

TYPE L3 CARRIER SYSTEM
POWER LOADING ADJUSTMENT — L3 POWER SECTION
PS1 POWER SYSTEM — LINE LOADING NOT COMPUTED

This section describes the procedure to be followed when making auxiliary repeater power load adjustments on the type L3 carrier system using the earlier (PS1) power system. This procedure is to be used *only* where computer calculations have *not* been obtained for exact power load adjustments.

Power load adjustments as described in this section are made when it is evident that the line current distribution must be changed because (a) the LOAD ADJ switch does not have sufficient range to meet HTR 1 voltage requirements at the auxiliary repeater, or (b) the difference in line current at the first auxiliary repeater in the power section and the last power loaded auxiliary repeater or last auxiliary repeater in the power section does not measure within the desired range, thus indicating that HTR 1 voltage requirements will not be met.

Two methods of adjusting the power loading are described:

- (a) Method A (preferred) — Auxiliary Repeater Locations Manned Simultaneously.
- (b) Method B (alternate) — Auxiliary Repeater Location Manned One at a Time.

The power load adjustment may be summarized as follows. The power load is first adjusted at the last power loaded auxiliary repeater and then progressively adjusted toward the power supply point. ODD and EVEN line current measurements are made at the first auxiliary repeater and the last power loaded auxiliary repeater. Intermediate power loaded auxiliary repeaters are not equipped for making line current measurements.

Fig. 1 is a graphic presentation of power loading and the changes in line current as the power loading is adjusted. Because of the capacitance shunting effect, line current would not be uniform in an unloaded power section. To overcome this capacitance shunting (capacitive reactance), series power loading (inductive reactance) is used to give a more uniform current distribution in the power section. Power loading is adjusted starting with the last power loaded auxiliary repeater and progressively adjusting the loading toward the power source. The power loading adjustment is continued until the line current is relatively uniform between the first auxiliary repeater and the last power loaded auxiliary repeater. As shown in the current distribution curve, there is a large change in the line current toward the power source but only a small change at the point adjusted or on the distant end of the power section.

Caution: To prevent erroneous readings, adjust power at the power source until the line current (or HTR 1 voltage) at the point adjusted is restored to the value measured prior to making the power load adjustment. This is necessary as the current distribution between the point adjusted and the power source is changed each time a power loading coil is adjusted.

This section is reissued to make the title definitive and to specify in the text the prime need for this section.

The purpose of this test is to make power loading adjustments at auxiliary repeaters of a type L3 carrier system using the PS1 power system.

APPARATUS:

- 2 — 1AL Power Test Sets (Method A)
 or
 1 — 1AL Power Test Set (Method B)

STEP	PROCEDURE
	Caution 1: <i>The line voltage on the L3 system is dangerous to personnel. All safety procedures and cautions as described in Section 359-020-500 must be observed so as to protect personnel working on the coaxial cable conductors or power supply equipment.</i> Caution 2: <i>The measurements described in this section can be made on an in-service basis. If adjustments are being made on a working line, the power supply voltages should not be interrupted as this interruption will cause objectionable hits and possible line switching.</i>
	Method A — Preferred Note 1: Power line-up crews should be provided at the first auxiliary repeater and the last power loaded auxiliary repeater in the power section under test. Note 2: Equip each line-up crew with a 1AL power test set. 1 At last power loaded auxiliary repeater in power section, check that LOAD ADJ switch is in position 6 if a thermometer-regulated repeater or in position 8 if a pilot-regulated repeater. 2 Adjust line current, if necessary, at main or terminal repeater supplying power until HTR 1 voltage at last power loaded auxiliary repeater measures 6.0 volts. 3 Measure and record ODD and EVEN line currents at first auxiliary repeater in power section. 4 Measure and record ODD and EVEN line currents at the last power loaded auxiliary repeater in power section. Requirement: If the average of the ODD and EVEN line currents at the first auxiliary repeater reads between 20 ma lower and 30 ma higher than the average of the ODD and EVEN line currents at the last power loaded auxiliary repeater in the power section, the power loading adjustment is assumed to be satisfactory. If the average falls outside this range, proceed with the power loading adjustments described in the following steps.

STEP	PROCEDURE
	Note: The line current measurements, which are given in this procedure, are used only as a guide when making power loading adjustments. The necessity for making power loading adjustments is shown by inability to meet HTR 1 voltage requirements with the available range on the LOAD ADJ switch. The desired LOAD ADJ switch setting at auxiliary repeaters is between positions 4 and 9.
5	At last power loaded auxiliary repeater, make variable load adjustment as follows: Adjust variable load dial to read 0 if average of ODD and EVEN line currents at first auxiliary repeater reads lower, or adjust variable load dial to read 100 if average of ODD and EVEN line currents reads higher than average of ODD and EVEN line current at last power loaded auxiliary repeater.
6	Manually adjust, if necessary, the power at main or terminal repeater until HTR 1 voltage at last power loaded auxiliary repeater measures 6.0 volts.
7	Repeat Steps 3 and 4.
8	If ODD and EVEN line currents still exceed requirement in Step 4, leave variable load dial on reading to which it was adjusted and proceed to Steps 9 through 11.
9	At next power loaded auxiliary repeater (toward power source) from power loaded auxiliary repeater already adjusted, set variable load dial to read as follows: 0 — If average of ODD and EVEN line currents at first auxiliary repeater reads lower than average at last power loaded auxiliary repeater. 100 — If average of ODD and EVEN line currents at first auxiliary repeater reads higher than average at last power loaded auxiliary repeater.
10	Repeat procedure in Steps 2, 3, and 4.
11	If ODD and EVEN line currents still exceed requirement in Step 4, proceed to Step 12.
12	Follow the procedure in Steps 9 through 11 at each power loaded auxiliary repeater under adjustment and at each subsequent power loaded auxiliary repeater in the power section toward the power source until the desired line current difference is obtained. Note: This procedure may be discontinued at any point where the line current difference is reduced to the requirement in Step 4.
13	If variable power loading at all power loaded auxiliary repeaters in power section has been adjusted in accordance with preceding procedure and HTR 1 voltage requirement cannot be met, proceed to Steps 9 and 10 of Method B.

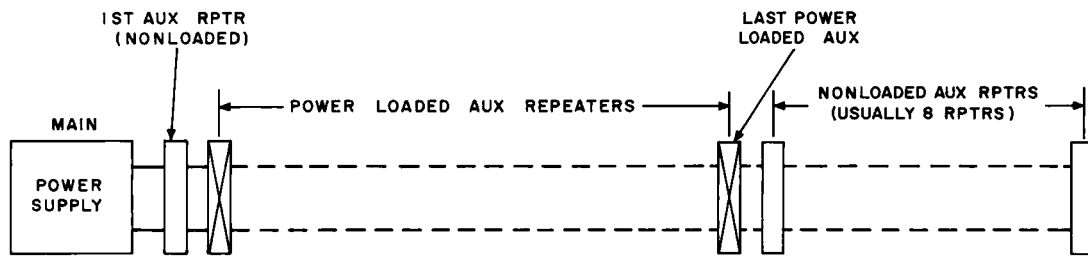
Method B — Alternate

This procedure may be used for an initial power line-up but is particularly adaptable to subsequent power loading adjustments when it becomes evident that the line current must be changed to meet HTR 1 voltage requirements at auxiliary repeaters. For the reasons stated in the description associated with Fig. 1, changing the loading adjustment at any one repeater makes a change in the line current toward the power source but not at the point being adjusted. Thus, if HTR 1 voltage is noted at the point being adjusted before making the power loading adjustment and then the power at the source is adjusted to restore HTR 1 voltage to its previous value, a change in line current will be indicated by before and after readings of the line current meters at the supply source. By using this difference in line current, it is possible to calculate the approximate change in line current at the first auxiliary repeater. Using this corrected value of line current at the first auxiliary repeater, it then is possible to calculate the line current difference between the first auxiliary repeater and the last power loaded auxiliary repeater to show when a sufficient number of loads have been adjusted and the adjustments can be stopped.

STEP	PROCEDURE						
1	Perform Steps 1 through 6 of Method A. It is not necessary to repeat Steps 1 through 3 if HTR 1 voltage and line currents in these steps are known.						
2	Record new values of ODD and EVEN line currents at main or terminal repeater which supplies the power.						
3	At main or terminal repeater supplying power, note difference between the present average of ODD and EVEN line currents and values recorded prior to making power adjustment. Example: Main or Terminal Repeater <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Original average</td><td style="text-align: right;">1450 ma</td></tr> <tr> <td>New average</td><td style="text-align: right;">1410 ma</td></tr> <tr> <td>Difference</td><td style="text-align: right;"><u>—40 ma</u></td></tr> </table> <i>Note:</i> In the preceding example, the new average line current is less than the original average line current. In this case, the sign of the difference is negative. (If new average line current is greater, the sign is positive.)	Original average	1450 ma	New average	1410 ma	Difference	<u>—40 ma</u>
Original average	1450 ma						
New average	1410 ma						
Difference	<u>—40 ma</u>						
4	Using the difference determined in Step 3, subtract (or add) this value to the previously recorded value of average line currents at first auxiliary repeater. Example: First Auxiliary Repeater <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Original average</td><td style="text-align: right;">1350 ma</td></tr> <tr> <td>Difference from Step 3</td><td style="text-align: right;"><u>—40 ma</u></td></tr> <tr> <td>Corrected average</td><td style="text-align: right;">1310 ma</td></tr> </table>	Original average	1350 ma	Difference from Step 3	<u>—40 ma</u>	Corrected average	1310 ma
Original average	1350 ma						
Difference from Step 3	<u>—40 ma</u>						
Corrected average	1310 ma						
5	Note difference between corrected average (Step 4) at first auxiliary repeater and average line currents previously recorded at last power loaded auxiliary repeater.						

STEP	PROCEDURE
5 (cont)	Requirement: If corrected average of ODD and EVEN line currents at the first auxiliary repeater reads between 15 ma lower and 25 ma higher than the last recorded average value of ODD and EVEN line currents at last power loaded auxiliary repeater in power section, the power loading is assumed to be satisfactory. If the average falls outside this range or HTR 1 voltage requirements at all auxiliary repeaters cannot be met with LOAD ADJ switch, proceed to first power loaded auxiliary repeater (toward power source) from the one already adjusted and perform Steps 6 through 8.
6	Measure and record HTR 1 voltage while ODD and EVEN line currents at the supply point are held to last recorded value.
7	Change variable load dial to same extreme of its range as at last power loaded auxiliary repeater.
8	Manually adjust, if necessary, the power at main or terminal repeater supplying power until HTR 1 voltage is restored to its previously recorded value. If requirement in Step 5 is still not met, progressively adjust power loading, using the alternate procedure. Start with auxiliary repeater adjacent to the one already adjusted and proceed to each succeeding auxiliary repeater in power section until required change in line current is obtained or until variable power loads have all been adjusted.
9	After making all power loading adjustments, it is possible that line currents or LOAD ADJ switch settings may still fail to meet the requirements. When this condition exists, check the following: (a) Strapping options on the transformer in the high-voltage unit should be verified. A different strapping option is used for pilot-regulated auxiliary repeaters than is used for thermometer-regulated auxiliary repeaters. (b) Power unit or power loading coil may be defective or wired incorrectly. Check power unit and wiring options. (c) If wiring options are correct and no apparent equipment trouble exists, continue with the pilot and power measurements. (d) If power line-up has been completed and required line current readings cannot be met or LOAD ADJ switch settings are outside the desired range, the line-up or pilot and power results should be forwarded through the lines of organization to the engineering department for consideration of corrective action.
10	Proceed with pilot and power measurements.

TYPICAL POWER LOOP



ELECTRICAL EQUIVALENT

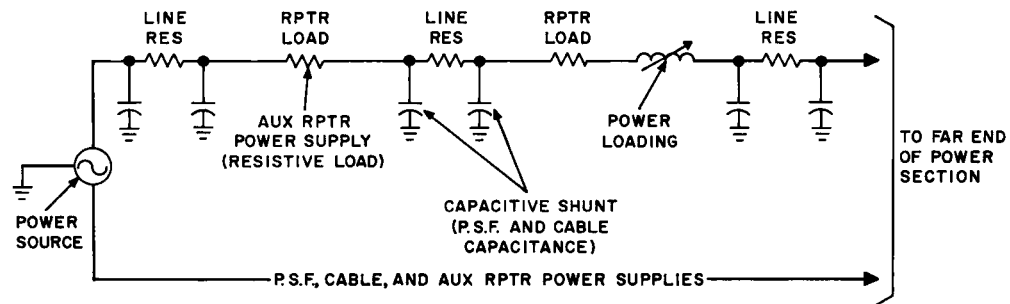
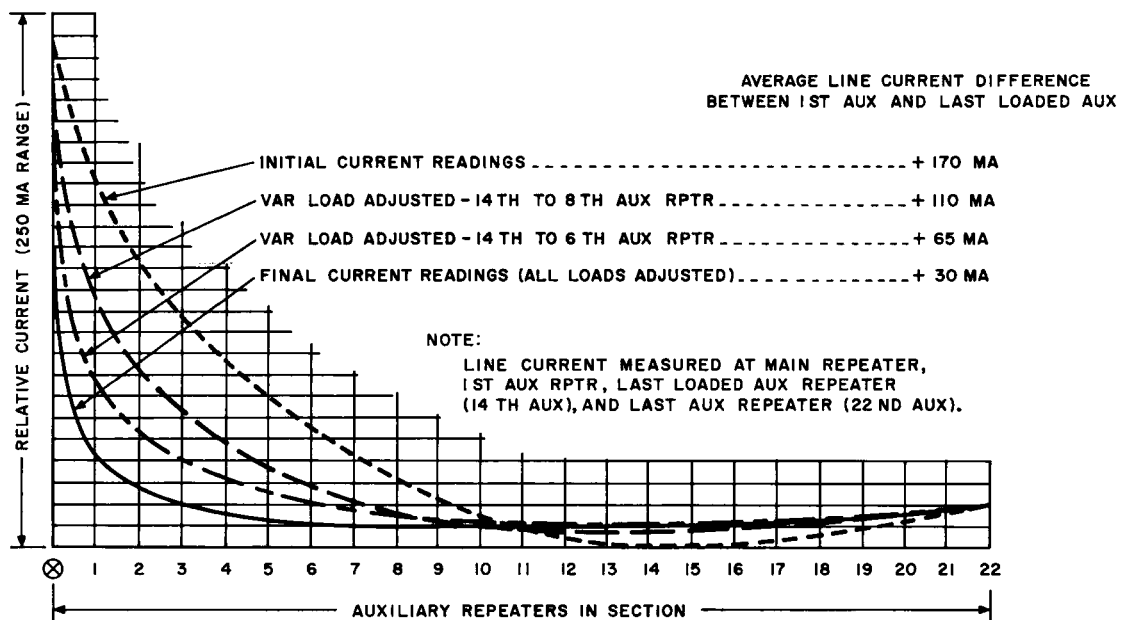
TYPICAL CURRENT DISTRIBUTION IN A POWER SECTION
SHOWING EFFECT OF POWER LOADING ADJUSTMENTS

Fig. 1 — Typical Power Section Showing Current Distribution