz GAIN	
	NL "in"	NL "out"
0	0.0 dB	0.0 dB
1	0.4	1.4
2	0.9	2.6
3	1.4	3.7
4	1.8	4.7
5	2.3	5.5
6	2.8	6.3
7	3.4	7.2
8	3.7	7.8
9	4.2	8.4
10	4.6	9.0
11	5.0	9.5
12	5.4	10.0
13	5.8	10.5
14	6.2	11.0
15	6.6	11.4

1 kHz GAIN IN dB VS.
SLOPE SETTINGS

BW SETTING	HT SETTING															
	0*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1
5	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
6	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.2
7	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3
8	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4
9	0	0	0	0	0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.5
10	0	0	0	0	0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.7
11	0	0	0	0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.7	0.9
12	0	0	0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.8	0.9	1.2
13	0	0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.3	1.7
14	0	0	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.8	1.0	1.2	1.4	1.7	2.0	2.5
15	0	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.2	1.5	1.7	2.0	2.4	2.8	3.3	3.9

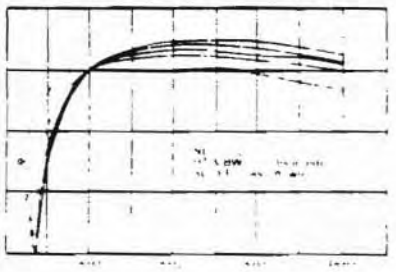
1 kHz GAIN IN dB FOR HT AND BW SETTINGS
HT setting of 0 disables the Bump Unit for all BW settings

RELATIVE RESPONSE OF SLOPE SETTING

a. Nonloaded Cable Slope Adjustment

FREQUENCY

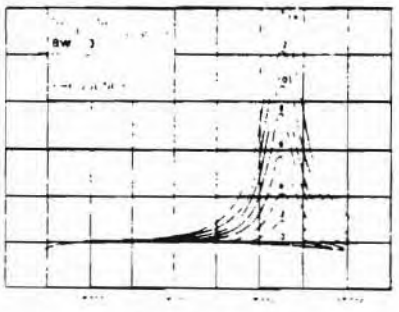
b. Loaded Cable Slope Adjustment



FREQUENCY

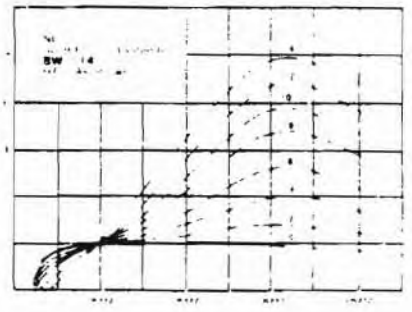
RELATIVE RESPONSE OF THE HIGH FREQUENCY EQUALIZATION

c. HT (Amplitude) Adjustment
With Bandwidth of 3



FREQUENCY

d. HT (Amplitude) Adjustment
With Bandwidth of 14



FREQUENCY

Figure 3. Cable Adjustment Settings

6.05 If the unit is in need of repair, call Teltrend for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid, along with a brief description of the problem, to:

Teltrend Inc.
620 Stetson Avenue
St. Charles, Illinois 60174
ATTN: Repair & Return Dept.

6.06 As specified in our warranty, Teltrend will repair and return the unit at no charge to the customer providing that the expiration date stamped on the unit has not elapsed. If an out-of-service situation exists, a replacement unit can be obtained; however, a purchase order number will be required to ensure return of the defective unit.

7. SPECIFICATIONS

RECEIVE AND TRANSMIT CHANNELS

Impedance: Facility-side, switch-selectable for 150, 600 or 1200 ohms via option switch S1. Equipment-side, 600-ohms, fixed

Max. Output: +7dBm

RCV And XMT Gain: Adjustable from −24dB to +24dB in 0.1dB steps via front-panel option switches. Loss or gain range is dependent on the setting of option switches S3 and S4 (0dB/24dB)

RECEIVE CHANNEL

Equalizer: Amplitude equalization may be added using the height (HT), bandwidth (BW), and slope (SL) switches. Performance settings (309B equivalent) are in accordance with BSP 332-912-232

Equalizer Gain: 0 to 15.3 at 1kHz, depending on equalizer switch settings

Equalizer Range:

	H88 Loaded Cable	Nonloaded Cable
19ga	<192kft	<66kft
22ga	<102kft	<48kft
24ga	<66kft	<38kft
26ga	<48kft	<29kft

Return Loss: 26.5dB, minimum

OPERATING ENVIRONMENT

Temperature: 32° to 122°F (0 to 50°C)

Humidity: 0 to 95%, no condensation

Power: −22 to −56 Volts dc

Mounting: One position of a Teltrend Type 550 shelf (Type 400 equivalent)

Dimensions: Height, 5.6 inches (14.1cm); width, 1.4 inches (3.6cm); depth, 5.90 inches (15cm)

Weight: Approx. 1.4 lbs. (0.68kg)

ORDERING INFORMATION

Order in accordance with the following:

5425 TLA-Transmission Line Amp. W/309B-Type Equalization
5426 TLA-Transmission Line Amp W/309B-Type Equalization And Jacks

Table 2. Testing And Alignment

STEP	ACTION
1	Set all option switches to the position specified on the CLR card. Place all XMT and RCV GAIN switches to OFF (towards the numbers silkscreened on the front panel). **Equalization** If the cable being used in nonloaded, place the switch-section identified as NL on the SLOPE DIP switch to the NL (ON) position. For loaded cable, place this switch to OFF. Proceed as follows: If equalization of the cable being used is not required, place the FLAT/EQL switch to the FLAT position and proceed to Step 2. If equalization is required, place this switch to the EQL position and proceed as follows: Initially set the HT, BW, and SLOPE switch-sections as follows: **Nonloaded Cable Switch-section NL = ON** SLOPE = 0 (1, 2, 4, and 8 OFF) HT = 3 (1 and 2 ON; 4 and 8 OFF) BW = 14 (2, 4, and 8 ON; 1 OFF) **Loaded Cable Switch-section NL = OFF** SLOPE = 0 (1, 2, 4, and 8 OFF) HT = 2 (2 ON; 1, 4, and 8 OFF) BW = 6 (2 and 4 ON; 1 and 8 OFF)

CONTINUED

Table 2. Testing And Alignment (Con't.)

STEP	ACTION
2.	**Receive Alignment** Insert a properly-terminated TMS to the RCV OUT point (pins 5 and 15). Request Serving Test Center (STC), or distant end, to transmit a 1004Hz tone at 0dBm0. Adjust the RCV GAIN switches until TMS indicates the level specified on the CLR.
3.	Request the STC to transmit a 3004Hz test tone and adjust the HT switch-sections until the TMS indicates the level specified on the CLR. (**Note:** It may become necessary to repeat Steps 2 and 3 in order to obtain the proper level at both 1004 and 3004Hz frequencies). If the level cannot be obtained easily, use the SLOPE switch-sections and repeat the Equalization procedure until the correct level is obtained at both frequencies and with the settings of the SL, HT, and RCV GAIN switches.
4.	**Transmit Alignment** Insert an oscillator, adjusted for 1004Hz at 0dBm0, to the XMT IN point (pins 55 and 49) and a properly-terminated TMS to the XMT OUT point (pins 41 and 47). Adjust the XMT GAIN switch-sections until the level specified on the CLR is obtained.