

**L3 CARRIER — DELAY DISTORTION EQUALIZATION OF AN L-UNIT
DEL BO (475A) AND SLOPE EQ (226L) ADJUSTMENT
AT SWITCHING AND TERMINAL MAIN REPEATERS
EQUIPPED WITH 6-PILOT REGULATION**

This section is reissued to include the latest testing methods available. Issue 1 was given a limited distribution for training purposes only.

The delay buildout network (DEL BO) in an L-unit is adjusted on a sectional basis with a cosine adjustment set connected to TV test points in the line connecting equipment. If the line is being used for combined telephone and TV service, the TV service will have to be removed, but the telephone service remains on the line during the period of these adjustments. The line switching circuit must be in the regular condition to adjust the DEL BO in a regular line, so that the network and line will be connected to their regular line connecting equipment. To prevent unnecessary line switches due to pilot hits, the line switching circuit is disabled. So that the television circuit functions normally when a stand-by line is switched into service, the stand-by line's DEL BO network must be adjusted after making a manual switch so that test signals will flow through the stand-by line. When more than one regular line is equipped for TV, the DEL BO in the stand-by line should be adjusted to a value which is the average of the optimum settings obtained from tests with each of the regular TV line connecting circuits. If it is desirable to have the best transmission over one of the regular lines, the stand-by line should be adjusted while switched to the line connecting equipment of the priority line. For adjustment of a stand-by line which is equipped for television, this line must be taken out of telephone service, and its normal TV circuit set up at each end of the L-unit.

The SLOPE EQ is used with flat amplifier E (DROP or through). It is adjusted periodically to compensate for flat amplifier aging.

Caution 1: *Changes in DEL BO and SLOPE EQ settings require readjustment of local and succeeding TV EQ A's (336A). A TV mop-up line-up per Section E34.090.12 should follow the procedure below, before a line is returned to TV service.*

Caution 2: *Unused TV TST and TV REC HY 1 NET jacks should always be terminated with 368A plugs to prevent pilot power deviations or hits during various line-ups.*

Caution 3: *To avoid disturbance to telephone channels on a combined system, do not change the transmitter of the cosine equalizer adjustment set from gain to delay (or vice versa) or operate the TRS switch to TP while the set is connected to the line.*

APPARATUS:

J68837C Cosine Equalizer Adjustment Set (at each end of the L-unit)

P2BJ Patch Cords

*J68827A Sending Console

*J68827B Receiving Console

*KS-14655 Pads

NO SUBSTITUTES

* (If SLOPE EQ is scheduled for adjustment, this apparatus is required at the Receiving End of the L-unit.)

STEP	PROCEDURE
1	<i>At Both Ends of the L-unit:</i> Calibrate the cosine adjustment sets for gain and delay distortion line-ups in the TV band per Section E40.266.3.
2	<i>At the Transmitting Terminal Main Repeater of the Pilot Link Involved:</i> Remove TV carrier from the line by disconnecting any T3 television terminal or through-TV-at-line-frequency connection. (If this repeater is participating in the sectional line-up as the transmitting end of the switching section, this procedure is included in the patching instructions below.)
3	<i>At the Transmitting End of the L-unit:</i> Make connections to the line to be adjusted as follows: <i>If a Terminal Repeater:</i> Patch from the cosine set TR jack to the BEF IN jack, and from the BEF OUT jack on the cosine set to the TV LINE IN jack associated with L-unit to be adjusted. (This patch bypasses cosine set monitoring facilities.) (See Fig. 1 and 2.) <i>If a Switching Main Repeater:</i> Patch from the cosine set TR jack to the BEF IN jack, and from the BEF OUT jack of the cosine set to the TV REC HY 1 NET jack in the line connecting equipment associated with the L-unit to be adjusted. (See Fig. 1 and 2.) AT THE RECEIVING END
4	If a TV EQ A (336A) is located in the <i>through</i> branch of the receiving location's line connecting equipment, record the positions of both gain and delay terms 1 through 5, and the positions of the two delay range-extending keys which are designated "-2, -1, 0, +1, +2." Set the term knobs to "5" and the delay range-extending keys to "0." <i>Caution:</i> <i>At a switching main repeater, the operation of the COARSE DELAY switches may cause a hit on the 7266 KC pilot in the succeeding section. Therefore, when operating the COARSE DELAY switches, operate the TRSG SW, associated with the transmitting switch control in the succeeding section, to DISC. After the COARSE DELAY switches have been operated, return the TRSG SW to normal. This will return the switching section to normal thus insuring maximum switching protection.</i>
5	(a) Observe the 7266 and 8320 KC PIL IND meters. <i>Requirement:</i> The PIL IND meters shall not fluctuate over a range greater than 0.10 db peak-to-peak. <i>Caution:</i> <i>If the requirement is not met, the transmitting end cosine adjustment set pilot skip (7266 kc fluctuation) or band edge setter (8320 kc fluctuation) MUST be readjusted before changes are made in the DEL BO or SCOPE EQ setting. Poor test signal pilot skip or band edge will cause line misregulation and incorrect settings.</i> (b) Patch from the REC jack of the cosine set to the TV TST jack of the line to be measured. (c) Operate the cosine receiver GAIN-DELAY key to DELAY. Set the ATT on the cosine set to 2 db, if receiving test signals from a switching main repeater, or to 0 db if receiving from a terminal main repeater.

STEP	PROCEDURE
6	For Tests on a Regular Line: Operate the LOCK NORMAL feature of the line switch. For Tests on a Stand-by Line: Manually switch the stand-by line into service with the line connecting circuit to be used for the test. Note: The above steps prevent unnecessary line switching caused by pilot hits due to DEL BO adjustment, and remove message service protection. The automatic protection system should be thus disabled only long enough to make the adjustments of Steps 7 and 8.
7	Center the received signal on the oscilloscope by means of the LINE ZERO control on the cosine set. Requirement: Adjust the DEL BO switches until the portion of the received trace between the high- and low-frequency markers changes from a downward to an upward slope when one-fourth of a section is added or subtracted. Note: If delay distortion is correctly equalized, the trace of the oscilloscope will show deviations about a horizontal axis. Since the trace shows the characteristic of BOTH an upward and a downward frequency sweep, one following the other, the desired characteristic can be described as a straight line. If the received trace slopes downward toward the high-frequency portion of the trace, the line is overequalized. Turning sections of DEL BO "IN" will add additional delay distortion and the high-frequency portion of the trace will rise. The setting of the DEL BO is given by adding the designation numbers of the switches which are in the "IN" position. Increasing the number of sections "IN" will cause the trace to slant upward from the low-frequency portion to the high-frequency portion. Similarly reducing the equalizer setting will cause the trace to slant downward.
8	Leave the switches in the positions which make the received trace as nearly horizontal as possible (after meeting the requirement for a change in direction of slope in Step 7).
9	Restore line switching to the regular condition.
10	If the SLOPE EQ is to be adjusted at this time, proceed with this step. If SLOPE EQ is not to be adjusted, omit this step and complete the line-up with Step 11. (a) If the 226L is a DROP SLOPE EQ, connect the receiving cosine set to TV DROP TST and if the 226L is a THROUGH SLOPE EQ connect the cosine set to the TV TST jack. If measuring at TV DROP TST and if a DROP TV EQ A is furnished, record its settings and set it "flat" as in Step 4. (b) Repeat the pilot skip check by observing the 7266 and 8320 KC PIL IND meters. Requirement: The PIL IND meters shall not fluctuate greater than 0.10 db peak-to-peak. Caution: Same as Step 5 (a). (c) Operate the receiver's GAIN-DELAY key to GAIN. Center the trace with the CR CENTER control. (The trace on the oscilloscope will have the thickness characteristic of delay test transmissions observed for gain characteristics, but can be easily used for the adjustment of the SLOPE EQ.) (d) Adjust SLOPE EQ (226L) for optimum flatness (minimum deviation about the horizontal axis).

STEP	PROCEDURE
11	(a) <i>At Both Ends of the L-unit</i>, restore patching to regular. (b) <i>At the Receiving End of the L-unit</i>, restore the controls of through or DROP TV EQ A (336A) to the positions recorded in Step 4 or 10. Caution: <i>At a switching main repeater, the operation of the COARSE DELAY switches may cause a hit on the 7266 KC pilot in the succeeding section. Therefore, when operating the COARSE DELAY switches, operate the TRSG SW, associated with the transmitting switch control in the succeeding section, to DISC. After the COARSE DELAY switches have been operated, return the TRSG SW to normal. This will return the switching section to normal thus insuring maximum switching protection.</i> (c) <i>At the Transmitting Terminal Main Repeater of the Pilot Link Involved</i>, restore the television terminal or through line connection removed in Step 2.
12	At the Receiving End: If the adjustment of SLOPE EQ has been changed, the 7266 KC pilot power should be measured at the TRSG HY OUT of the succeeding L-unit per Section E34.591.39. Requirement: The 7266 KC pilot power should meet the requirement for measurements at TRSG HY OUT in Section E34.591.39. If it does not, adjust TV ATT to achieve the "Optimum Reading" ± 0.05 db. Note: This step may be omitted if a local <i>through circuit</i> TV EQ A (336A) is scheduled for immediate line-up. (For TV mop-up line-ups repeat this step at through equalizer points.)

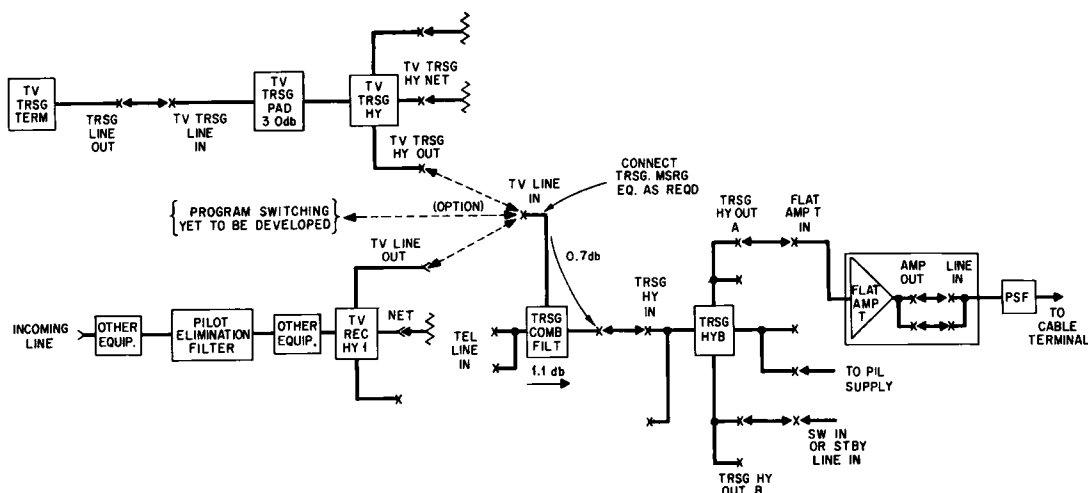
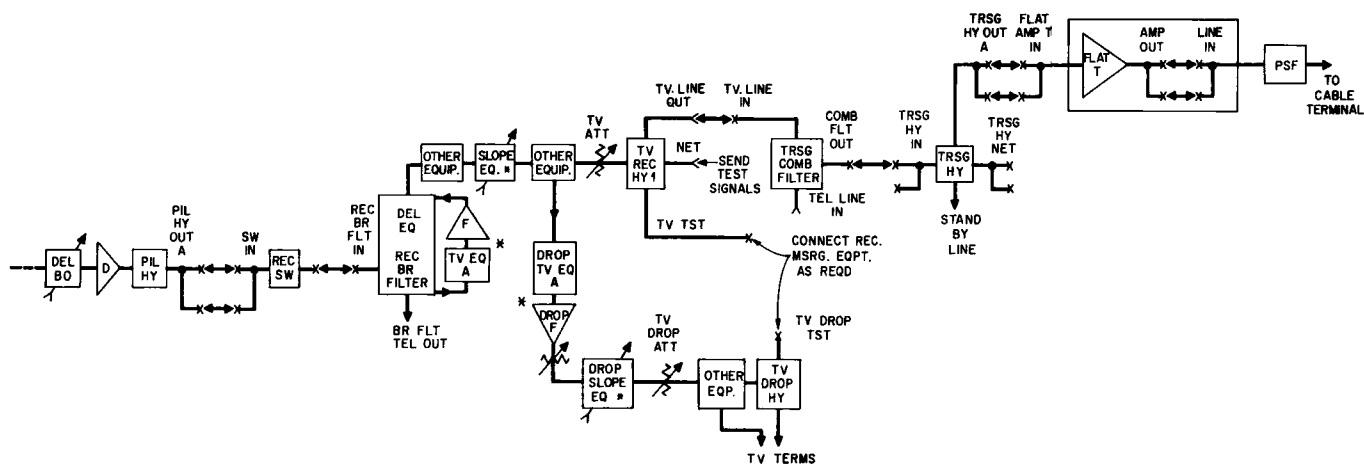


Fig. 1 - Test Transmission from Transmitting Terminal Repeaters



* THROUGH OR DROP TV EQ A & FLAT AMP F MAY BE FURNISHED IN ONE OF THE OPTIONAL LOCATIONS SHOWN, BUT NOT BOTH. SLOPE EQ OR DROP SLOPE EQ ALSO FURNISHED IN ONLY ONE LOCATION.

Fig. 2 - Delay Distortion Measurements at Switching and Terminal Main Repeaters
Delay Distortion Test Transmission at Switching Main Repeaters