# L MULTIPLEX TERMINALS

# LMX-2

# TRANSMITTING CIRCUITS

# GROUP MODULATOR

# OUT-OF-SERVICE GAIN TESTS

Each group modulator circuit in a group bank (Fig. 1):

(a) Accepts the 60- to 108-kHz frequency band, at −42 dBTL from either the output of a channel bank or group connector

(b) Amplifies this signal with a 231A(P) amplifier which has a nominal gain of 8.3 dB with a ±2 dB adjustment range

(c) Translates this signal to its allocated slot in the 312- to 552-kHz supergroup band.

This translated signal is combined with the translated signals from four other group modulator circuits. The combined signals are amplified by a 231B amplifier, which has a nominal gain of 28 dB, and are delivered to the GR BANK OUT jacks at −25 dBTL. Hence, a gain of 17 dB exists between the GR MOD IN jacks and the GR BANK OUT jacks.

The test are performed as follows:

(a) The 104.08-kHz group pilot from a spare group bank or a spare channel bank is verified as correct.

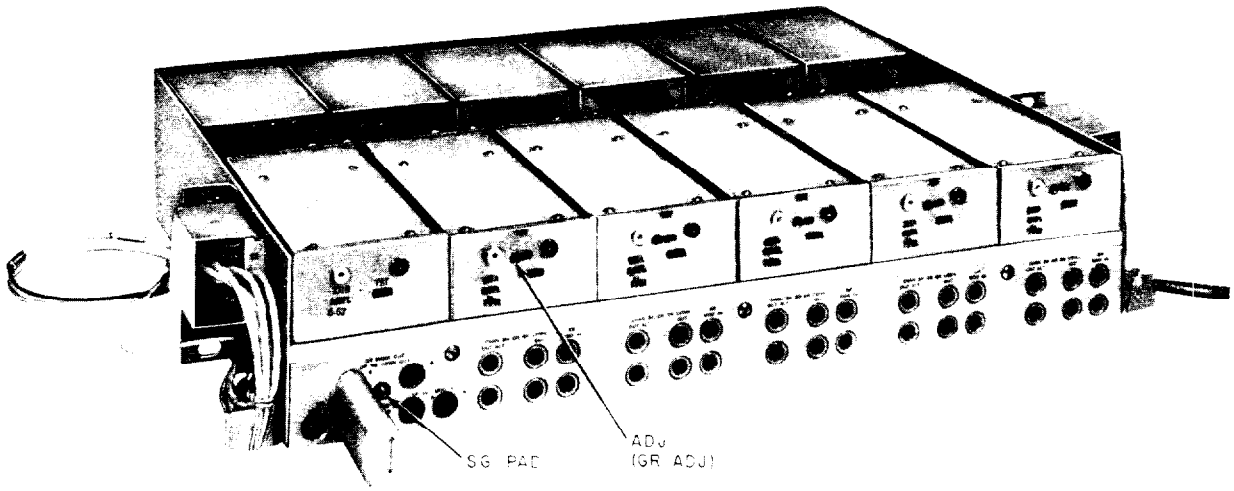



**Fig. 1—Transmitting Group Bank**

(b) The required gain of 17 dB is established by monitoring the translated 104.08-kHz group pilot (see Table A) at the GR BANK OUT A jack and adjusting the ADJ control on the 231A(P) amplifier associated with that circuit.

*Note:* The group pilot is 20 dB below transmission level.

(c) The passband test is performed by inserting test tones (see Table B) into the GR MOD IN jacks and comparing the monitored translated tones at the GR BANK OUT A jack.

This section is reissued to clarify jack designations and test procedures. Change arrows indicate major changes. ***Equipment Test Lists are not affected.***

**APPARATUS:**

The tests in this section require suitable transmission test equipment. Refer to Section 356-010-500 and select, from available equipment, sending and receiving units having the following capabilities:

***Sending test equipment*** capable of delivering, into 135-ohm circuits, signals between 60 kHz and 108 kHz at a level of −42 dBm

***Receiving test equipment*** capable of detecting, from 75-ohm and 135-ohm circuits, signals between 100 kHz and 552 kHz at levels between −25 dBm and −72 dBm.

In addition to the above, the following are required:

***Spare Group Bank or Spare Channel Bank***

***J68858AT Pilot Filter Set*** for group 1 if the selected receiving test equipment is other than the 49A Measuring System

***3P20B Cords,*** as required

***P2BJ Cords,*** as required

| STEP | PROCEDURE |
|---|---|
| | **Input Pilot Level Test** |
| 1 | Select a spare group bank or spare channel bank. |
| 2 | Prepare the receiving test equipment for a 135-ohm terminated measurement of 104.08 kHz at −62 dBm (−72 dBm at 75 ohms if the 58AT pilot filter set is used). |
| 3 | Connect the receiving test equipment to the ♦PIL OUT *or* CHAN BK or GR CONN OUT♦ jack [patch (1), Fig. 2]. |

| STEP | PROCEDURE |
|---|---|

4 Measure the level of the 104.08-kHz signal.

***Requirement:*** −62 dBm ±0.05 dB
−72 dBm ±0.05 dB (if the 58AT pilot filter set is used)

5 If the requirement of Step 4 is met, proceed to Step 6. If it is not met, make tests as prescribed in Section 356-011-503 and repeat Steps 3 through 5.

6 Disconnect the receiving test equipment from the ◗PIL OUT ***or*** CHAN BK or GR CONN OUT◖ jack.

**Gain Test**

***Note:*** ◗Gain tests of groups assigned to N3-L junctions must be performed on an ***out-of-service*** basis.◖

7 Remove the group bank to be tested from service (Section 356-205-300).

8 Prepare the receiving test equipment for a 75-ohm terminated measurement of the translated 104.08-kHz pilot at −45 dBm for the group modulator circuit being tested (−55 dBm if the 58AT pilot filter set is used).

***Note:*** The translated 104.08-kHz group pilots are listed in Table A.

TABLE A

FREQUENCY TRANSLATION (GROUP MODULATORS)

| INPUT PILOT FREQUENCY (KHZ) | OUTPUT PILOT FREQUENCY (KHZ) FOR GROUPS 1 THROUGH 5 | | | | |
|---|---|---|---|---|---|
| | 1* | 2 | 3 | 4 | 5 |
| 104.08 | 315.92 | 363.92 | 411.92 | 459.92 | 507.92 |

* Use the 58AT Pilot Filter Set for group 1 if the selected test equipment is other than the 49A Measuring System.

9 Connect the spare group bank or spare channel bank to the GR MOD IN jacks [patch (2), Fig. 2].

10 Connect the receiving test equipment to the GR BANK OUT or SG CONN OUT A jack [patch (3), Fig. 2].

11 Measure the level of the translated pilot.

***Requirement:*** −45 dBm ±0.05 dB
−55 dBm ±0.05 dB (if the 58AT pilot filter set is used)

| STEP | PROCEDURE |
|---|---|

12 If the requirement of Step 11 is met, proceed to Step 17. If it is not met, adjust the ADJ control on the 231A(P) amplifier of the group modulator circuit being tested to meet the requirement.

13 If the requirement of Step 11 cannot be met, repeat Steps 8 through 12 for any one of the remaining group modulator circuits in the group bank being tested.

14 If the group modulator circuit selected in Step 13 meets the requirement of Step 11, suspect a defective 231A(P) amplifier in the circuit originally tested. Proceed to Step 16.

15 If the group modulator circuit selected in Step 13 does not meet the requirements of Step 11, suspect a defective 231B(F) amplifier. Proceed to Step 16.

16 Remove and replace the amplifier suspected of causing trouble and repeat Steps 8 through 12 to determine if the group now meets its requirement.

17 Remove patch (2), Fig. 2, and the 58AT pilot filter set if it were used.

**Passband Test**

18 Adjust the receiving test equipment to measure the translated 95-kHz signal at −25 dBm for the group modulator circuit being tested.

***Note:*** All translated signals are listed in Table B.

TABLE B

FREQUENCY TRANSLATION (GROUP MODULATORS)

| INPUT TEST FREQUENCY (KHZ) | OUTPUT TEST FREQUENCY (KHZ) FOR GROUPS 1 THROUGH 5 | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 63 | 357 | 405 | 453 | 501 | 549 |
| 95 | 325 | 373 | 421 | 469 | 517 |
| 107 | 313 | 361 | 409 | 457 | 505 |

19 Prepare the sending test equipment to deliver, into a 135-ohm circuit, a 95-kHz signal at −42 dBm.

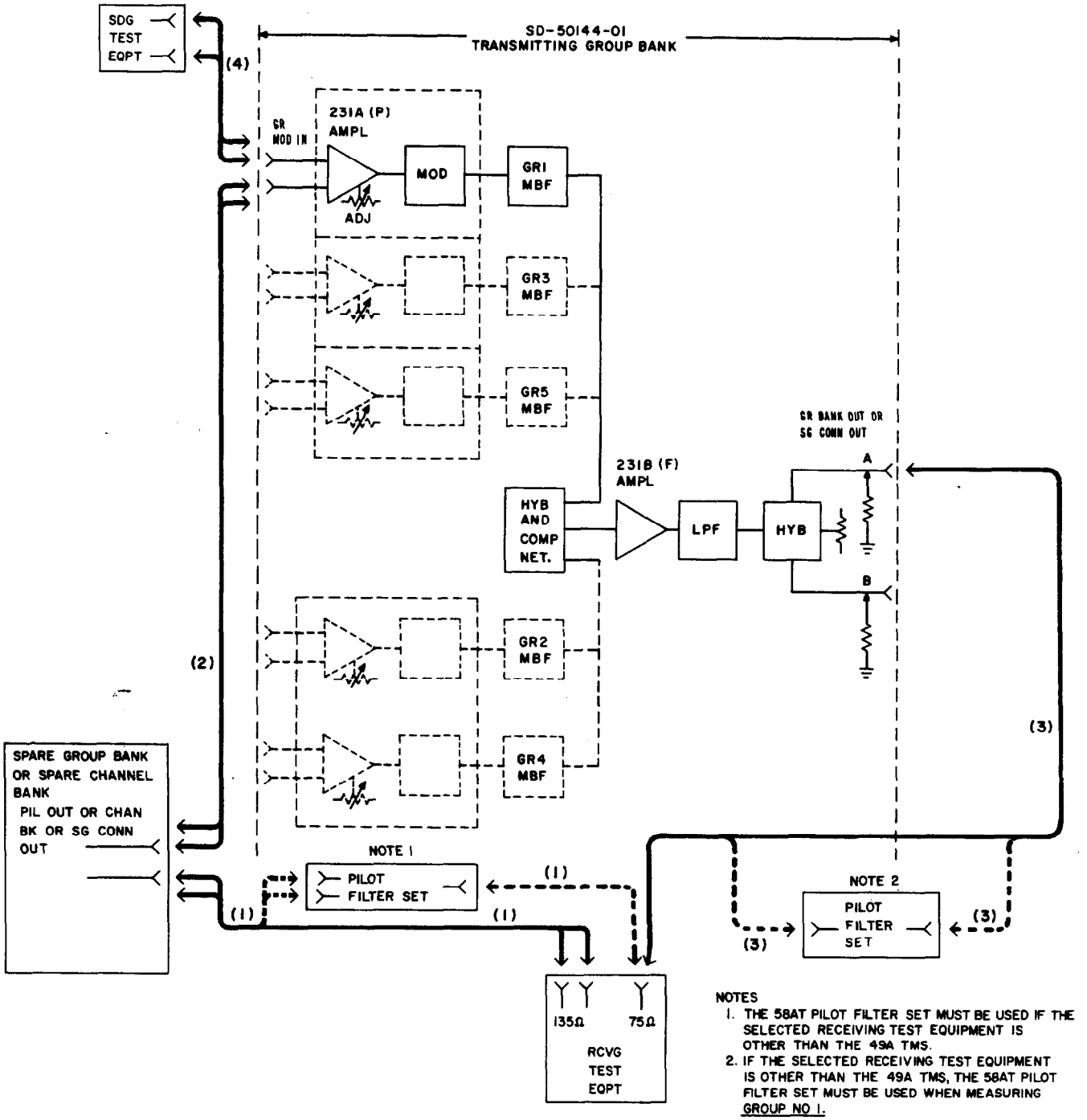
20 Connect the sending test equipment to the GR MOD IN jack [patch (4), Fig. 2].

21 Measure and record the level of the translated 95-kHz signal at the GR BANK or SG CONN OUT A jack.

22 Adjust the receiving test equipment to measure the translated 63-kHz signal.

23 Adjust the sending test equipment to deliver 63 kHz.

| STEP | PROCEDURE |
|---|---|
| 24 | Measure the translated 63-kHz signal.<br><br>***Requirement:*** Within −1.0 dB to +0.2 dB of the value recorded in Step 21 |
| 25 | Adjust the receiving test equipment to measure the translated 107-kHz signal. |
| 26 | Adjust the sending test equipment to deliver 107 kHz. |
| 27 | Measure the translated 107-kHz signal.<br><br>***Requirement:*** Within −1.0 dB to +0.2 dB of the value recorded in Step 21 |
| 28 | Repeat Steps 8 through 27 for the remaining group modulator circuits in the group bank being tested. |
| 29 | Disconnect the test equipment and restore service to normal. |




NOTES
1. THE 58AT PILOT FILTER SET MUST BE USED IF THE SELECTED RECEIVING TEST EQUIPMENT IS OTHER THAN THE 49A TMS.
2. IF THE SELECTED RECEIVING TEST EQUIPMENT IS OTHER THAN THE 49A TMS, THE 58AT PILOT FILTER SET MUST BE USED WHEN MEASURING GROUP NO 1.

**Fig. 2—Group Modulator—Out-of-Service Gain Tests**