
L4 AND L4S CARRIER REPEATERS TESTS AT REGULATING REPEATER LOCATION

In the L4 and L4S coaxial carrier systems, routine tests and trouble isolation tests are performed at a main station. Maintenance at a line repeater location is limited to measurement of the 11.648-MHz line pilot power, determination of repeater gain, adjustment of the monitoring oscillator signal power, and replacement of defective equipment units.

This section is reissued to include reference to the L4S carrier system, to add a procedure for use of the Wandel & Goltermann selective level meter AT463, and to update the existing procedures. ***Equipment Test Lists are not affected.*** Due to extensive changes, change arrows are not used.

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APPARATUS

J68898() Pilot Test Set (Section 103-456-000)

or

Transmission Measuring Set (TMS)

Frequency: 11.648 MHz

Power: -28 to -55 dBm

Impedance: 75 ohms, unbalanced

Type: Wandel & Goltermann AT463 (W&G AT463) (Section 103-406-000)

L4 High-Voltage Isolation Test Probe ED-51073-30 (for W&G AT463)

APPARATUS (Cont)

- 185A Adapter (for extending the monitoring oscillator assembly)
- 452A Plug (for bypassing an L4 repeater)
- 566A Jack (for discharging an L4 repeater)
- KS-20141, L1 Extractor (for inserting and removing the 51A pad)
- Equipment, as listed in Section 640-440-205, necessary to open and close line repeater apparatus cases.
- Replacement equipment units which have been selected, prepared, and tested for the particular regulating repeater location.

CHART 1

ACTIONS AT MAIN STATION

STEP	PROCEDURE
1	Select, prepare, and test all equipment units to be installed at the regulating repeater location. <i>Note:</i> Section 359-205-506 prescribes the procedures.
2	Place equipment units in a protective container for transportation to the regulating repeater location. <i>Caution: Remove an equipment unit from the protective container only when the unit is to be placed in an apparatus case.</i>
3	Check that the L4 or L4S line is removed from service, if required.
4	Ensure that all persons concerned have been notified that line maintenance is to be performed.

CHART 2

ACTIONS AT REGULATING REPEATER LOCATION

Regulating repeater stations are entered through a manhole at ground level.

Section 620-140-501 prescribes procedures for opening and closing an L4 line repeater station.

CHART 2 (Cont)

Caution: Before entering the underground room, ventilate the regulating repeater location.

Note: A squeegee will be useful for removing condensed moisture from the ceiling of the underground room.

Two regulating repeaters are housed in the apparatus case as shown in Fig. 1.

Section 640-440-205 prescribes procedures for opening and closing an L4 line repeater apparatus case.

Warning 1: Exercise extreme care because hazardous voltages, as high as 1800 volts, are present in L4 line repeaters and as high as 1200 volts in L4S repeaters.

Warning 2: Line build-out (LBO) networks must not be removed from a repeater while in the repeater location. Removing LBO networks exposes parts of the repeater and LBO networks which may be charged to a high voltage. Replacement repeaters must be carried into the repeater location fully assembled with the LBO networks secured to the repeater chassis. Removed repeaters must be discharged and carried from the repeater location before any attempt is made to remove an LBO network.

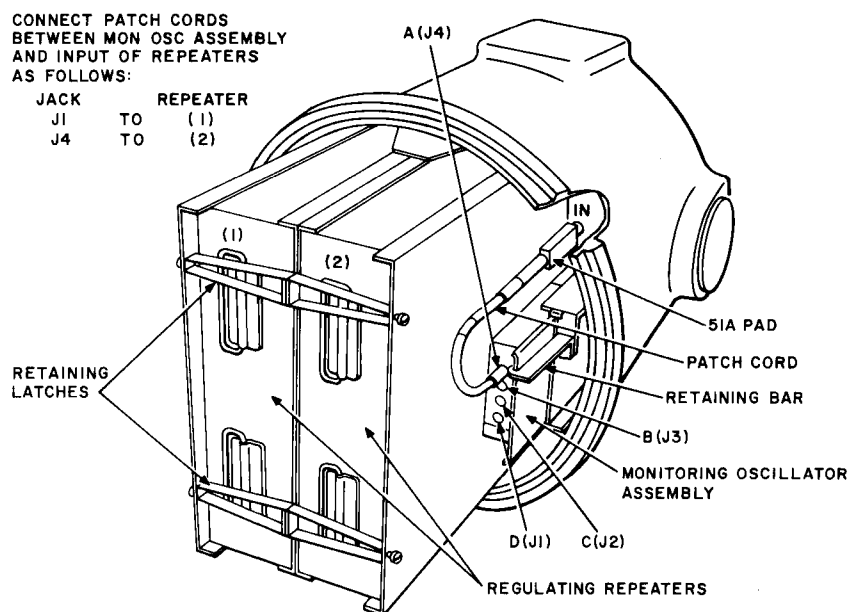


Fig. 1—Regulating Repeater—Equipment Arrangement

CHART 2 (Cont)

STEP	PROCEDURE
A. Preliminary Steps	
1	Establish communication with the main station.
2	Check with the main station attendant that the monitoring oscillator associated with the regulating repeater to be tested is turned off.
3	Follow the procedure in Section 640-440-205 to open the apparatus case.
4	Proceed to Part B or Part C, as applicable.
B. Repeater Measurement and Replacement	
5	Determine which repeater is to be tested and ensure that the associated line has been removed from service.
	Note: Repeater apparatus cases at a regulating repeater location can contain two regulating repeater units; therefore, be extremely careful to remove the correct repeater.
6	Remove the patch cord that connects the monitoring oscillator assembly to the 51A pad (Fig. 1).
	Warning: Remove patch cord from the 51A pad first.
7	Using the KS-20141, L1 extractor, remove the 51A pad from the repeater IN jack.
8	Perform Steps 9 through 31 (W&G TMS), or 32 through 44 (pilot test set) as applicable.
	Using the TMS
9	Connect the L4 high-voltage isolation test probe to the repeater IN jack.
10	Connect the test probe to the TMS.
	Caution: Connect the test probe first to the IN jack and then to the TMS. This sequence prevents a voltage surge from damaging the TMS.
11	Measure and record the 11.648-MHz pilot power at the repeater IN jack (nominal = -55 dBm).
	Note: The actual pilot power at the repeater input is approximately 30-dB greater than the indicated value, due to loss in the test probe.
12	Disconnect the test probe from the TMS.
13	Disconnect the test probe from the repeater IN jack.

CHART 2 (Cont)

STEP	PROCEDURE
14	Connect the test probe to the repeater OUT jack.
15	Connect the test probe to the TMS.
16	Measure and record the 11.648-MHz pilot power at the repeater OUT jack (nominal = -28 dBm).
17	Compute the repeater gain at 11.648 MHz by subtracting the value recorded in Step 11 from that obtained in Step 16.
	Requirement: Refer to office records.
18	Disconnect the test probe from the TMS.
19	Disconnect the test probe from the repeater OUT jack.
20	If the requirement of Step 17 was not met, proceed to Step 21. If it was met, proceed to Step 28.
21	Insert the 452A plug into the repeater IN and OUT jacks.
	Note: The 452A plug bypasses the L4 signal and dc supply current around the repeater so that line continuity will not be interrupted when the repeater is removed in Step 23.
22	Unfasten the repeater retaining latches (Fig. 1).
23	Remove the repeater from its slot in the apparatus case.
	Warning: Observe the following precautions to avoid electrical shock. Immediately upon removal, discharge the repeater by connecting the 566A discharging jack to repeater plugs P1 and P2, in turn. Do not remove the LBO networks from the repeater while in the manhole.
24	Insert a replacement repeater in the apparatus case.
	Caution: Use a gentle oscillatory motion to achieve correct alignment of the plugs on the unit with the connectors in the case. Make sure the connectors are fully mated.
25	Fasten the repeater retaining latches.
26	Remove the 452A plug.
27	Repeat Steps 9 through 19.
28	Using the KS-20141, L1 extractor, insert the 51A pad in the repeater IN jack.

CHART 2 (Cont)

STEP	PROCEDURE
29	Connect the patch cord from the monitoring oscillator assembly to the 51A pad. Warning: <i>Connect patch cord to the 51A pad last.</i>
30	Contact the controlling main station and request that the line be checked to ensure that the replacement repeater is operating properly.
31	Proceed to Part D. Using the J68898() Pilot Test Set
32	Connect the J68898() pilot test set probes to the repeater IN and OUT jacks. Note: The test set bypasses the L4 signal and dc supply current around the repeater so that line continuity will not be interrupted if the repeater is removed in Step 36.
33	Perform the repeater gain test as described in Section 103-456-000. Requirement: Refer to office records. Note: The J68898A pilot test set can also be used to test for dc voltage on the coaxial line, and the J68898B set can be used as a hit indicator at the 11.648-MHz pilot frequency.
34	If the requirement of Step 33 was not met, proceed to Step 35. If it was met, proceed to Step 40.
35	Unfasten the repeater retaining latches (Fig. 1).
36	Remove the repeater from its slot in the apparatus case. Warning: <i>Observe the following precautions to avoid electrical shock. Immediately upon removal, discharge the repeater by connecting the 566A discharging jack to repeater plugs P1 and P2, in turn. Do not remove the LBO networks from the repeater while in the manhole.</i>
37	Insert a replacement repeater in the apparatus case. Caution: <i>Use a gentle oscillatory motion to achieve correct alignment of the plugs on the unit with the connectors in the case. Make sure the connectors are fully mated.</i>
38	Fasten the repeater retaining latches.
39	Repeat Step 33.
40	Remove the J68898() pilot test set probes from the repeater IN and OUT jacks.

CHART 2 (Cont)

STEP	PROCEDURE
41	Using the KS-20141, L1 extractor, insert the 51A pad into the repeater IN jack.
42	Connect the patch cord from the monitoring oscillator assembly to the 51A pad. <i>Warning: Connect patch cord to the 51A pad last.</i>
43	Contact the controlling main station and request that the line be checked to ensure that the replacement repeater is operating properly.
44	Proceed to Part D. C. Monitoring Oscillator Replacement and Adjustment
45	Remove the two patch cords that connect the monitoring oscillator assembly to the two 51A pads (Fig. 1). <i>Warning: Remove patch cords from the 51A pads first.</i>
46	Loosen the fastener on the monitoring oscillator assembly retaining bar.
47	Remove the monitoring oscillator assembly from the apparatus case.
48	Insert a 185A adapter in place of the monitoring oscillator assembly (Fig. 2). <i>Note: Make sure the connectors are fully mated.</i>
49	Connect a replacement monitoring oscillator assembly to the 185A adapter. <i>Note: The replacement must be the same code as the one removed in order to produce the correct frequency.</i>
50	Connect the two patch cords between the two 51A pads and the replacement monitoring oscillator (Fig. 2). <i>Warning: Connect patch cords to the 51A pads last.</i>
51	Request that the attendants at the controlling main stations at each end of the line monitor the lines served by the replacement monitoring oscillator.
52	Adjust the ADJ A (4) and ADJ D (1) controls on the replacement oscillator assembly to obtain the required indication at each controlling main station.
53	Remove the two patch cords that connect the replacement monitoring oscillator to the two 51A pads. <i>Warning: Remove patch cords from the 51A pads first.</i>

CHART 2 (Cont)

STEP

PROCEDURE

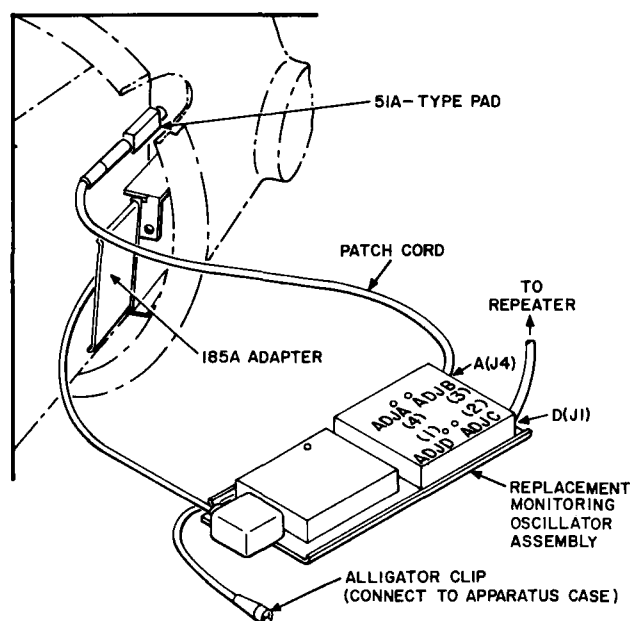


Fig. 2—Equipment Connections for Adjusting the Monitoring Oscillator Assembly at a Regulating Repeater Location

- 54 Disconnect the replacement monitoring oscillator assembly from the 185A adapter.
- 55 Remove the 185A adapter from the apparatus case.
- 56 Insert the monitoring oscillator assembly into the apparatus case.
- 57 Connect the two patch cords between the replacement monitoring oscillator and the two 51A pads.

Warning: Connect patch cords to the 51A pads last.

Note: Make sure the connectors are fully mated.

- 58 Tighten the fastener on the monitoring oscillator assembly retaining bar.
- 59 Request that the attendants at the controlling main stations monitor the affected line(s) to ensure proper operation of the replacement oscillator assembly.
- 60 Proceed to Part D.

CHART 2 (Cont)

STEP**PROCEDURE**

D. Final Steps

- 61 Close the apparatus case in accordance with the procedure in Section 640-440-205.

Note: Take care to avoid introducing any moisture or dirt into the apparatus case. Bleed all moisture from the hose from the nitrogen cylinder before recharging the repeater apparatus case.

- 62 Remove all test equipment, tools, replaced equipment units, and other items from the underground room.

- 63 Take all equipment units removed from the underground room to the main station.

Note: These equipment units should be tested and tagged at the main station. Send all defective units to a maintenance center for repair.
