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**ANALOG MULTIPLEX TERMINAL EQUIPMENT**  
**COMMON EQUIPMENT**  
**SUPERGROUP CONNECTORS**  
**C3 SUPERGROUP CONNECTOR OUT-OF-SERVICE TESTS**

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The tests in this section should be performed before a supergroup connector is placed in service and in case of trouble.

*Equipment Test Lists are affected.*

A supergroup connector (Fig. 1) performs three functions:

- (a) Connects the basic supergroup band from a receiving supergroup demodulator to a transmitting supergroup modulator
- (b) Provides the proper gain
- (c) Provides equalization across the basic supergroup band to provide a flat level-frequency characteristic through the supergroup connector section.

A supergroup connector is used to connect the output of a supergroup demodulator to the input of a supergroup modulator. The supergroup connector includes an adjustable amplifier and an adjustable equalizer. A bandpass filter eliminates signals outside the basic supergroup band: 312 to 552 kHz.

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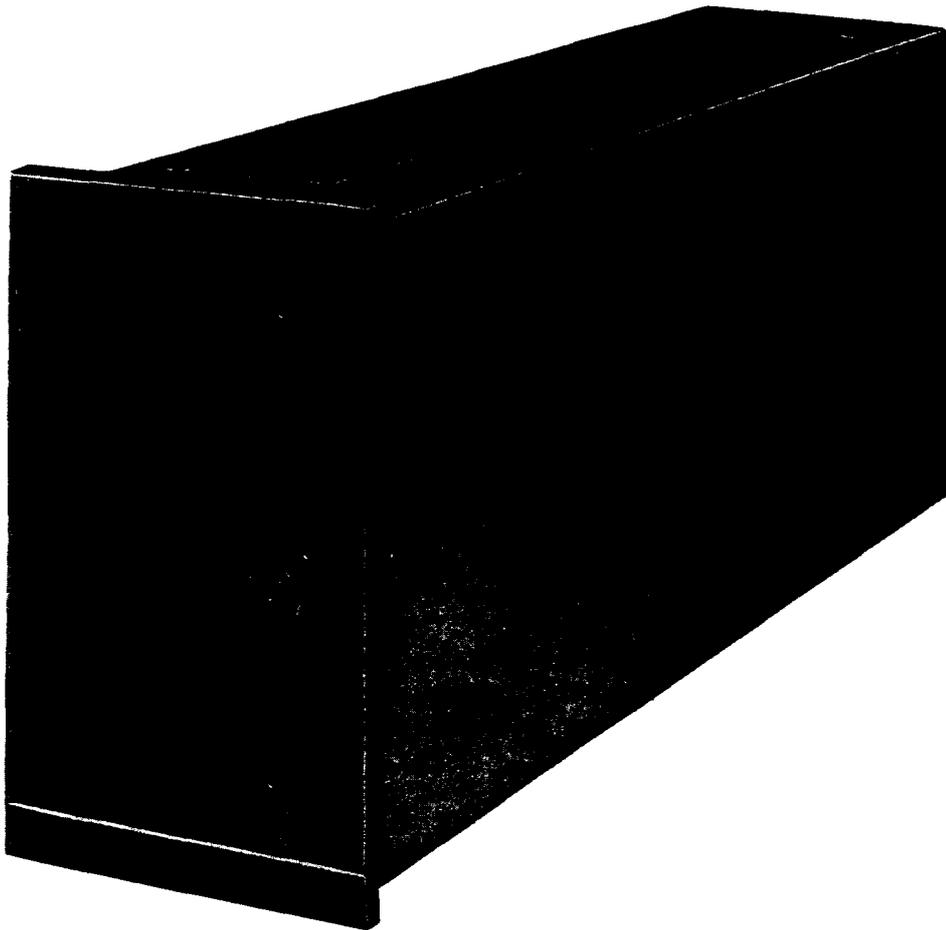


Fig. 1—C3<sup>o</sup> Supergroup Connector

**APPARATUS:**

The tests in this section require suitable transmission measuring 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 75-ohm circuits, signals between 314 and 550 kHz at -20 to -30 dBm

***Receiving test equipment*** capable of detecting, from 75-ohm circuits, signals between 314 and 550 kHz at powers between -20 and -65 dBm.

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**CHART 1**
**INITIAL TESTS**


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This chart includes tests which should be performed before a supergroup connector is placed in service. Chart 2 includes tests which can be performed to check equalization of the supergroup section.

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**STEP**
**PROCEDURE**


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**A. Prepare for Tests**

- 1 Determine from office records the *receiving* supergroup and the *transmitting* supergroup served by the supergroup connector to be tested.

*At supergroup connector bay,*

- 2 Locate the C3 supergroup connector to be tested.

**Caution:** *Verify that the supergroup connector to be tested is out of service before proceeding.*

- 3 Check that the correct supergroup connector is installed.

**Note:** Two arrangements of the C3 supergroup connector (SD-51597) are available: the 4250A and the 4250B networks (Fig. 2). These connectors are identical except the 4250B network includes a delay equalizer. Six connectors can be mounted in supergroup connector shelf ED-52427 in supergroup connector bay J68941M, AE, or AF.

*At rear of supergroup connector shelf,*

- 4 Check that the input signal cable is connected to the IN jack for the supergroup connector under test.

- 5 Check that the output signal cable is connected to the associated OUT jack.

**Note:** Power is connected via the terminal strip at the right end of the shelf. Three pairs of power leads from the terminal strip serve the six connectors in the shelf.

*At supergroup connector,*

- 6 Set the two controls on the equalizer to position 0.

**Note:** The equalizer is set to the flat-gain condition with both the high (center) control and the low (larger) control on position 0.

## CHART 1 (Cont)

STEP

PROCEDURE

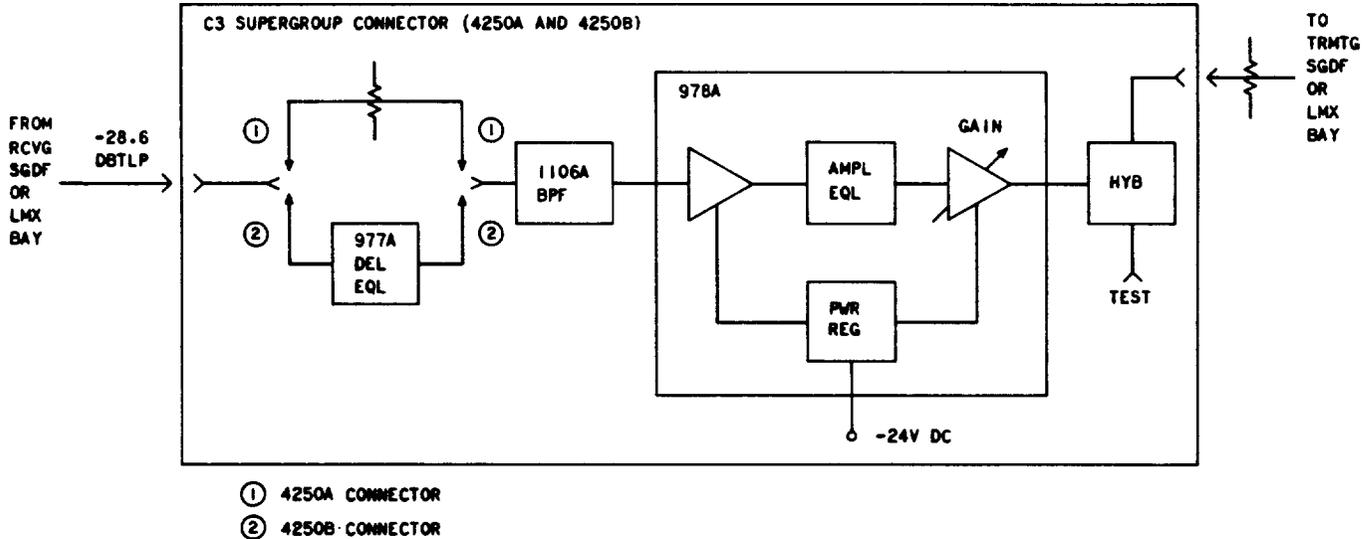


Fig. 2—Block Diagram of C3 Supergroup Connectors

**B. Check Bandpass of Supergroup Connectors**

**Note:** For a supergroup connector that is connected via a supergroup distribution frame (Fig. 3), perform the applicable test procedure in Section 356-005-501.

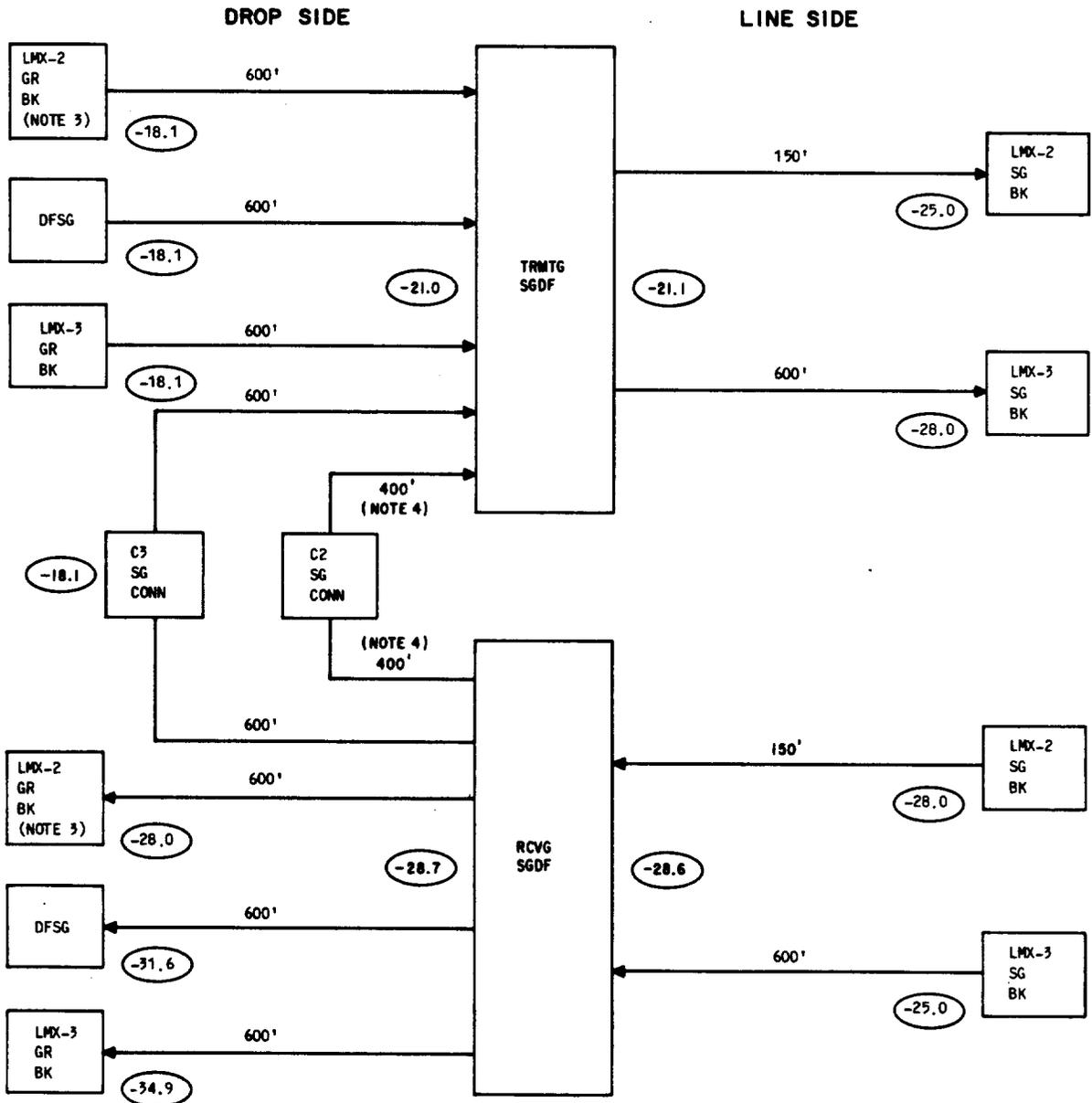
**At receiving supergroup bank,**

- 7 Apply a 432-kHz test signal at -28.0 dBm to the SG CONN IN A jack (LMX-2) *or* at -25.0 dBm to the SGDF IN jack on the receiving patch unit in the supergroup bank shelf (LMX-3) for the supergroup connector under test.

**At transmitting supergroup bank,**

- 8 Measure and record the 432-kHz signal power at the SG CONN OUT B jack (LMX-2) *or* at the SGDF OUT ALT jack on the transmitting patch unit (LMX-3) for the supergroup connector under test.

**Note:** Nominal power at the SG CONN OUT B jack is -25 dBm, and nominal power at the SGDF OUT ALT jack is -28 dBm.



NOTES:

1. LEVELS ARE EXPRESSED IN DBTLP.
2. ALL INTERCONNECTING CABLE IS TYPE 730A.
3. LEVELS AT MODIFIED LMX-2 GROUP BANK ARE COMPATIBLE WITH SGDF.
4. C2B SUPERGROUP CONNECTOR CONTAINS 512F NETWORK INSTEAD OF 512D NETWORK FOR 400-FOOT CABLE LENGTHS.

Fig. 3—Supergroup Connector Connected via Supergroup Distribution Frame

## CHART 1 (Cont)

STEP	PROCEDURE
	<i>At receiving supergroup bank,</i>
9	Repeat Step 7 using a 314-kHz test signal.
	<i>At transmitting supergroup bank,</i>
10	Measure the 314-kHz signal power at the SG CONN OUT B jack <i>or</i> at the SGDF OUT ALT jack.
	<b>Requirement:</b> 314-kHz signal power is within +0.3 to -1.3 dB of the 432-kHz signal power value recorded in Step 8.
11	Proceed to Step 14 if the requirement is met. Otherwise, proceed to Step 12.
	<i>At supergroup connector bay,</i>
12	Replace the supergroup connector.
13	Repeat Steps 7 through 11 with the new supergroup connector.
	<i>At receiving supergroup bank,</i>
14	Repeat Step 7 using a 550-kHz test signal.
	<i>At transmitting supergroup bank,</i>
15	Measure the 550-kHz signal power at the SG CONN OUT B jack <i>or</i> at the SGDF OUT ALT jack.
	<b>Requirement:</b> 550-kHz signal power is within +0.3 to -1.3 dB of the 432-kHz signal power value recorded in Step 8.
16	Proceed to Step 19 if the requirement is met. Otherwise, proceed to Step 17.
	<i>At supergroup connector bay,</i>
17	Replace the supergroup connector.
18	Repeat Steps 7 through 16, as required.
19	Remove all test equipment.
	<i>At receiving supergroup bank,</i>
20	Check that a patch plug is in place between the SG DEM OUT A and SG CONN IN A jacks (LMX-2).

## CHART 1 (Cont)

STEP	PROCEDURE
	<i>At transmitting supergroup bank,</i>
21	Check that a patch plug is in place between the SG CONN OUT A and SG MOD IN jacks (LMX-2).
	<b>C. Adjust Equalizer</b>
	<i>Note:</i> The <i>preferred method</i> in Steps 23 through 33 provides a complete check of the transmission through the supergroup connector section. The <i>abbreviated method</i> in Steps 26 through 32 provides only an approximate setting for the equalizer in the supergroup connector. This method does <i>not</i> provide information about the group pilot power values at the far station nor permit the isolation of possible troubles, such as excessive slope, in the transmission path.
22	Proceed to Step 23 for the preferred method of equalizer adjustment, <i>or</i> proceed to Step 26 for the abbreviated method.
	<i>Note:</i> <i>Near station</i> refers to the station at which the supergroup connector under test is located. <i>Far station</i> refers to the adjacent station that includes the LMX terminal transmitting the supergroup received by the supergroup connector under test.
	<i>At far station,</i>
	<i>Note:</i> The group modulators and the supergroup modulator (LMX-2) <i>must</i> be adjusted per Section 356-205-501, either now or later.
	<i>At transmitting supergroup bank,</i>
23	Measure and record the power of the 315.92-kHz (group 1), 411.92-kHz (group 3), and 507.92-kHz (group 5) pilot signals at the SG CONN OUT B jack (LMX-2) <i>or</i> at the SGDF OUT ALT jack (LMX-3) for the supergroup under test.
	<i>Note:</i> Nominal group pilot power is -45.0 dBm at the SG CONN OUT jack and -48.0 dBm at the SGDF OUT ALT jack.
24	Report the three pilot power values to the near station.
	<i>At near station,</i>
25	Record the three pilot power values reported by the far station.

CHART 1 (Cont)

STEP	PROCEDURE
<i>At receiving supergroup bank,</i>	
26	Measure and record the power of the three group pilot signals at the DEM OUT jack for the supergroup under test.  <b>Note:</b> Nominal group pilot power is -48.0 dBm at the SG DEM OUT B jack (LMX-2) and -45.0 dBm at the DEM OUT jack (LMX-3). For the preferred method, the <i>relative levels</i> of the three group pilots should be the same as reported by the far station. Any difference as large as ±1.0 dB should be investigated.
<i>At supergroup connector bay,</i>	
27	Set the two controls on the equalizer in the supergroup connector to the positions indicated in Table A, according to the number of the received supergroup.  <b>Example:</b> For a received supergroup 25, set the low (larger) control to position 6, and set the high (center) control to position 7.
<i>At transmitting supergroup bank,</i>	
28	Measure and record the power of the 315.92-kHz (group 1), 411.92-kHz (group 3), and 507.92-kHz (group 5) pilot signals at the SG CONN OUT B jack (LMX-2) <i>or</i> at the SGDF OUT ALT jack (LMX-3) for the supergroup connector under test.  <b>Note:</b> Nominal group pilot power is -45 dBm at the SG CONN OUT B jack and -48 dBm at the SGDF OUT ALT jack.

TABLE A

EQUALIZER NOMINAL CONTROL SETTINGS

SUPERGROUP		1	2 OR 12	3 OR 13	4 OR 14	5 OR 15	6 OR 16	7 OR 17	8 OR 18	9	10	D25	D26	D27	D28
		1	2	3	4	5	6	7	8	9	10	D25	D26	D27	D28
EQUALIZER CONTROL SETTINGS	LOW	2	1	0	1	3	4	4	6	7	8	6	4	4	4
	HIGH	9	3	5	4	5	7	7	7	7	8	7	9	9	9

## CHART 1 (Cont)

STEP

PROCEDURE

*At supergroup connector bay,*

- 29 Adjust the controls on the equalizer to obtain, as near as possible, the same relative levels of the three pilots as was reported by the far station in Step 24 (preferred method) or measured in Step 26 (abbreviated method).

**Note:** Each step of an equalizer control (Fig. 4) provides a change of approximately 0.2 dB at the low or high end of the basic supergroup band.

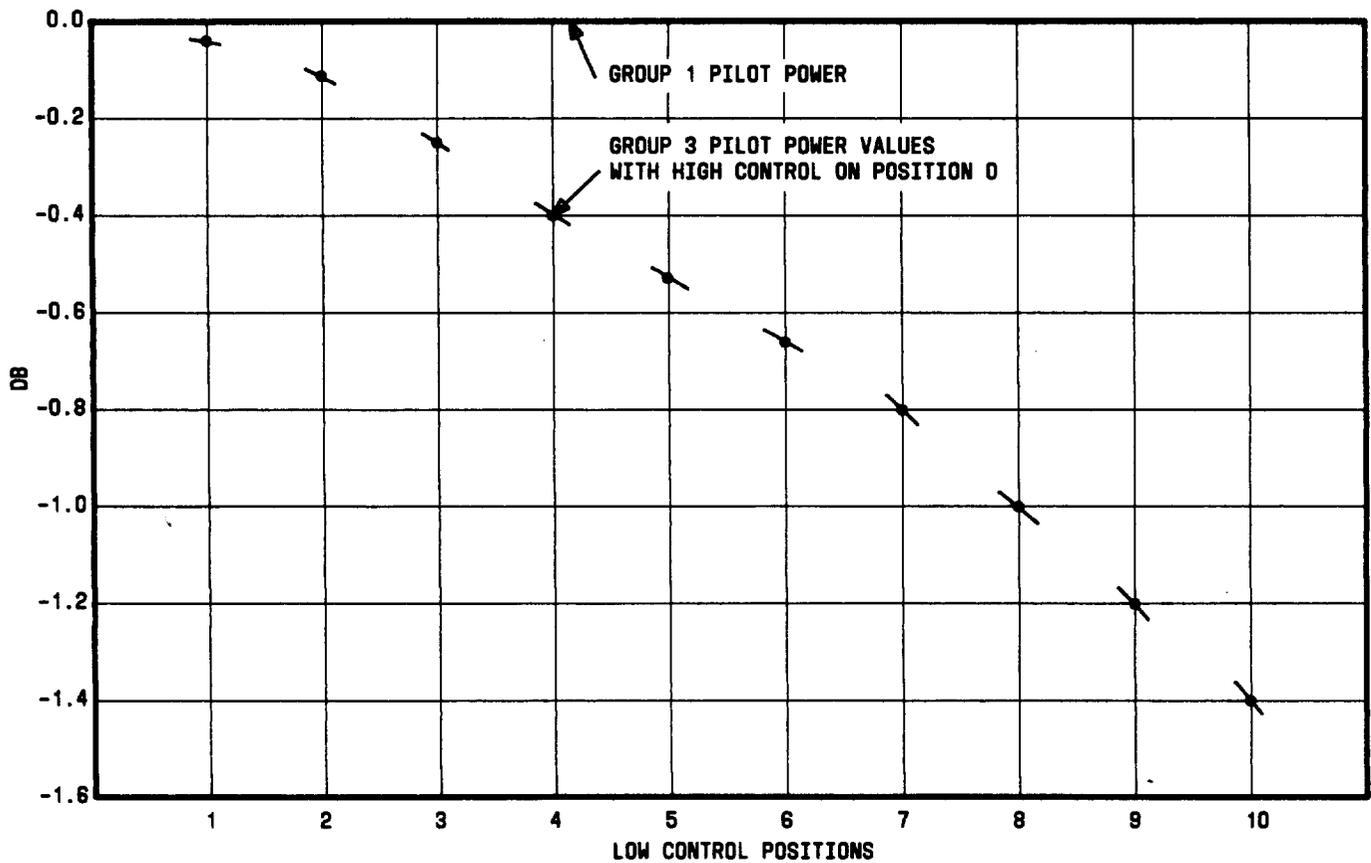


Fig. 4—Group 3 Pilot Power Values Relative to Group 1 Pilot Power

## CHART 1 (Cont)

STEP	PROCEDURE
30	<p>Repeat Steps 28 and 29 to check the equalization.</p> <p><b>Requirement:</b> Each of the three group pilot signals is within <math>\pm 0.1</math> dB of the required relative level.</p>
31	<p>Repeat Steps 28 through 30, if required, to meet the requirement.</p>
32	<p>Remove all test equipment.</p> <p><b>Note:</b> This completes the procedure for the abbreviated method. The preferred method should be performed, if possible, before the supergroup connector is placed in service.</p> <p><b>Preferred Method</b></p>
33	<p>Tag the supergroup connector to indicate the control settings for the adjusted equalizer.</p> <p><b>D. Adjust Gain</b></p> <p><b>At receiving supergroup bank,</b></p>
34	<p>Measure and record the 315.92-kHz pilot power at the SG DEM OUT B jack (LMX-2) <i>or</i> at the DEM OUT jack (LMX-3) for the receiving supergroup served by the supergroup connector under test.</p> <p><b>Note:</b> Nominal 315.92-kHz pilot power is -48 dBm at the SG DEM OUT B jack and -45 dBm at the DEM OUT jack. Record the pilot power value at the DEM OUT jack for use in Steps 44 and 46.</p>
35	<p>Proceed to Step 36 for a receiving LMX-2 terminal, <i>or</i> proceed to Step 43 for a receiving LMX-3 terminal.</p> <p><b>At receiving LMX-2 terminal,</b></p>
36	<p>Adjust the SG OUTPUT control on the receiving supergroup regulated amplifier to obtain a 315.92-kHz pilot power of -48.0 dBm at the SG DEM OUT B jack, if the transmitted 315.92-kHz pilot power at the far station was adjusted in Part C. Otherwise, adjust the SG OUTPUT control to obtain the required <i>relative level</i>. (See <i>Note</i> in Step 26).</p> <p><b>Note:</b> Record the pilot power value for use in Steps 38 and 41.</p> <p><b>At supergroup connector,</b></p>
37	<p>Measure the 315.92-kHz pilot power at the TEST jack on the front of the supergroup connector.</p> <p><b>Note:</b> Nominal 315.92-kHz pilot power is -38.1 dBm at the TEST jack on the supergroup connector.</p>

## CHART 1 (Cont)

STEP	PROCEDURE
38	Adjust the GAIN control on the supergroup connector to obtain a 315.92-kHz pilot power at the TEST jack 9.9 dB greater than the power obtained in Step 36 at the SG DEM OUT B jack.  <i>At LMX-2 transmitting supergroup bank,</i>
39	Check that a patch plug is in place between the SG BK OUT A jack and the adjacent XMTG HYB IN A jack (L600A) <i>or</i> MG AMPL IN A jack (L1860A).
40	Measure the supergroup pilot power (translated 315.92-kHz pilot power) at the SG BK OUT TST jack for the <i>transmitting</i> supergroup served by the supergroup connector under test.  <i>Note:</i> The supergroup pilot signal has a nominal power of -63.4 dBm at the SG BK OUT TST jack.
41	Adjust the SG PAD control to obtain a 315.92-kHz pilot power at the SG BK OUT TST jack 15.4 dB lower than the power recorded in Step 36 at the SG DEM OUT B jack.
42	Proceed to Step 47.  <i>At supergroup connector,</i>
43	Measure the 315.92-kHz pilot power at the TEST jack on the front of the supergroup connector.  <i>Note:</i> Nominal 315.92-kHz pilot power is -38.1 dBm at the TEST jack on the supergroup connector.
44	Adjust the GAIN control on the supergroup connector to obtain a 315.92-kHz pilot power at the TEST jack 6.9 dB greater than the power obtained in Step 34 at the DEM OUT jack (LMX-3).  <i>At LMX-3 transmitting supergroup bank,</i>
45	Measure the 315.92-kHz pilot signal power at the SGDF OUT ALT jack on the transmitting patch unit.  <i>Note:</i> The pilot signal has a nominal power of -48.0 dBm at the SGDF OUT ALT jack.
46	Adjust the appropriate TRMTG SGDF TRK ADJ control on the rear of the supergroup bank bay to obtain a 315.92-kHz pilot power at the SGDF OUT ALT jack 3 dB lower than the power recorded in Step 34 at the DEM OUT jack.

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 CHART 1 (Cont)
 

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STEP	PROCEDURE
47	<p>Remove all test equipment.</p> <p><b>Caution:</b> Check that the locking bar is in place across the front of the supergroup connector shelf. This bar prevents accidental removal of a supergroup connector when the test cord is removed.</p> <p><b>Note:</b> After all supergroup connectors in the supergroup section have been adjusted, proceed to Chart 2 to check equalization over the supergroup section.</p>

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 CHART 2
 

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## CHECK SUPERGROUP SECTION

**Supergroup section** refers to the entire transmission path for a given supergroup. This includes the equipment, coaxial lines, and radio channels between the LMX bay at which the basic supergroup signal from a group bank is added, and the LMX receiving bay at which the basic supergroup signal is dropped to the group bank equipment.

Supergroup section equalization must be checked to ensure that the basic supergroup signal at the output of the LMX receiving bay does not have excessive gain deviations, slope, or ripple. That is, the received signal should not differ significantly from the basic supergroup signal at the input to the LMX transmitting bay. A supergroup section may include several supergroup connector sections.

**Supergroup connector section** refers to the transmission path from the GR BK OR SG CONN OUT A jack at one station to the SG CONN OUT A jack (LMX-2) at the next station where a supergroup connector is provided or from SGDF OUT ALT jack to SGDF OUT ALT jack (LMX-3).

STEP	PROCEDURE
<i>At receiving end of supergroup section,</i>	
1	<p>Request the attendant at the transmitting end of the supergroup section to measure and report the group pilot powers at the GR BK OUT A jack (LMX-2) or at the GR BK OUT ALT jack (LMX-3) for the supergroup under test.</p> <p><b>Note:</b> Group pilot frequencies are 315.92 kHz (group 1), 363.92 kHz (group 2), 411.92 kHz (group 3), 459.92 kHz (group 4), and 507.92 kHz (group 5).</p>
2	<p>Measure and record the group pilot powers at the SG DEM OUT A jack (LMX-2) or at the DEM OUT jack (LMX-3) for the supergroup under test.</p>

## CHART 2 (Cont)

STEP	PROCEDURE
3	Compare the two power values measured for each group pilot signal.  <i>Note:</i> For LMX-2, the nominal level difference between the GR BK OUT A jack in the transmitting station and the SG DEM OUT A jack in the receiving station is 3 dB. For LMX-3, the nominal level difference between the GR BK OUT ALT jack in the transmitting station and the DEM OUT jack in the receiving station is 6.9 dB.  <i>Requirement:</i> The difference between the two power values for each of the pilot signals of groups 2 through 5 should be within $\pm 0.5$ dB of the difference between the two power values for the group 1 pilot signal.
4	Repeat for each supergroup connector section in the direction of transmission, if required, to locate and correct the gain deviations.
5	Remove all test equipment.
6	Replace all patch plugs removed.