tellabs
technical manual
76-81263DA/DB
rev C

practice section 81263DA/81263DB

263DA and 263DB Data Station Termination (DST) Systems

contents

1. general description

1.01 The Tellabs 263DA and 263DB Data Station Termination (DST) Systems (figure 1) each interface a 4wire data set with a 4wire transmission facility. Both systems are compact, self-contained units that provide data interface and power rectification/regulation circuitry in an attractive enclosure that can be wall mounted or placed on a desktop. The difference between the two units is that the 263DB can be powered directly from a commercial 117Vac, 60Hz outlet, while the 263DA requires an external source of nominal 26Vac such as that supplied by the Tellabs 8015 Transformer. Each unit is available in three versions; the 263DA-1, -2, and -3 and the 263DB-1, -2, and -3. All three versions of each unit feature prescription gain and attenuation in the receive channel, prescription attenuation in the transmit channel, and tone- or switch-activated loopback. While the 263DA-1 and the 263DB-1 provide no amplitude equalization, the 263DA-2 and the 263DB-2 each contain a prescription slope-type equalizer in the receive channel, and the 263DA-3 and 263DB-3 each contain a receive-channel equalizer functionally equivalent to the Western Electric 309B Prescription Equalizer. All six versions can be supplied with an optional 20mA sealing current subassembly and with optional gas-tube lightning protectors. Table 1 summarizes the distinguishing features of the various 263DA and 263DB units.

1.02 This practice section is revised to cover the 263DA-3 and 263DB-3 DSTs in addition to the 263DA-1/DB-1 and 263DB-1/DB-2 units. The differences between these units are summarized above.

1.03 The 263DA and 263DB each provide from −15 to +15dB of gain in the receive channel and from 0 to 31dB of loss in the transmit channel. Both gain and loss are prescription-set in 1dB increments. The maximum input and output level of both channels is +10dBm.

1.04 An active prescription slope-type amplitude equalizer in the receive channel of the 263DA-2 and 263DB-2 provides up to 7.5dB of gain at 2804Hz (re 1004Hz) in 0.5dB increments. Because this equalizer does not affect 1004Hz levels of the 263DA-2 and 263DB-2, equalization can be introduced not only before but also after levels are set, with no interference between level and equalization adjustments.

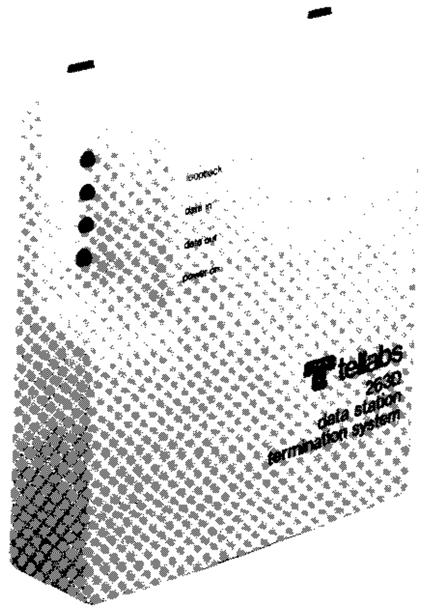


figure 1. 263DA DST System

1.05 An active amplitude equalizer in the receive channel of the 263DA-3 and 263DB-3 provides prescription post-equalization for either loaded or nonloaded cable facilities. Functionally equivalent to the Western Electric 309B Prescription Equalizer, the 263DA/DB's equalizer offers both low-end slope-type and high-end bump-type equalization, with switch-selectable degree of slope, height of bump, and affected bandwidth.

1.06 Impedance-matching transformers at the station-side ports of both DST systems provide fixed, balanced 600-ohm terminating impedance in both channels. Transformers at the facility-side ports can be switch-optioned for balanced 1200-, 600-, or 150-ohm terminating impedance in both channels. The 150-ohm option provides approximately 2dB of slope equalization for long sections of nonloaded cable through the deliberate impedance mismatch. (For the 263DA-2, 263DB-2, 263DA-3, and 263DB-3, this is in addition to any equalization provided by the receive equalizer.) Both facility-side transformers are center-tapped to derive balanced simplex leads.

1.07 The 263DA and 263DB provide loopback of the facility for testing and troubleshooting. The loopback function can be activated either remotely by transmission of a 2713Hz tone or locally via a

Tellabs model number	uses 18 to 26Vac power only (e.g., Tellabs 8015 Transformer)	uses commercial 117Vac, 60Hz power only	no equalization	prescription active slope equalization in receive channel	prescription receive-channel equalizer equivalent to WECo 309B Prescription Equalizer
263DA-1	X		X		
263DA-2	X			X	
263DA-3	X				X
263DB-1		X	X		
263DB-2		X		X	
263DB-3		X			X

table 1. Distinguishing features of 263DA and 263DB DST Systems

chassis-mounted loopback switch. Normal operation is restored by transmission of a second 2713Hz tone (remote operation) or by resetting the switch to the normal position. Both systems provide equal-level loopback with switch-selectable gain of 8 or 16dB in the loopback path.

1.08 The 263DA and 263DB can be equipped with an optional plug-on sealing-current subassembly (Tellabs part number 263D L1) to provide an internal source of 20mA sealing current for the 4wire facility. Another option available for both the 263DA and 263DB is a pair of gas-tube lightning protectors for the facility-side ports (Tellabs part number 263D L2). For additional information about these options, see the application section of this practice.

1.09 Other features of the 263DA and 263DB Systems include two 310-type test jacks and four status-indicating LEDs. The test jacks are opening-type jacks that face the DST system at the receive output and transmit input ports. The four LEDs are all visible with the unit's cover in place. A yellow *power on* LED lights when power is applied to the unit. A red *loopback* LED lights when the loopback circuitry is activated. The other two yellow LEDs, labeled *data in* and *data out*, light when data is present in the receive and transmit channel, respectively.

1.10 Both systems operate from ac input voltage. The 263DB contains an internal transformer that allows it to be powered by commercial 117Vac at 60Hz and is equipped with an 8-foot power cord that plugs into a standard grounded outlet. The 263DA requires an external source of 18 to 28Vac; this can be provided from a commercial 117Vac, 60Hz outlet through the use of Tellabs 8015 Transformer, which can be ordered at the same time as the 263DA. An overload-protection fuse, which can be changed without removing the unit's cover, is supplied with the 263DB.

1.11 The 263DA and 263DB each consist of a metal chassis on which all internal circuitry is mounted, and a removable plastic cover. Designed primarily for wall mounting, these units are also equipped with rubber feet for desktop placement if desired. A hole in the bottom of the cover (when wall-mounted) allows access to each unit for external connections. Connections to the facility and, for the 263DA, to the power source are made at a 15-position screw-terminal strip. Connections to the data station are made to the terminal strip or to a six-pin modular phone jack.

2. application

2.01 The 263DA and 263DB DST Systems are used in applications where a 4wire data station communicates with other data stations or a central processor unit (CPU) over a voice-grade 4wire telephone facility. Both the 263DA and 263DB provide the necessary level coordination and impedance matching to interface the modem portion of the 4wire data station with the 4wire facility. If the data station is provided by the customer, the 263DA and 263DB act as interconnect devices, providing end-termination of the telco facility. Transformer coupling at the station-side ports of the 263DA and 263DB allows these systems to be located at a distance from the modem consistent with the station-side level ranges of the DSTs and with the level requirements of the modem itself. Loopback circuitry on both units provides locally or remotely activated loopback of the facility, with switch-selectable loopback-path gain of 8 or 16dB. The 263DA-2, 263DB-2, 263DA-3 and 263DB-3 versions of the two systems contain integral receive-channel amplitude equalizers. An optional subassembly can be ordered with all six 263DA and 263DB versions to provide sealing current to the facility.

2.02 Level coordination between the station and the facility is achieved separately and independently in each channel of the 263DA and 263DB. The receive channel provides up to 15dB of prescription-set loss or gain, while the transmit channel provides up to 31dB of prescription-set loss. Both receive-channel loss or gain and transmit-channel loss are introduced in 0.1dB increments by DIP switches located on each system's printed circuit board. The maximum input and output level of both channels is +10dBm. These level ranges allow the DST systems to easily accommodate the −3 receive TLP (transmission level point) and +13 transmit TLP (assuming a −13dBm OTLP) required by most modems.

receive equalizer switch setting (dB)	equalized gain (in dB) introduced at various frequencies								
	300Hz	400Hz	500Hz	800Hz	1004Hz	1500Hz	1800Hz	2500Hz	2804Hz
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	−0.23	−0.19	−0.15	−0.06	0.0	+0.15	+0.24	+0.43	+0.50
1.0	−0.52	−0.42	−0.33	−0.13	0.0	+0.32	+0.52	+0.93	+1.07
1.5	−0.75	−0.60	−0.49	−0.18	0.0	+0.46	+0.74	+1.33	+1.54
2.0	−1.00	−0.80	−0.64	−0.24	0.0	+0.61	+0.98	+1.76	+2.04
2.5	−1.22	−0.98	−0.78	−0.29	0.0	+0.75	+1.20	+2.15	+2.49
3.0	−1.50	−1.20	−0.95	−0.36	0.0	+0.90	+1.45	+2.60	+3.01
3.5	−1.71	−1.37	−1.09	−0.41	0.0	+1.03	+1.65	+2.97	+3.45
4.0	−2.02	−1.63	−1.29	−0.49	0.0	+1.22	+1.95	+3.54	+4.12
4.5	−2.25	−1.79	−1.42	−0.53	0.0	+1.33	+2.14	+3.90	+4.56
5.0	−2.49	−1.98	−1.57	−0.59	0.0	+1.47	+2.36	+4.32	+5.08
5.5	−2.68	−2.14	−1.69	−0.63	0.0	+1.58	+2.53	+4.67	+5.51
6.0	−2.89	−2.30	−1.81	−0.68	0.0	+1.69	+2.72	+5.05	+5.99
6.5	−3.07	−2.44	−1.93	−0.72	0.0	+1.79	+2.87	+5.38	+6.41
7.0	−3.29	−2.61	−2.05	−0.76	0.0	+1.89	+3.05	+5.76	+6.90
7.5	−3.45	−2.74	−2.15	−0.78	0.0	+1.98	+3.19	+6.06	+7.30

table 2. Typical receive-channel slope equalization

2.03 *Data in* and *data out* LEDs on the cover of each system light when data is present in the receive and transmit channel, respectively. The level detectors that drive these LEDs respond to data levels greater than −25dBm.

2.04 Up to 7.5dB of prescription-set active slope equalization at 2804Hz (re 1004Hz) is available in the receive channel of the 263DA-2 and 263DB-2. The amount of equalized gain introduced into the receive channel is selected, in 0.5dB increments, by a four-position DIP switch on each unit's equalizer subassembly. Typical flatness achievable with the slope equalizer is ±0.3dB from 404 to 3200Hz (re 1004Hz). Typical frequency response of the equalizer is shown graphically in figure 2 and in tabular form in table 2.

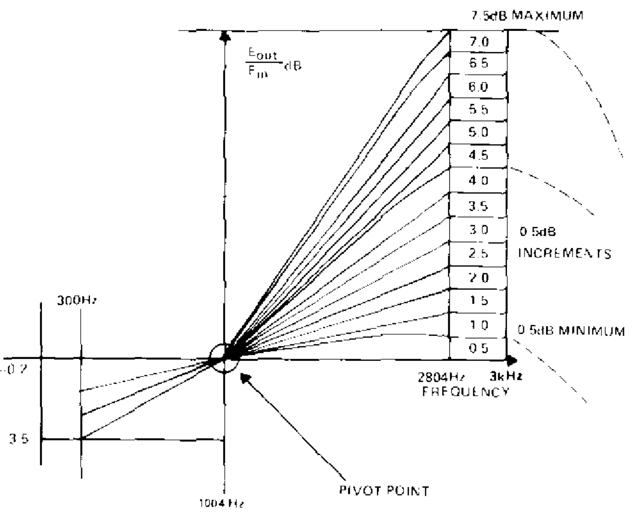


figure 2. Typical response curves for receive-channel equalizer

2.05 As can be seen in figure 2, the response curves of the slope equalizer "pivot" at 1004Hz. Thus, the equalizer has no effect upon 1004Hz levels. As a result, equalization can be introduced into the receive channel of the 263DA-2/DB-2 not only before but also **after** receive levels are set, with no interference between level and equalization adjustments.

2.06 The 263DA-3/DB-3 provides active prescription post-equalization of loaded or nonloaded cable facilities in its receive channel. The 263DA-3/DB-3's equalizer is functionally equivalent to the Western Electric 309B Prescription Equalizer, providing low-end slope equalization down to 404Hz and high-end bump equalization centered at 3250Hz. Degree of slope, height of bump, and affected bandwidth are controlled by option switches on the module's printed circuit board.

2.07 Figures 3 and 4 show typical response curves for the 263DA-3/DB-3's equalizer in the slope mode. Figure 3 shows the curves for nonloaded cable, while figure 4 shows the curves for loaded cable. For comparison purposes, all frequency-response curves in figures 3 and 4 are drawn with the same 0dB-gain reference point (1004Hz). Actually, all of these curves except those for a 0 (zero) *SLOPE* switch setting are raised above the 0dB level at 1004Hz by as much as 11.4dB. The exact amount by which a particular curve is raised depends upon the *SLOPE* and *L/NL* (loaded/nonloaded) switch settings selected. These amounts are listed in table 3.

2.08 Figures 5 and 6 show typical response curves for the 263DA-3/DB-3's equalizer in the bump mode. Figure 5 shows the curves representing various height settings versus a wide bandwidth setting, while figure 6 shows the curves representing various height settings versus a narrow bandwidth setting. For comparison purposes, all frequency response curves in figures 5 and 6 are drawn with the same 0dB-gain reference point (1004Hz). Actually, all of these curves except those with an *HT* switch setting of 1 or 0 and/or with a *BW* switch setting of 5 or less are raised above the 0dB level by as much as 3.9dB. The exact amount by which a particular curve is raised

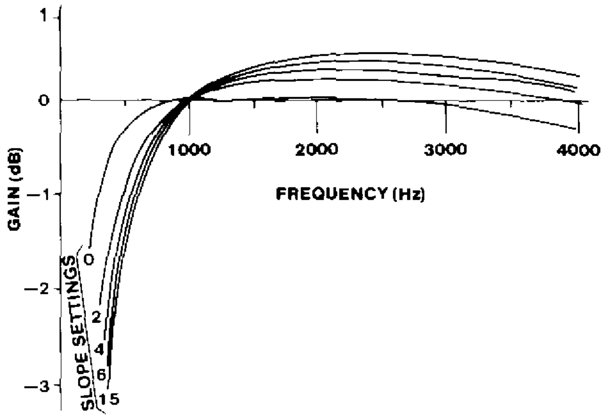


figure 3. Typical response curves for receive-channel equalizer in slope mode, nonloaded cable

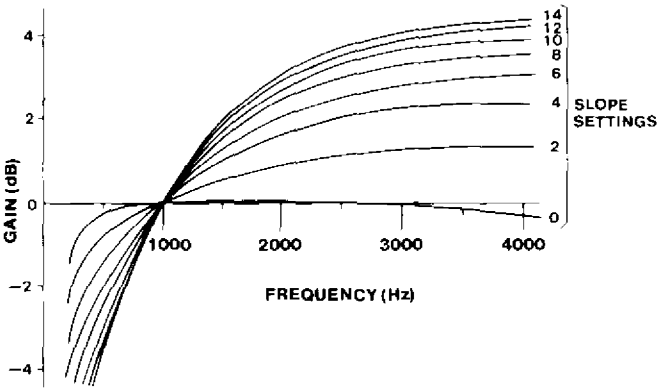


figure 4. Typical response curves for receive-channel equalizer in slope mode, loaded cable

SLOPE switch setting	L/NL (loaded/nonloaded) switch setting	
	L	NL
0 (slope disabled)	0.0dB	0.0dB
1	1.4	0.4
2	2.6	0.9
3	3.7	1.4
4	4.7	1.8
5	5.5	2.3
6	6.3	2.8
7	7.2	3.4
8	7.8	3.7
9	8.4	4.2
10	9.0	4.6
11	9.5	5.0
12	10.0	5.4
13	10.5	5.8
14	11.0	6.2
15	11.4	6.6

table 3. Equalized gain (in dB) at 1004Hz in slope mode

depends upon the *HT* and *BW* switch settings selected. These amounts are listed in table 4.

2.09 The transformers at the facility-side ports of the 263DA and 263DB can be switch-optioned to

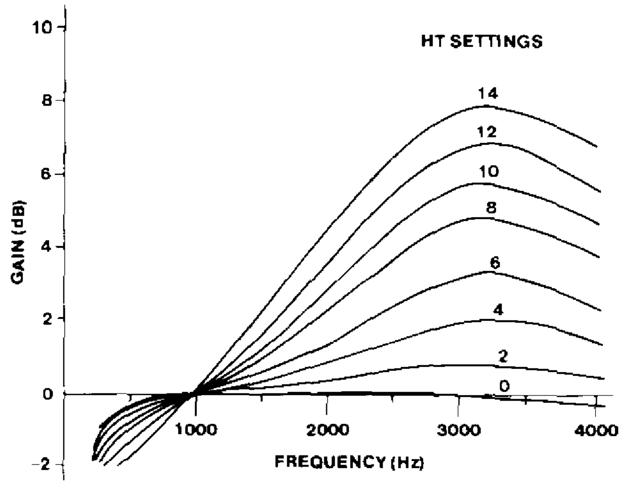


figure 5. Typical response curves for receive-channel equalizer in bump mode, BW switch = 14

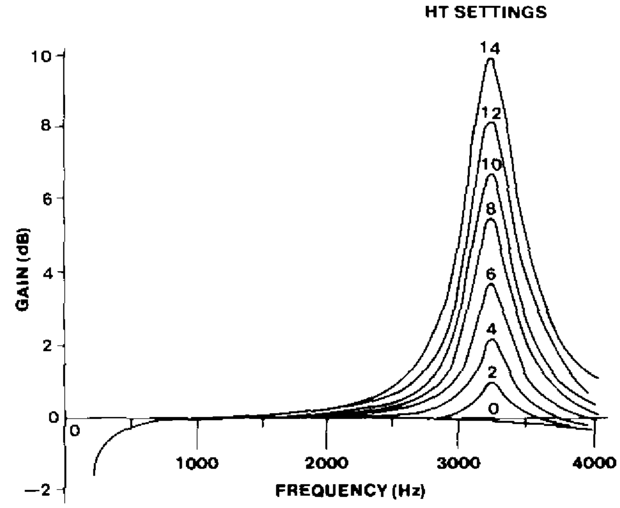


figure 6. Typical response curves for receive-channel equalizer in bump mode, BW switch = 3

provide terminating impedance of 1200 ohms to interface loaded cable, 600 ohms to interface nonloaded cable or carrier, or 150 ohms to provide approximately 2dB of slope equalization for long sections of nonloaded cable through the deliberate impedance mismatch. (This is in addition to any equalization provided by the receive equalizer on the 263DA-2, 263DB-2, 263DA-3 and 263DB-3.) Both station-side ports of the DST units provide fixed, balanced 600-ohm terminating impedance.

2.10 Sealing current can be supplied in any of three ways, if desired. The simplex leads derived by the facility-side transformers can be strapped together to provide a return path for sealing current applied externally at the far end of the facility. This connection is made via jumper between *SXT* and *SXR* on *TB1*. Alternatively, a local external sealing-current source connected to the DST unit's facility-side simplex leads (at *SXT* and *SXR* on *TB1*) may be used. A third alternative is an optional sealing-current subassembly (Tellabs part number **263D L1**), which provides an internal 20mA source of

HT switch setting*	BW switch setting**									
	6	7	8	9	10	11	12	13	14	15
2	0.0dB	0.0dB	0.0dB	0.0dB	0.0dB	0.0dB	0.0dB	0.1dB	0.1dB	0.2dB
3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3
4	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.4
5	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.5
6	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.7
7	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.9
8	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.7	1.2
9	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.8	1.5
10	0.0	0.1	0.2	0.2	0.2	0.3	0.4	0.6	1.0	1.7
11	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.7	1.2	2.0
12	0.1	0.1	0.2	0.3	0.3	0.4	0.6	0.9	1.4	2.4
13	0.1	0.2	0.3	0.3	0.4	0.6	0.8	1.1	1.7	2.8
14	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.3	2.0	3.3
15	0.2	0.3	0.4	0.5	0.7	0.9	1.2	1.7	2.5	3.9

*HT switch position 0 disables bump function. HT switch position 1 introduces 0.1dB of gain or less at 1004Hz.
**BW switch positions 0 through 5 introduce 0.1dB of gain or less at 1004Hz for all HT settings.

table 4. Equalized gain (in dB) re 1004Hz in bump mode

sealing current for the facility. If, at a later time, a sealing-current source at the distant end of the facility is to be used instead of the **263D L1** subassembly, an option switch on the subassembly can be set to provide a return path for the distant-end sealing current. Removal of the subassembly and installation of a jumper are not required to establish the return path. An LED on the sealing-current subassembly lights when its internal sealing-current option is selected and sealing current is flowing.

2.11 The 263DA and 263DB can also be equipped with two optional gas-tube lightning protectors (Tellabs part number **263D L2**) at the facility-side ports. These gas tubes provide lightning protection (in addition to that already provided on the 263DA and 263DB) for systems used in areas where carbon-block protection is not provided or in areas prone to lightning strikes.

Note: *For maximum protection when the optional gas tubes are used, connect earth ground to the* PROT GND *terminal of* TB1.

2.12 The 263DA and 263DB DST Systems can serve as testing and troubleshooting devices through their ability to isolate the facility from the station via loopback. The loopback feature allows the transmission level and frequency response of the facility to be tested from a remote location (e.g., the serving CO). Loopback also allows the source of trouble to be localized to either the facility or the data station, thus permitting the maintenance responsibility involved in a particular case of trouble to be determined.

2.13 The loopback circuitry in the DST units can be activated either remotely by transmission of nominal 2713Hz loopback tone from the distant end of the facility or locally via a loopback switch. Loopback will not occur accidentally because of power failure. When loopback is activated, the loopback (LB) relay operates, disconnecting the station from the data circuit and looping the receive path back to the transmit path. Additional contacts of the LB relay electrically disable the data station via the unit's TEK5 and TEK6 leads. The *loopback* LED on each unit's cover lights to indicate that loopback is activated.

2.14 Remote loopback is accomplished by placing a 2713Hz tone on the receive pair of the DST unit for longer than 1.4 seconds and then removing that tone. The DST unit initiates loopback only upon the removal of the loopback tone. This prevents accidental looping of other than the intended loopback point on a multipoint circuit. The threshold of the loopback tone detection circuit is −26dBm as measured at the receive output port. The loopback tone detector's center frequency is 2713Hz ± 0.2% with a maximum bandwidth of 75Hz. A signal-to-guard ratio of 4dB prevents either raw data signals or harmonics of those signals from initiating loopback, thus allowing the 263DA and 263DB to operate in circuits where similar units might be prone to false loopback. Remote loopback is deactivated when the unit detects a second loopback tone 0.7 second or longer in duration; removal of this tone is not necessary to deactivate loopback.

2.15 Local loopback is initiated by setting the loopback switch to the *LPBK* position. Loopback is maintained until the switch is reset to the *NORMAL* position.

2.16 Equal-level loopback is provided by an amplifier in the loopback path of both DST units. This amplifier can be switch-optioned to provide either 8 or 16dB of gain between the receive channel and the transmit channel when the loopback circuitry is activated. Thus, in a data circuit with either an 8 or 16dB difference between the receive and transmit TLPs, a test signal transmitted from the distant end of the facility at the normal data level will be returned at the normal level. In data circuits with a TLP differential other than 8 or 16dB, the gain inserted into the loopback path will have to be considered when making transmission level tests. (Please note that this problem can be avoided by setting the amplifier for 8dB and inserting an additional 8dB of attenuation into the transmit channel via the *transmit level* control while testing is in progress.)

3. installation

inspection

3.01 The 263DA and 263DB Data Station Termination Systems should be visually inspected upon arrival to find any damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the units should be visually inspected again prior to installation.

cover removal

3.02 To install the 263DA and 263DB Systems, their protective plastic covers must be removed. The covers are held in place by a single captive screw on the bottom of the unit. To remove the cover, loosen the screw and swing the bottom of the cover up and out until it clears the unit's chassis. The cover is replaced by reversing the procedure.

mounting

3.03 The 263DA and 263DB are wall-mounted via three screws (not supplied) inserted through holes in the baseplate of the unit. A template for positioning the screws is provided at the end of this practice. Four rubber feet are provided for desktop mounting. If desired, these rubber feet may be removed for flush wall-mounting.

installer connections

3.04 Before making any connections to the 263DA and 263DB, ensure that power is **not applied** to the unit. Power should be connected to the unit only **after** all other installer connections are made and **after** the unit is properly optioned.

3.05 Make all external facility (telco) connections to the 263DA or 263DB at 15-position terminal block *TB1*. (These include transmission leads, simplex leads, and local loopback leads.) Make all modem connections (transmission leads and data-set-disable leads) either at *TB1* or via the six-pin modular phone jack, *J3*, supplied with both units. Access to both *TB1* and *J3* is through the bottom of the unit. Connections to the 263DA and 263DB are listed in table 5.

3.06 Power connections to the 263DB are made by plugging the unit's power cord into a 117Vac, 60Hz grounded outlet. Power connections to the 263DA consist of wiring terminals 1 and 3 of the Tellabs 8015 Transformer to the *AC* terminals of *TB1* (polarity need not be considered) and then plugging the 8015 into a 117Vac, 60Hz grounded outlet. As stated above, power connections to the 263DA and 263DB should be made only **after** all other connections are made and **after** the units are properly optioned.

connect:	to TB1 pin:
Facility:	
XMT OUT TIP	TT
XMT OUT RING	TR
RCV IN TIP	RT
RCV IN RING	RR
Simplex Leads:	
transmit	SXT
receive	SXR
Data Station:	
XMT IN TIP	DTT (or J3 pin 4)
XMT IN RING	DTR (or J3 pin 3)
RCV OUT TIP	DRT (or J3 pin 2)
RCV OUT RING	DRR (or J3 pin 5)
DATA SET DISABLE	TEK 5 (or J3 pin 1)
DATA SET DISABLE	TEK 6 (or J3 pin 6)
AC INPUT (263DA only)	AC
EARTH GROUND	PROT GND

table 5. External connections to 263DA and 263DB

Note: *For maximum protection when the optional gas tubes are used, connect earth ground to the* PROT GND *terminal of* TB1.

optioning

3.07 Optioning the 263DA and 263DB consists of selecting the facility-side port impedance, selecting the loopback-path gain, and, when the optional sealing-current subassembly is used, selecting internal sealing current or a return path for distant-end sealing current. Locations of the option switches on the DST unit and the sealing-current subassembly are shown in figure 7. Table 6 summarizes the functions and settings of each option switch and includes a convenient optioning checklist. The checklist can be filled out (by checking the appropriate box for each switch) either prior to installation to allow for prescription optioning of the unit, or as the unit is being optioned to provide a record for future reference. Detailed instructions for optioning the 263DA and 263DB are provided in paragraphs 3.08 through 3.10.

3.08 Switch *S1* selects balanced 1200-, 600-, or 150-ohm impedance at the DST unit's facility-side ports (receive input and transmit output ports). Set *S1* to the *1200*, *600*, or *150* position as required. Generally, the 1200-ohm option is used for loaded cable, the 600-ohm option is used for nonloaded cable or carrier, and the 150-ohm option is used to provide a small degree of slope equalization for long sections of nonloaded cable through the deliberate impedance mismatch.

3.09 Position 5 of switch *S3* selects the amount of gain inserted between the receive channel and the transmit channel when the DST unit is in loopback (see paragraph 2.11). To insert 8dB of gain into the loopback path, set *S3-5* to the *8dB* position. To insert 16dB of gain into the loopback path, set *S3-5* to the *16dB* position.

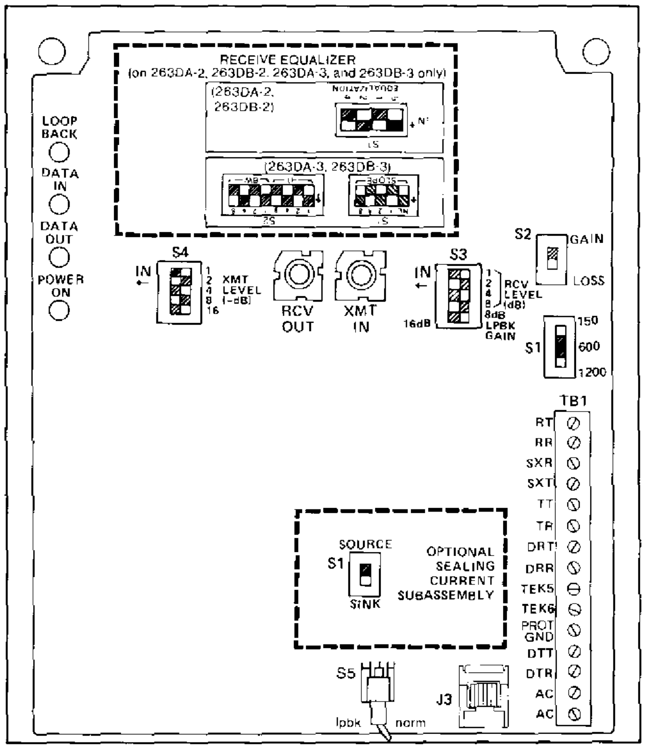


figure 7. 263DA and 263DB option switch locations

function	switch	selections	settings	check-list
facility-side port impedances (rcv and xmt)	S1	150 ohms	150	
		600 ohms	600	
		1200 ohms	1200	
loopback path gain	S3-5	8dB gain	8dB	
		16dB gain	16dB	
sealing current (on optional sealing current subassembly only)	S1	internal sealing current source selected	SOURCE	
		returns sealing current supplied from facility	SINK	

table 6. 263DA and 263DB option-switch summary and checklist

3.10 When the 263DA or 263DB is equipped with the optional sealing-current subassembly, switch *S1* on the subassembly must be set for the desired sealing-current option. To supply 20mA of sealing current to the 4wire facility via the DST unit's simplex leads, set *S1* to the *SOURCE* position. To provide a return path for sealing current supplied from the far end of the facility, set *S1* to the *SINK* position.

Note: *To provide a return path for sealing current supplied from the facility when the 263DA or 263DB is not equipped with the optional sealing current subassembly, install a jumper across pins* SXR *and* SXT *of* TB1.

alignment

3.11 Alignment of the 263DA and 263DB consists of setting the transmit and receive transmission levels and, on the 263DA-2, 263DB-2, 263DA-3 and 263DB-3, setting the receive equalization. After all options on the units are selected, two methods of alignment are available: prescription or direct measurement (non-prescription). With the prescription method, the unit's *RCV GAIN/LOSS, RCV LEVEL,* and *XMT LEVEL* switches are set according to the specifications on the circuit layout record (CLR). Procedures for prescription alignment of the 263DA and 263DB are given in paragraphs 3.12 through 3.14. In cases where the information supplied by the CLR is inadequate or unavailable, it is necessary to perform the direct measurement (non-prescription) alignment procedure. The non-prescription procedures consist of making measurements at the unit's station-side ports to determine the required settings of the level control switches and are given in paragraphs 3.16 through 3.19. Figure 8 provides a condensed version of the non-prescription alignment procedures. Alignment switch settings and checklist are provided in table 7.

function	switch	settings	check-list
rcv loss or gain	S2	loss	
		gain	
rcv level (gain or loss, depending upon S2 setting)*	S3-1 through S3-4	1dB	
		2dB	
		4dB	
		8dB	
xmt level (loss only)*	S4-1 through S4-5	1dB	
		2dB	
		4dB	
		8dB	
		16dB	
receive slope equalization (263DA-2 and 263DB-2 only)*	S1-1 through S1-4	0.5dB	
		1dB	
		2dB	
		4dB	
receive slope/ bump equalization (263DA-3 and 263DB-3 only)	S1, SLOPE NL/L switch	NL (nonloaded)	
		loaded (NL switch OFF)	
	S1, SLOPE value switches	1	
		2	
		4	
		8	
	S2, BW (bandwidth)	1	
		2	
		4	
		8	
	S2, HT (height)	1	
		2	
		4	
		8	
* These DIP-switch positions are cumulative.			

table 7. 263DA and 263DB alignment-switch summary and checklist

Note: *To place the 263DA or 263DB in loopback for testing, either transmit a 2713Hz tone burst 1.4 seconds or longer in duration at a minimum level of*

−26dBm (remote loopback) and then remove the tone, or set switch S5 *to the* LPBK *position (local loopback). To restore normal operation, either transmit a second tone burst 0.7 second or longer in duration or return the* LPBK/NORM *switch to* NORM.

prescription level adjustment, transmit and receive

3.12 To adjust the transmit and receive levels on the 263DA and 263DB, proceed as follows: From the CLR, determine whether gain or loss is required in the receive channel and set the *RCV GAIN/LOSS* switch (*S2*) to the appropriate position (*LOSS* or *GAIN*). Next, determine (from the CLR) the amount of loss or gain required in the receive channel and the amount of loss required in the transmit channel. Then set to *IN* the proper combination of *XMT LEVEL* and *RCV LEVEL* DIP switches to achieve the required levels. The specific amount of loss or gain (in dB) introduced by each DIP-switch position is indicated on the printed circuit board adjacent to the switch position. These switch positions are cumulative; the total amount of flat loss or gain introduced into a channel is the sum of that channel's DIP-switch positions set to *IN*.

prescription receive slope equalization (263DA-2 and 263DB-2 only)

3.13 To adjust the receive equalization on the 263DA-2 and 263DB-2, proceed as follows: From the CLR, determine the amount of equalized gain required at 2804Hz (re 1004Hz). Equalization is introduced into the receive channel via the *EQUALIZER* DIP switch on the receive equalizer subassembly. The specific amount of equalized gain at 2804Hz (re 1004Hz) introduced via each DIP-switch position is indicated on the printed circuit board adjacent to the switch position. These switch positions are cumulative; the total amount of equalized gain (0 to 7.5dB) introduced is the sum of those DIP-switch positions set to *IN*. Because the amounts of required equalization given in the CLR may be specified to the nearest 0.1dB while the equalization switch is arranged in 0.5dB increments, table 8 gives the rounded switch settings for the equalizer's full range.

1000Hz-2804Hz difference	amount of equalized gain required
0.0 to 0.2dB	0.0dB
0.3 to 0.7dB	0.5dB
0.8 to 1.2dB	1.0dB
1.3 to 1.7dB	1.5dB
1.8 to 2.2dB	2.0dB
2.3 to 2.7dB	2.5dB
2.8 to 3.2dB	3.0dB
3.3 to 3.7dB	3.5dB
3.8 to 4.2dB	4.0dB
4.3 to 4.7dB	4.5dB
4.8 to 5.2dB	5.0dB
5.3 to 5.7dB	5.5dB
5.8 to 6.2dB	6.0dB
6.3 to 6.7dB	6.5dB
6.8 to 7.2dB	7.0dB
7.3 to 7.7dB	7.5dB

table 8. Equalized gain settings from cable loss data

prescription receive slope or bump (309B-equivalent) equalization (263DA-3 and 263DB-3 only)

3.14 Adjusting the receive-channel equalization on the 263DA-3 and 263DB-3 consists of setting the *SLOPE, BW,* and *HT* DIP switches on the equalizer subassembly. These switches are functionally identical to those found on Western Electric 309B Prescription Equalizer. Refer to the circuit layout record (CLR) for the proper combination of *SLOPE, BW,* and *HT* switch settings required, and set each DIP-switch position as required. Prescription settings for the receive equalizer can also be found in BSP 332-912-232.

post-alignment testing

3.15 After the transmission levels and receive equalization are set, it may be desirable to confirm the results via end-to-end tests. Where computer-controlled test equipment is used, a subsequent printout will verify the alignment results. Any deviation from the required levels can then be adjusted via the appropriate switches. If computer-controlled test equipment is not available, the alignment results can be confirmed by performing the measurements in the condensed test procedures in figure 8.

non-prescription receive-level adjustment

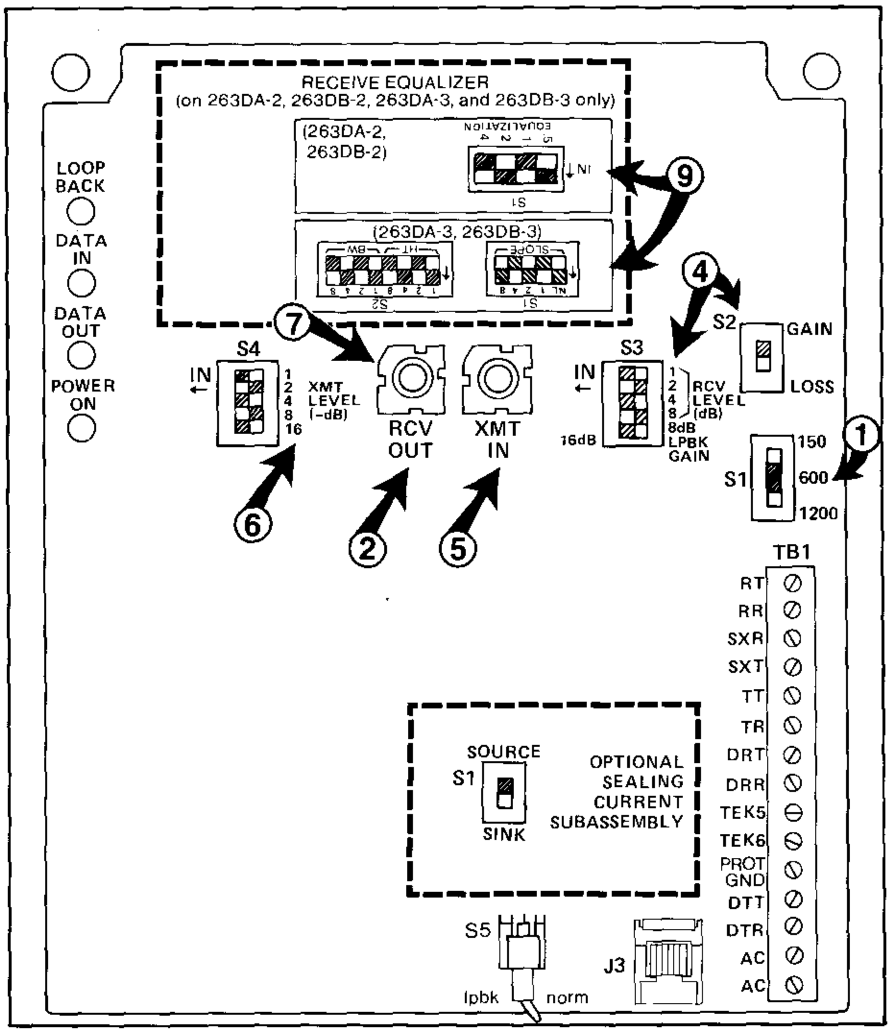
3.16 To adjust the receive level of the 263DA and 263DB when prescription level settings are not given in the CLR or when the given settings do not produce adequate results, proceed as follows:

A. Ensure that no *RCV LEVEL* DIP-switch positions are set to *IN*. Also ensure that the facility-side port impedance switch (*S1*) is set correctly.
B. Arrange the receive portion of a transmission measuring set (TMS) for 600-ohm terminated measurement and connect it to the *RCV OUT* jack. Have the distant location send 1004Hz test tone at the specified level.
C. If the level measured at the *RCV OUT* jack is the same as that specified on the CLR, proceed to the transmit level adjustment (paragraph 3.16). If the measured level is lower than the specified level, set the *RCV GAIN/LOSS* switch (*S2*) to the *GAIN* position; if the measured level is higher than the specified level, set *S2* to the *LOSS* position. Then set to *IN* that combination of *RCV LEVEL* DIP switch positions which equals the required amount of gain or loss (i.e., the difference between the specified level and the measured level).

Note: *The amount of loss or gain introduced by each position of the* RCV LEVEL *DIP switch is indicated on the printed circuit board. These switch positions are cumulative; the total amount of gain or loss introduced is the sum of those switch positions set to* IN.

non-prescription transmit level adjustment

3.17 To adjust the transmit level of the 263DA and 263DB when prescription level settings are not



1 Refer to the CLR and determine the following: facility port impedances, required receive output level, and transmit input level. Ensure that *S1* (facility port impedance) is set correctly. Then proceed to step 2 and perform the alignment procedures in numeric order. The paragraphs referenced in the procedure headings provide a more detailed explanation of that specific procedure.

Receive Level (paragraph 3.16)

2 Arrange the receive portion of the TMS for 600-ohm terminated measurement and connect it to the *RCV OUT* jack.

3 Have the far end transmit 1004Hz test tone at the level specified on the CLR. Measure the received level.

4 If the specified receive level is higher than the measured level, set *S2* to the *GAIN* position. If the specified level is lower than the measured level, set *S2* to the *LOSS* position. Then set the *RCV LEVEL* switches in the proper combination to achieve the specified output level.

Transmit Level (paragraph 3.17)

5 Arrange the transmit portion of the TMS (terminated at 600 ohms) for 1004Hz tone output at the CLR-specified level, and connect it to the *XMT IN* jack.

6 Have the far end measure and report the received level. Then set the *XMT LEVEL* switches in the proper combination to achieve the specified level at the far end.

Receive Active Slope Equalization (263DA-2 and 263DB-2 only) (paragraph 3.18)

7 Connect the receive portion of a properly terminated TMS to the *RCV OUT* jack. Have the far end send 1004Hz and 2804Hz test tones at the CLR-specified level. Measure and record these levels.

8 Subtract the 2804Hz level from the 1004Hz level.

9 Set to *IN* the proper combination of equalization switches on the equalizer subassembly that most closely approximates the amount arrived at in step 8.

Receive Slope/Bump Equalization (309B-Equivalent; 263DA-3 and 263DB-3 only) (paragraph 3.19)

Non-prescription alignment procedures can be found in BSP 332-912-234.

figure 8. Condensed non-prescription alignment procedure

given in the CLR or when the given settings do not produce adequate results, proceed as follows:

A. Ensure that no *XMT LEVEL* DIP-switch positions are set to *IN*. Also ensure that the facility-side port impedance switch (*S1*) is set correctly.
B. Arrange the transmit portion of the TMS (properly terminated at 600 ohms) to output 1004Hz tone at 0dBm (or other data level specified by the CLR), and connect it to the *XMT IN* jack.
C. Have personnel at the far end measure and report their receive level; the difference between the measured level and the specified level is the amount of loss required in the transmit channel of the DST unit. Set to *IN* the proper combination of *XMT LEVEL* DIP-switch positions that equals the required amount of attenuation.

Note: *The amount of loss introduced by each position of the* XMT LEVEL *switch is indicated on the printed circuit board. These switch positions are cumulative; the total amount of loss introduced is the sum of those switch positions set to* IN.

non-prescription receive slope equalization (263DA-2 and 263DB-2 only)

3.18 To determine the need for receive-channel equalization (i.e., post-equalization at the local end of the 4wire facility) and to make the required adjustments on the 263DA-2 or 263DB-2, proceed as follows:

A. Ensure that **none** of the four equalization DIP-switch positions are set to *IN*. Also ensure that the facility-side port impedance switch (*S1*) is set correctly.
B. Arrange the receive portion of a TMS for 600-ohm terminated measurement and connect it to the *RCV OUT* jack. Request the far end to send 1004Hz test tone at the level specified on the CLR. Verify the presence of test tone and record the level.
C. Have the far end send 2804Hz test tone at the level specified on the CLR. Measure and record the received 2804Hz level. Subtract the 2804Hz level from the 1004Hz level recorded in step B.
D. Set to *IN* the proper combination of equalization DIP-switch positions that approximates as closely as possible the measured difference (see table 6).

non-prescription receive slope or bump (309B-equivalent) equalization (263DA-3 and 263DB-3 only)

3.19 The receive-channel equalizer on the 263DA-3 and 263DB-3 is functionally identical to the Western Electric 309B Prescription Equalizer. Non-prescription alignment procedures for this equalizer can be found in BSP 332-912-234.

4. circuit description

4.01 This circuit description is intended to familiarize you with the 263DA and 263DB Data Station Termination Systems for engineering and application purposes only. Attempts to troubleshoot these units internally are not recommended and may void your warranty. Troubleshooting procedures should be limited to those prescribed in section 7 of this practice. Refer to the 263DA and 263DB block diagram, section 5 of this practice, while reading this circuit description.

4.02 Each unit's *power supply* consists of a full-wave bridge rectifier and a capacitor-input pi-type filter that convert ac input into a dc voltage. A series voltage regulator in each unit's *power supply* circuitry ensures stable supply voltages to the unit's internal circuitry. The 263DA requires nominal 26Vac input such as that provided by the Tellabs 8015 Transformer; the 263DB is equipped with an integral step-down isolation transformer ahead of the unit's *power supply* that allows the unit to operate directly from commercial 117Vac, 60Hz power.

4.03 Transformers at the facility-side ports (receive input and transmit output) of both systems are tapped to provide switch-selectable 1200-, 600-, or 150-ohm terminating impedance. A voltage-transient suppressor on the secondary side of each transformer limits transient potentials to a safe level and provides surge protection. Both facility-side transformers are center-tapped to derive balanced simplex leads. An optional sealing-current subassembly can be installed on both units to provide an internal source of nominal 20mA sealing current. This subassembly can be switch-optioned to provide sealing current to the facility via the DST unit's simplex leads or to provide a return path for sealing current supplied at the far end of the facility.

4.04 Transformers at the data-station-side ports (receive output and transmit input) of both units provide fixed, balanced 600-ohm terminating impedance.

4.05 Levels between the facility and the data station are coordinated by the *receive amplifier* and the *receive level control* circuitry. DIP switches in the *receive level control* circuitry introduce controlled feedback into the *receive amplifier* to provide up to 15dB of receive-channel loss or gain in 1.0dB increments. A two-position slide switch (*S2*) determines whether gain or loss is inserted by the *receive amplifier*.

4.06 The output of the *receive amplifier* feeds a series-connected prescription amplitude equalizer in the 263DA-2, 263DB-2, 263DA-3, and 263DB-3. For the 263DA-2 and 263DB-2, the *receive equalizer* is an active slope-type equalizer that introduces up to 7.5dB of equalized gain at 2804Hz (re 1004Hz) in switch-selectable 0.5dB increments. For the 263DA-3 and 263DB-3, the *receive equalizer* is a slope- and bump-type equalizer that is functionally identical to the Western Electric 309B Prescription Equalizer. The amount of equalization introduced by this equalizer is controlled by the 263DA/DB-3's *SLOPE, HT* (height), and *BW* (bandwidth) DIP switches. An additional switch position on the *SLOPE* DIP switch conditions the equalizer for use with loaded or nonloaded cable.

4.07 The *receive level detector* responds to the presence of *data in* the receive channel at levels greater than −25dBm by lighting the *data in* LED. The location of the *receive level detector* in the circuit — following the *receive amplifier* and *level control* circuitry and, on the 263DA-2, 263DB-2, 263DA-3 and 263DB-3, the *receive equalizer* — makes it a valuable troubleshooting aid because it provides a check on virtually all active circuitry in the receive channel.

4.08 Level coordination between the data station and the facility is provided by the *transmit amplifier* and the *transmit level control* circuitry. A five-step attenuator in the *transmit level control* circuitry provides up to 31dB of flat loss, which is inserted into the transmit channel in 1.0dB increments by a five-position DIP switch.

4.09 The *transmit level detector* performs the same functions for the transmit channel as the *receive level detector* does for the receive channel, i.e., responding to the presence of data signals above −25dBm by lighting the *data out* LED. The *transmit level detector* is similarly located at a point in the circuit where it provides a check of the maximum amount of active transmit-channel circuitry.

4.10 The *loopback control* circuitry provides detection, timing, and logic functions for loopback operation of the 263DA and 263DB. Loopback can be activated either locally by option switch (*S5*) (dc loopback) or remotely by 2713Hz tone (two-tone loopback). When loopback is activated by either method, the loopback (*LB*) relay operates, opening the transmit and receive channels toward the modem and connecting the receive channel to the transmit channel. The *LB* relay also provides data-set-disable leads (*TEK5* and *TEK6*) to disable the associated data set during loopback. The *loopback* LED on the unit's cover lights when the unit is in loopback.

4.11 Remote loopback is initiated by a 2713Hz tone burst of 1.4 seconds or longer, with activation upon **removal** of the tone. The threshold of the tone detector in the *loopback control* circuitry is fixed at −26dBm. A 4dB guard band prevents loopback activation by other than the intended signal. Loopback is deactivated by a second 2713Hz tone burst of 0.7 second or longer.

4.12 The *loopback amplifier* in the loopback path can be switch-optioned to provide either 8 or 16dB of gain between the receive and transmit channels when the unit is in the loopback mode. In circuits with either an 8 or 16dB differential between the receive and transmit TLPs, this feature allows a test signal received at the normal data level to be returned to the remote location at the same level as in normal operation.

6. specifications

receive channel

level range
−15 to +15dB of gain in switch-selectable 1.0dB increments, with gain or loss selected via option switch

maximum input level
+10dBm

maximum output level
+10dBm

input impedance
150 ohms ± 15%, 600 ohms ± 10%, or 1200 ohms ± 10%, balanced, switchable

output impedance
600 ohms ± 10%, balanced

total harmonic distortion
1% maximum, 300 to 4000Hz

frequency response
± 0.5dB re 1004Hz, 300 to 4000Hz

amplitude equalization (263DA-2 and 263DB-2 only)
up to 7.5dB of active slope equalization at 2804Hz (re 1004Hz) in switch-selectable 0.5dB increments

amplitude equalization (263DA-3 and 263DB-3 only)
prescription active slope/bump equalizer functionally identical to Western Electric 309B Prescription Equalizer

noise
10dBrnC0 maximum

envelope delay distortion
less than 100 microseconds, 400 to 3000Hz

transmit channel

level range
0 to 31dB of attenuation in switch-selectable 1.0dB increments

maximum input level
+10dBm

maximum output level
+10dBm

input impedance
600 ohms ± 10%, balanced

output impedance
150 ohms ± 15%, 600 ohms ± 10%, or 1200 ohms ± 10%, balanced, switchable

total harmonic distortion
1% maximum, 300 to 4000Hz

frequency response
± 0.5dB re 1004Hz, 300 to 4000Hz

noise
10dBrnC0 maximum

envelope delay distortion
100 microseconds maximum, 400 to 3000Hz

loopback specifications

tone-loopback threshold
−26dBm

tone loopback signal-to-guard ratio
4dB minimum

loopback level
either 16dB (equal-level) or 8dB loopback-path gain, switch selectable

tone loopback frequency
2713Hz center frequency, ± 0.2% stability, 75Hz maximum bandwidth

operating times, tone loopback
initiate: 1.4 seconds minimum, loopback after removal of tone
release: 0.7 second maximum, release during tone

common specifications

sealing current (optional)
integral facility-side sealing-current source (Tellabs 263D L1 plug-on subassembly) available; an option switch on the subassembly selects either locally applied 20mA (nominal) sealing current or a return path for sealing current applied at distant end of facility

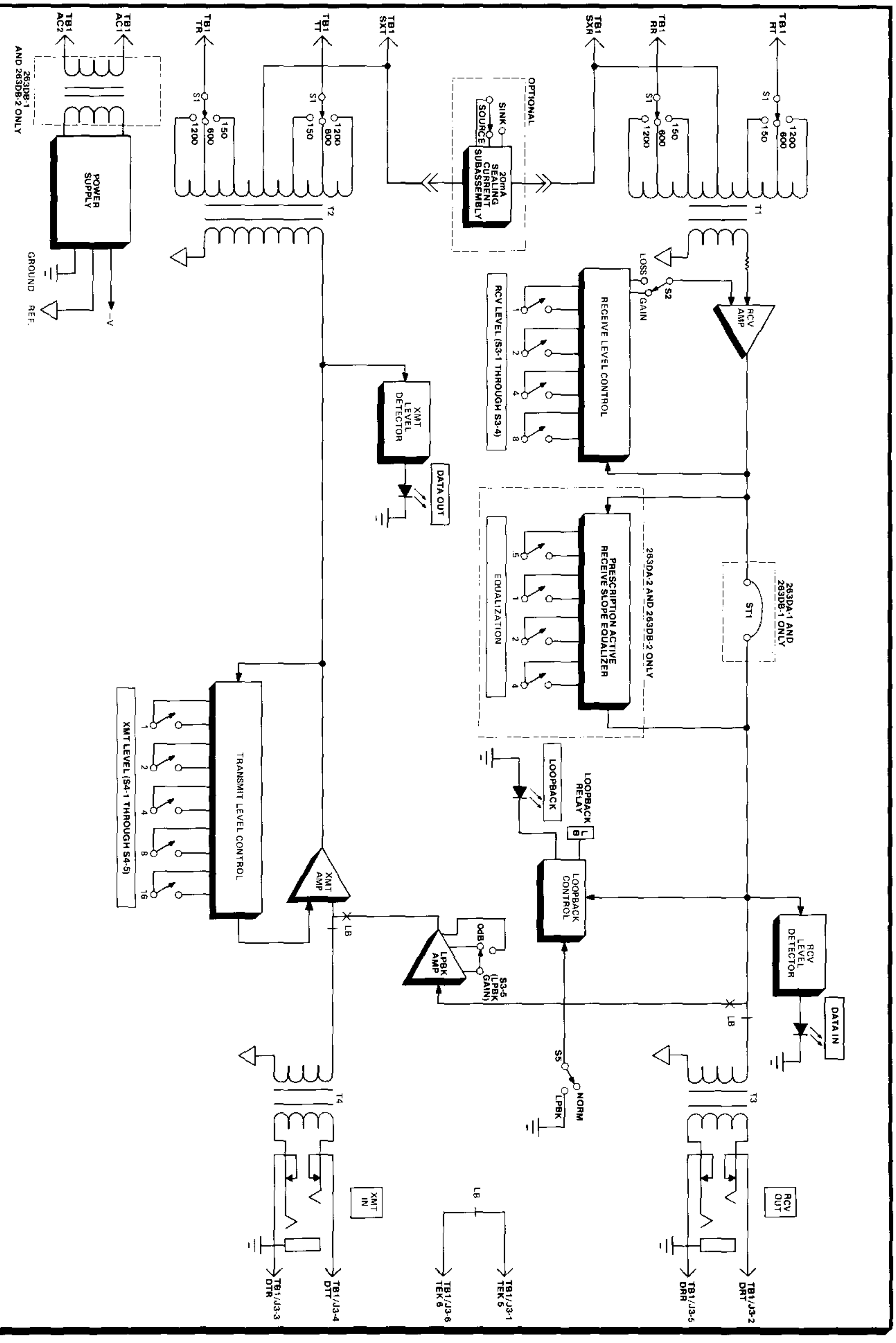
input power
263DA: 18 to 26Vac, 60 Hz, 7.5VA maximum
263DB: 105 to 120Vac, 60Hz, 100mA maximum

operating environment
20° to 130°F (−7° to +54°C), humidity to 95% (no condensation)

dimensions
height: 7.6 inches (19.3 cm)
width: 6.7 inches (17.0 cm)
depth: 2.0 inches (5.0 cm)

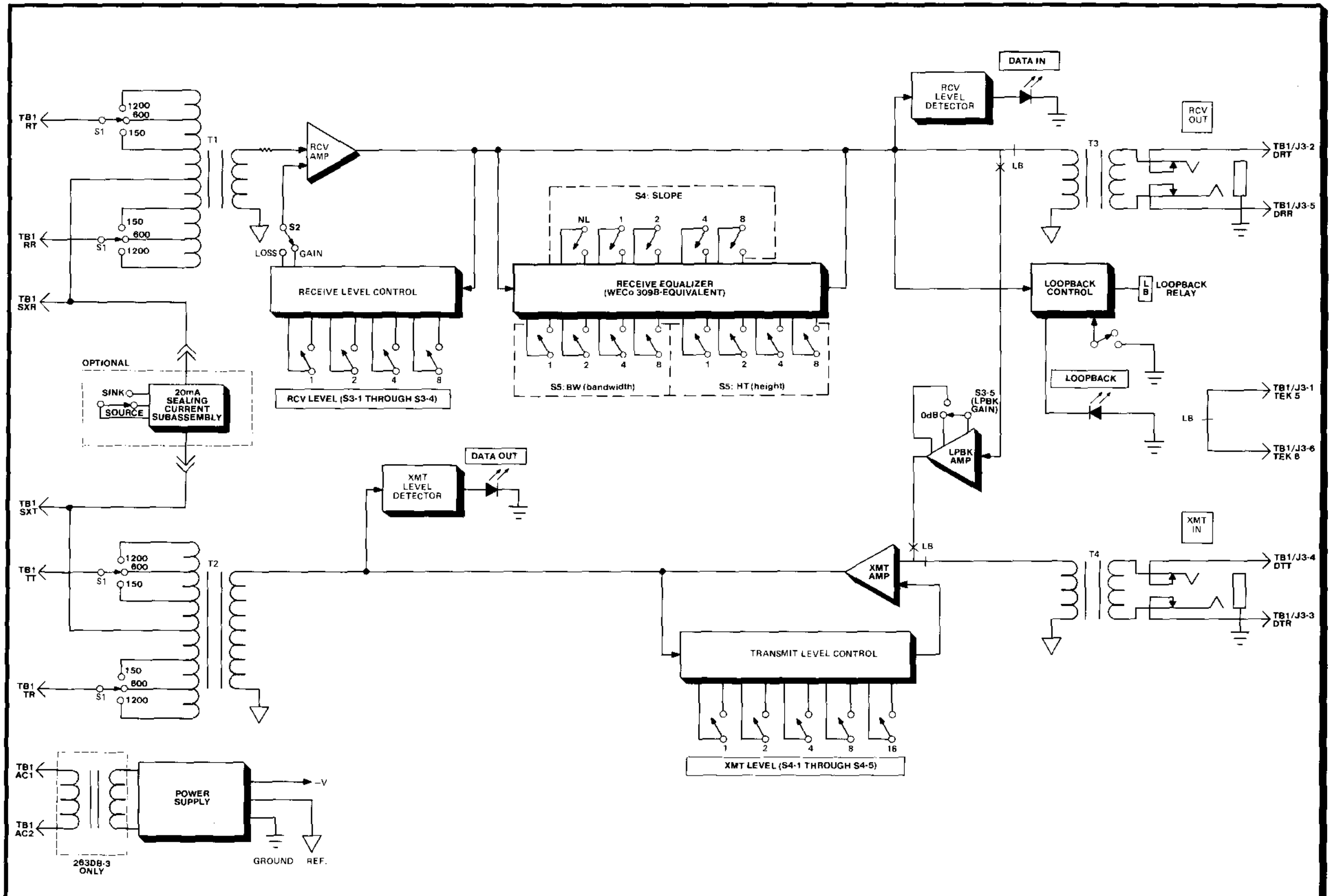
weight
263DA: 1 pound 14 ounces (850 grams)
263DB: 3 pounds (1.4 kg)

mounting
wall-mounted; rubber feet also provided for desktop placement



263DA-1, 263DA-2, 263DB-1, and 263DB-2 Data Station Termination Systems 81263DA-1/-2/ 81263DB-1/-2

5.1. block diagram



263DA-3 and 263DB-3 Data Station Termination Systems 81263DA-3/81263DB-3

5.2. block diagram

7. testing and troubleshooting

7.01 The *testing guide checklist* in this section may be used to assist in the installation, testing, or troubleshooting of the 263DA and 263DB Data Station Termination (DST) Systems. The checklist is intended as an aid in the localization of trouble to a specific DST unit. If a unit is suspected of being defective, a new one should be substituted and the test conducted again. If the substitute unit operates correctly, the original unit should be considered defective and returned to Tellabs for repair or replacement. We strongly recommend that no internal (component-level) testing or repairs be attempted on the unit. Instead, a malfunctioning unit should be returned to Tellabs for repair or replacement as directed below. Unauthorized testing or repairs may void the unit's warranty. Also, if the unit is part of a registered system, unauthorized repairs will result in noncompliance with Part 68 of the FCC Rules and Regulations.

Note: *Warranty service does not include removal of permanent customer markings on Tellabs products, although an attempt will be made to do so. If a product must be marked* **defective**, *we recommend that it be done on a piece of tape or on a removable stick-on label.*

7.02 If a situation arises that is not covered in the checklist, contact Tellabs Customer Service as follows (telephone numbers are given below):

USA customers: Contact Tellabs Customer Service at your Tellabs Regional Office.

Canadian customers: Contact Tellabs Customer Service at our Canadian headquarters in Mississauga, Ontario.

International customers: Contact your Tellabs distributor.

US capital region: (703) 478-0468
US central region: (312) 969-8800
US Atlantic region: (203) 798-0506
US southeast region: (305) 645-5888
US western region: (702) 827-3400
Canada: (416) 624-0052

7.03 If a unit is diagnosed as defective, follow the replacement procedure in paragraph 7.04 when a critical service outage exists (e.g., when a system or a critical circuit is down and no spares are available). If the situation is not critical, follow the repair and return procedure in paragraph 7.05.

replacement

7.04 To obtain a replacement unit, notify Tellabs via letter or telephone (see addresses and numbers below) or via TWX (910-695-3530 in the USA, 610-492-4387 in Canada). Be sure to provide all relevant information, including the 8X263DA/8X263DB part number that indicates the issue of the unit in question. Upon notification, we shall ship a replacement to you. If the unit in question is in warranty, the replacement will be shipped at no charge. Pack the defective unit in the replacement's carton, sign the packing slip included with the replacement, and enclose it with the defective unit (this is your return authorization). Affix the preaddressed label provided with the replacement to the carton being returned, and ship the unit prepaid to Tellabs.

repair and return

7.05 Return the defective unit, shipment prepaid, to Tellabs (attn: repair and return).

in the USA: Tellabs, Inc.
4951 Indiana Avenue
Lisle, Illinois 60532
telephone (312) 969-8800

in Canada: Tellabs Communications Canada, Ltd.
1200 Aerowood Drive, Unit 39
Mississauga, Ontario, Canada L4W 2S7
telephone (416) 624-0052

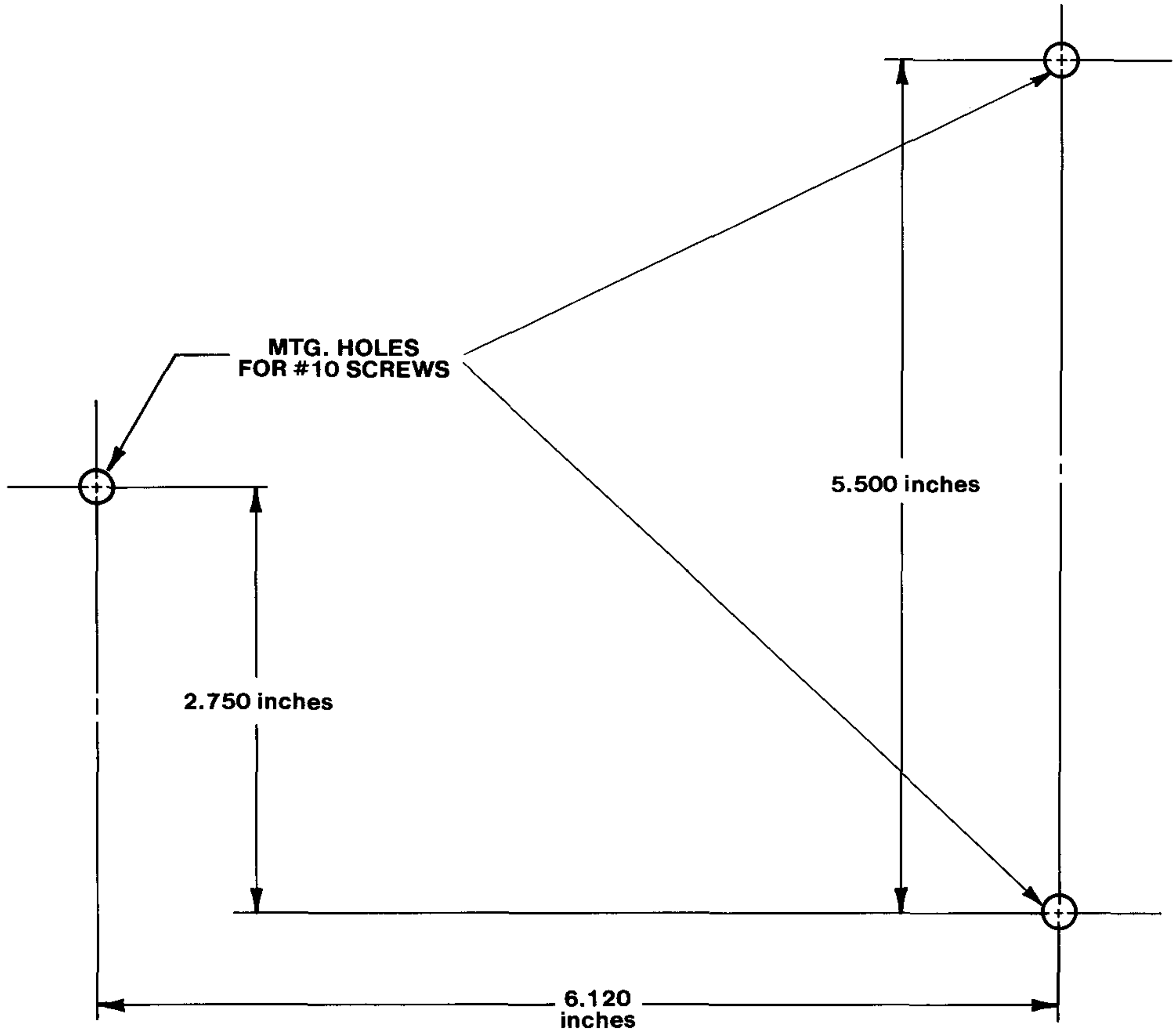
Enclose an explanation of the unit's malfunction. Follow your company's standard procedure with regard to administrative paperwork. Tellabs will repair the unit and ship it back to you. If the unit is in warranty, no invoice will be issued.

testing guide checklist

test	procedure	normal result	if normal conditions are not met, verify:
transmit level	Arrange xmt portion of TMS for 1004Hz tone at 0dBm and 600 ohms. Connect this signal to *XMT IN* jack. Arrange rcv portion of TMS for terminated measurement at facility-side port impedance selected on DST unit, and connect it to pins *TT* and *TR* on *TB 1*. Vary *XMT LEVEL* switches over their entire loss range.	Signal level follows loss setting ☐.	Power ☐. Wiring ☐. Proper impedance terminations ☐. Impedance switch *S1* on main board properly set ☐. Unit not in loopback ☐.
transmit-channel noise	Short xmt input leads together either by inserting a shorting plug into *XMT IN* jack or by strapping pins *DTT* and *DTR* on *TB 1* together. Connect noise measuring test set to pins *TT* and *TR* on *TB 1*. Vary *XMT LEVEL* switches over their entire loss range. Remove xmt input short before proceeding to next test.	Noise level follows loss setting ☐. Measured noise level is less than 10dBrnC0 for all loss settings ☐.	Xmt input leads shorted ☐. Proper impedance terminations ☐. High RF environment not present ☐.

test	test procedure	normal result	if normal conditions are not met, verify:
receive level	Arrange xmt portion of TMS for 1004Hz tone output at −10dBm and at facility-side port impedance selected on DST unit. Connect this signal to pins *RT* and *RR* on *TB 1*. Arrange rcv portion of TMS for 600-ohm terminated measurement and connect it to *RCV OUT* jack. Vary *RCV LEVEL* switches over their entire gain and loss ranges.	Signal level follows gain and loss settings □.	Power □. Wiring □. Proper impedance terminations □. Switch *S1* on main board properly set □. Unit not in loopback □.
receive slope equalization (263DA-2 and 263DB-2 only)	Maintain TMS connections as described above. Transmit 2804Hz tone at −10dBm from TMS and set equalization switches (*S1-1* through *S1-4* on equalizer subassembly) to *IN* position one at a time.	Signal level increases to 7.5dB above 1004Hz level as equalization is added □.	Input level at 2804Hz same as at 1004Hz □. Strap *ST1* cut or removed □.
receive slope/bump equalization (263DA-3 and 263DB-3 only)	Maintain TMS connections as described above. On equalizer subassembly, set all *BW* switches to *ON* and all *SLOPE* and *HT* switches to *OFF*. Transmit 3250Hz tone at −10dBm from TMS and set *HT* switches to *ON* one at a time.	Signal level increases as equalization is added □.	Input level at 3250Hz same as at 1004Hz □. Strap *ST1* cut or removed □.
	Maintain TMS connections as described above. Set all *BW* and *HT* switches to *OFF*. Transmit 404Hz tone at −10dBm from TMS and set *SLOPE* switches to *ON* one at a time.	Signal level increases as equalization is added □.	Input level at 404Hz same as at 1004Hz □. Strap *ST1* cut or removed □.
receive-channel noise	Short rcv input leads together by strapping pins *RT* and *RR* on *TB1* together. Connect noise measuring test set to *RCV OUT* jack. Vary *RCV LEVEL* switches over their entire gain and loss ranges. Remove rcv input short before proceeding to next test.	Noise level follows gain and loss settings □. Measured noise is less than 10dBrnC0 for all gain and loss settings □.	Receive input leads shorted □. Proper impedance terminations □. High RF environment not present □.
tone loopback activation and loopback-level circuitry	Connect rcv portion of TMS (properly terminated) to pins *TT* and *TR* on *TB1*. Arrange xmt portion of TMS for 2713Hz tone output at CLR-specified loopback tone level. Connect this signal to pins *RT* and *RR* on *TB1*. After 2 seconds, change frequency to 1004Hz and note TMS level reading.	*Loopback* LED lights □. Level indicated on TMS is within ±1dB of CLR-specified loopback tone level □.	Transmit and receive channels properly aligned □. Loopback tone level above −26dBm □. Switch *S3-5* (*LPBK GAIN*) properly set □. Shorts at xmt input and rcv input ports removed □.
tone loopback release	Maintain test connections as described above and change TMS tone frequency back to 2713Hz for 1 second.	*Loopback* LED goes out □.	Same as above □.
dc-activated loopback	Set loopback switch to *lpbk* position. Arrange xmt portion of TMS for 1004Hz tone output at CLR-specified rcv input level. Connect this signal to pins *RT* and *RR* on *TB1*. Arrange rcv portion of TMS for approriately terminated measurement, and connect it to pins *TT* and *TR* on *TB1*.	*Loopback* LED lights □. Level indicated on TMS is within ±1dB of CLR-specified loopback tone level □.	Transmit and receive channels properly aligned □. Switch *S3-5* (*LPBK GAIN*) properly set □.
sealing current	With unit optioned for internal sealing current (*S1* set to *SOURCE*), connect VOM (arranged to measure up to 50mA) between TB1 RR and TB1TT.	VOM indicates approximately 20mA □.	Power □. Wiring □. Switch *S1* properly set □.

3DB



263DA and 263DB mounting template

tellabs
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