L MULTIPLEX TERMINALS

LMX-2

TRANSMITTING CIRCUITS

SUPERGROUP MODULATOR

OUT-OF-SERVICE LOSS TESTS

PURPOSE OF TESTS

(a) To measure and, if necessary, adjust the loss of each supergroup modulator circuit in a supergroup bank

(b) To determine that each supergroup modulator circuit meets its passband loss requirements.

REASON FOR ISSUE

Part of the information in this section was previously in Section 356-205-513. It is renumbered during the process of reorganizing the 356- division of practices and includes information on the C2B and C2C supergroup banks. Passband frequencies and requirements are also changed. *Equipment Test Lists are affected.*
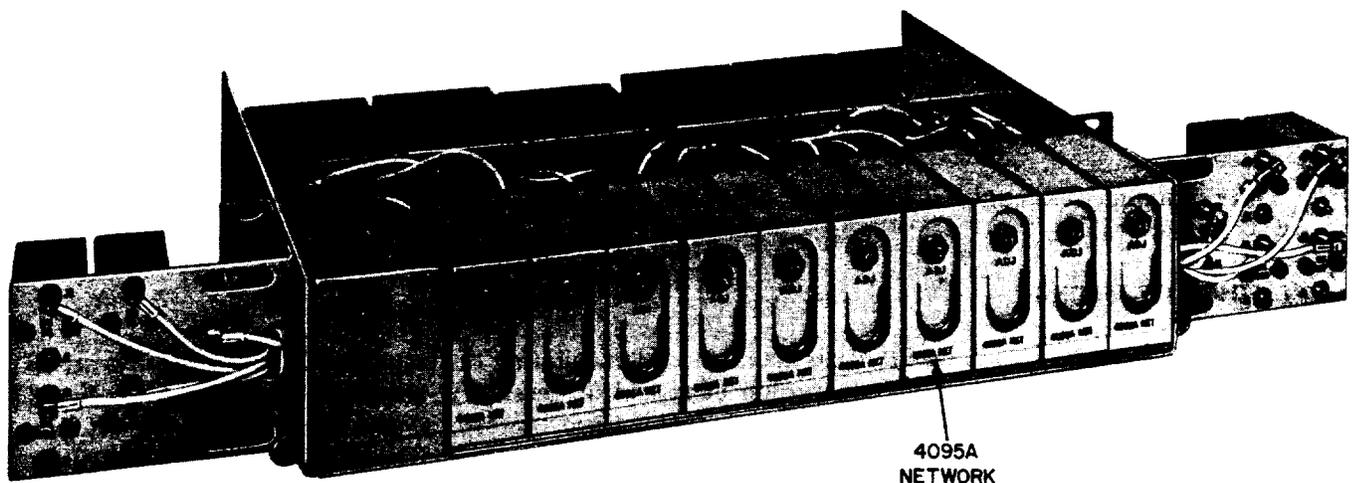

4095A
NETWORK

Fig. 1—J68858U C2B Universal Supergroup Bank Shelf Assembly
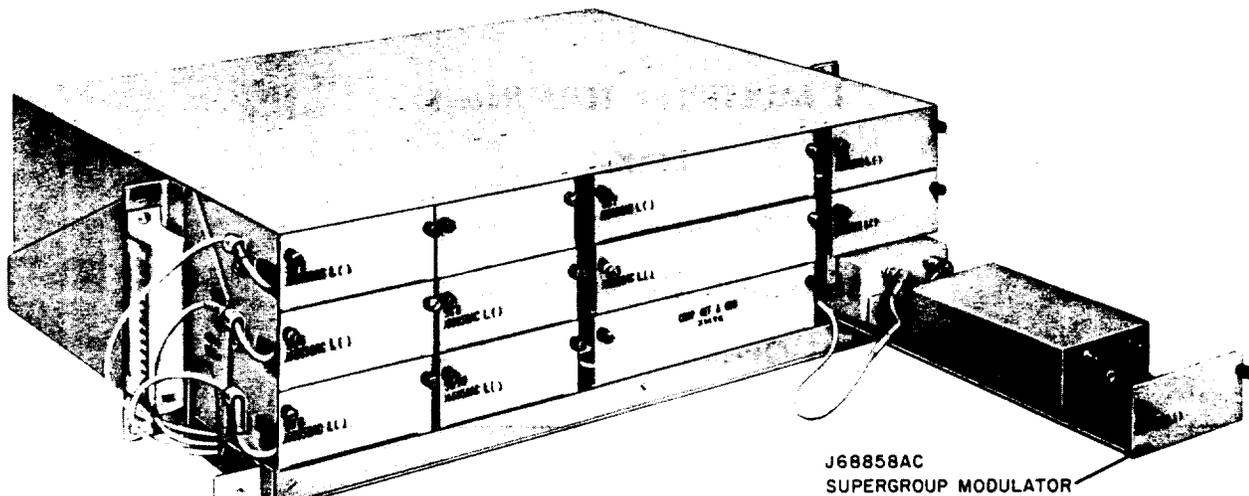
J68858AC
SUPERGROUP MODULATOR

Fig. 2—J68858F C2A Supergroup Modulator Shelf Assembly

SYNOPSIS (SEE FIG. 1 AND 2)

Each supergroup modulator circuit in a supergroup bank:

(a) Accepts the 312- to 552-kHz supergroup frequency band, at a transmission level of -25 dB, from either a group bank or a supergroup connector

(b) Translates the received supergroup frequency band into its proper frequency allocation for further modulation or for transmission over a carrier or a radio facility.

The translated output of each supergroup modulator circuit, combined with the outputs of all other supergroup modulator circuits in the supergroup bank, is delivered to the supergroup bank output jacks at a transmission level of -43.4 dBm. Thus, a loss of 18.4 dB exists between the SG MOD IN jacks and the SG (or DSG) BK OUT jacks.

Note: In the C2A bank, supergroups 1, 3, and 13, **when used,** require amplification to provide the correct loss.

METHOD OF TESTING

The loss of the supergroup modulator is maintained by monitoring the translated 315.92-kHz supergroup pilot at the output jacks of the supergroup bank and, if necessary, adjusting the control associated with that particular supergroup modulator circuit. Once the loss is determined to be correct, the passband characteristic of the supergroup modulator and associated bandpass filter is checked by first measuring two translated test signals and then establishing a difference relative to the translated 315.92-kHz supergroup pilot.

CHART	PAGE

APPARATUS:

The tests in this section require 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 75-ohm circuits, signals between 315 kHz and 549 kHz at a level of −25 dBm

Receiving test equipment capable of detecting, from 75-ohm circuits, signals between 63 kHz and 3081 kHz at levels of −43.4 dBm and −63.4 dBm.

In addition to the above, the following are required:

Out-of-Service Transmitting Group Bank

P2BJ Cords

CHART 1

C2A (J68858F) SUPERGROUP MODULATOR

Early productions of the L600A and the L1860A multiplex transmitting terminals used the J68858F supergroup modulator shelf assembly shown in Fig. 2. The supergroup modulator and bandpass filter are contained in the J68858AC-L( ) slide-in unit.

The SG PAD control, used for adjusting the output level of the regular C2A supergroup modulator circuit, is located on the group bank shelf (see Fig. 3) associated with that particular supergroup.

The SP SG PAD control, used for adjusting the output level of the spare supergroup modulator circuit, is located on the supergroup modulator equipment at the spare supergroup modulator shelf.

CHART 1 (Cont)
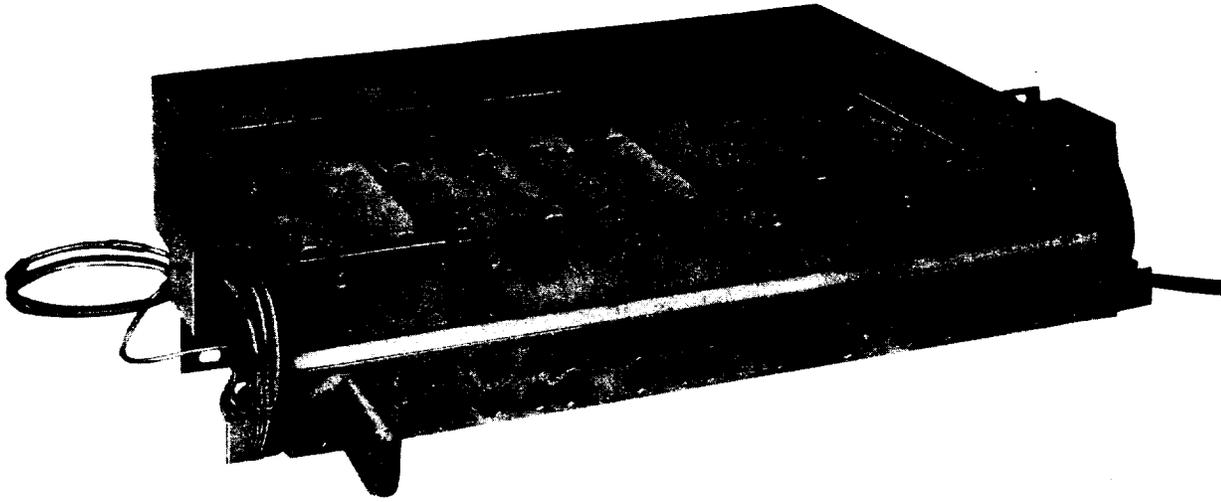
Fig. 3—Transmitting Group Bank Shelf Assembly

STEP	PROCEDURE
	LOSS TEST
1	Remove from service the supergroup bank to be tested.
2	Prepare the RTE (receiving test equipment) for a 75-ohm terminated measurement of 315.92 kHz at approximately −45 dBm.
3	Select an out-of-service transmitting group bank.
4	Make patch (1) in Fig. 4.
5	Measure and record the level of the 315.92-kHz pilot at the GR BK OUT A jack of the selected group bank. *Requirement:* Approximately −45 dBm.
6	Adjust the RTE for a 75-ohm terminated measurement of the translated 315.92-kHz pilot at approximately −63.4 dBm for the supergroup modulator circuit being tested. *Note:* The translations of the 315.92-kHz pilot and the 433-kHz and 549-kHz test frequencies used in this chart are listed in Table A.
7	Remove patch (1) and make patches (2) and (3) in Fig. 4.
8	Measure the level of the translated 315.92-kHz pilot at the SG BK OUT A jack.

	CHART 1 (Cont)
STEP	**PROCEDURE**
	Fig. 4—Supergroup Modulator—Out-of-Service Loss Tests **Requirement:** 18.4 dB less than the value recorded in Step 5. (−46 dBm is less than −45 dBm).
9	If the requirement of Step 8 is met, proceed to Step 11. If it is not met, adjust the SG PAD control associated with the supergroup modulator circuit to meet the requirement of Step 8.
10	If the requirement of Step 8 cannot be met, replace the J68858AC-L( ) slide-in unit with a similar unit and repeat Steps 8 and 9 to determine if the supergroup modulator now meets the requirement.

STEP	PROCEDURE
	CHART 1 (Cont)

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CHART 1 (Cont)

TABLE A

FREQUENCY TRANSLATION (SUPERGROUP MODULATORS)

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L600A TERMINAL

INPUT FREQUENCY (KHZ)	OUTPUT FREQUENCIES (KHZ) FOR SUPERGROUPS 1 — 10					
	1	2	3	4	5	
315.92	296.08	315.92	800.08	1048.08	1296.08	
433	179	433	683	931	1179	
549	63	549	567	815	1063	
	6	7	8	9	10	
315.92	1544.08	1792.08	2040.08	2175.92	2784.08	
433	1427	1675	1923	2293	2667	
549	1311	1559	1807	2409	2551	

L1860A TERMINAL

INPUT FREQUENCY (KHZ)	OUTPUT FREQUENCIES (KHZ) FOR SUPERGROUPS 12-18, D25-D28					
	12	13	14	15	16	17
315.92	315.92	800.08	1048.08	1296.08	1544.08	1792.08
433	433	683	931	1179	1427	1675
549	549	567	815	1063	1311	1559
	18	D25	D26	D27	D28	
315.92	2040.08	2336.08	2584.08	2832.08	3080.08	
433	1923	2219	2467	2715	2963	
549	1807	2103	2351	2599	2847	

PASSBAND TEST

STEP	PROCEDURE
11	Adjust the RTE to measure the translated 433-kHz signal at -43.4 dBm for the supergroup modulator circuit being tested.
12	Prepare the STE (sending test equipment) to deliver a 433-kHz signal at -25 dBm.
13	Remove patch (2) and make patch (4) in Fig. 4.
14	Measure and record the level of the translated 433-kHz signal at the SG BK OUT A jack.

Requirement: -42.4 dBm to -44.1 dBm (-43.4 dBm is nominal).

CHART 1 (Cont)	
STEP	**PROCEDURE**
15	If the requirement of Step 14 is met, proceed to Step 17. If it is not met, trouble is indicated. Locate and correct the trouble.
16	Repeat Steps 11 through 15 to verify correction of the trouble.
17	Adjust the RTE to measure the translated 549-kHz signal at -43.4 dBm.
18	Adjust the STE to deliver a 549-kHz signal at -25 dBm.
19	Measure the level of the translated 549-kHz signal at the SG BK OUT A jack. *Requirement:* Within -1.0 dB to $+0.7$ dB of the value recorded in Step 14.
20	If the requirement of Step 19 is met, proceed to Step 22. If it is not met, trouble is indicated. Locate and correct the trouble.
21	Repeat Steps 11 through 20 to verify correction of the trouble.
22	Repeat Steps 2 through 21 for each supergroup modulator circuit to be tested in the supergroup bank.
23	Remove all patches and restore service to normal.

CHART 2

C2B (J68858U, V) AND C2C (J68858V, W) SUPERGROUP MODULATOR

The J68858U supergroup modulator shelf assembly (Fig. 1) contains the C2B supergroup bank comprised of the ten adjustable 4095A networks and the bandpass filter units for supergroups 13 through 18 and supergroups D25 through D28 in the L1860A terminal. The J68858W supergroup modulator shelf assembly contains the C2C supergroup bank comprised of only nine adjustable 4095A networks and the bandpass filter units for supergroup 1 and supergroups 3 through 10 in the L600A terminal. The J68858V shelf assembly (Fig. 5) contains the 4095B modulator network and bandpass filter unit which provides supergroup 2 in the L600A terminal or supergroup 12 in the L1860A terminal. The ADJ control, used for adjusting the output level of each supergroup modulator circuit, is located on the front of the 4095( ) network.

CHART 2 (Cont)

4095 B
NETWORK
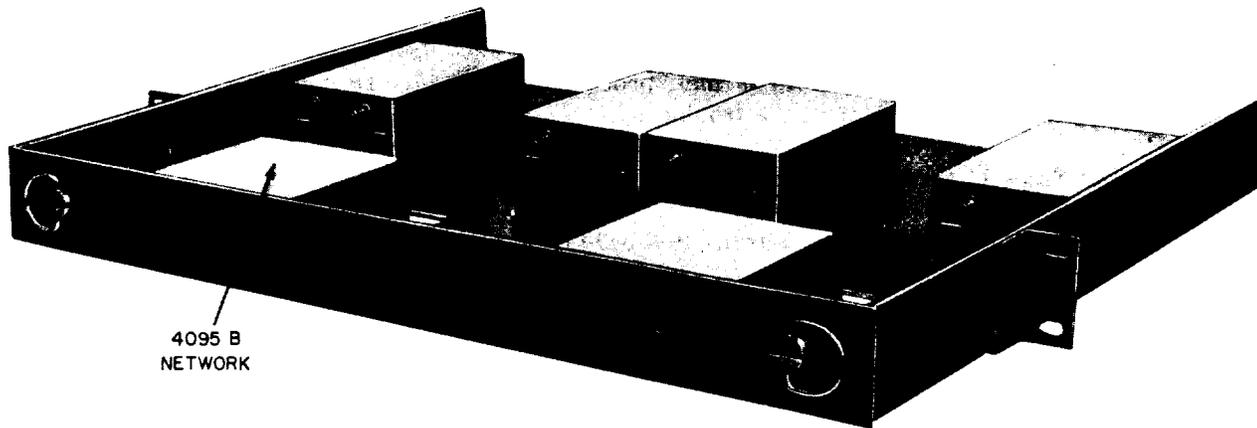
Fig. 5—J68858V Supergroup 2 or 12 Universal Shelf Assembly

STEP	PROCEDURE
	LOSS TEST
1	Remove from service the supergroup bank to be tested.
2	Prepare the RTE (receiving test equipment) for a 75-ohm terminated measurement of 315.92 kHz at approximately −45 dBm.
3	Select an out-of-service transmitting group bank.
4	Make patch (1) in Fig. 6.
5	Measure and record the level of the 315.92-kHz pilot at the GR BK OUT A jack of the selected group bank. *Requirement:* Approximately −45 dBm.
6	Adjust the RTE for a 75-ohm terminated measurement of the translated 315.92-kHz pilot at approximately −63.4 dBm for the supergroup modulator circuit being tested. *Note:* The translations of the 315.92-kHz pilot and the 433-kHz and 549-kHz test frequencies used in this chart are listed in Table B.
7	Remove patch (1) and make patches (2) and (3) in Fig. 6.
8	Measure the level of the translated 315.92-kHz pilot at the DSG BK OUT A jack. *Requirement:* 18.4 dB less than the value recorded in Step 5 (−46 dBm is less than −45 dBm).

CHART 2 (Cont)

STEP	PROCEDURE

Fig. 6—Supergroup Modulator—Out-of-Service Loss Tests

9   If the requirement of Step 8 is met, proceed to Step 11. If it is not met, adjust the ADJ control associated with the supergroup modulator circuit to meet the requirement.

10   If the requirement of Step 8 cannot be met, replace the 4095( ) modulator network with a similar unit and repeat Steps 8 and 9 to determine if the supergroup modulator now meets the requirement.

PASSBAND TEST

11   Adjust the RTE to measure the translated 433-kHz signal at −43.4 dBm for the supergroup modulator circuit being tested.

12   Adjust the STE (sending test equipment) to deliver a 433-kHz signal at −25 dBm.

13   Remove patch (2) and make patch (4) in Fig. 6.

14   Measure and record the level of the translated 433-kHz signal at the DSG BK OUT A jack.

   Requirement: −42.4 dBm to −44.1 dBm (−43.4 dBm is nominal).

STEP	PROCEDURE

CHART 2 (Cont)

TABLE B

FREQUENCY TRANSLATION (SUPERGROUP MODULATORS)

L600A TERMINAL

INPUT FREQUENCY (KHZ)	OUTPUT FREQUENCIES (KHZ) FOR SUPERGROUPS 1 — 10					
	1	2	3	4	5	
315.92	296.08	315.92	800.08	1048.08	1296.08	
433	179	433	683	931	1179	
549	63	549	567	815	1063	
	6	7	8	9	10	
315.92	1544.08	1792.08	2040.08	2175.92	2784.08	
433	1427	1675	1923	2293	2667	
549	1311	1559	1807	2409	2551	

L1860A TERMINAL

INPUT FREQUENCY (KHZ)	OUTPUT FREQUENCIES (KHZ) FOR SUPERGROUPS 12-18, D25-D28					
	12	13	14	15	16	17
315.92	315.92	800.08	1048.08	1296.08	1544.08	1792.08
433	433	683	931	1179	1427	1675
549	549	567	815	1063	1311	1559
	18	D25	D26	D27	D28	
315.92	2040.08	2336.08	2584.08	2832.08	3080.08	
433	1923	2219	2467	2715	2963	
549	1807	2103	2351	2599	2847	

15 If the requirement of Step 14 is met, proceed to Step 17. If it is not met, trouble is indicated. Locate and correct the trouble.

16 Repeat Steps 11 through 15 to verify correction of the trouble.

17 Adjust the RTE to measure the translated 549-kHz signal at −43.4 dBm.

18 Adjust the STE to deliver a 549-kHz signal at −25 dBm.

19 Measure the level of the translated 549-kHz signal at the DSG BK OUT A jack.

Requirement: Within −1.0 dB to +0.7 dB of the value recorded in Step 14.

STEP	PROCEDURE
	CHART 2 (Cont)
20	If the requirement of Step 19 is met, proceed to Step 22. If it is not met, trouble is indicated. Locate and correct the trouble.
21	Repeat Steps 11 through 20 to verify correction of the trouble.
22	Repeat Steps 2 through 21 for each supergroup modulator circuit to be tested in the supergroup bank.
23	Remove all patches and restore service to normal.