A5 12-CHANNEL BANK
REDUCTION OF INTRACHANNEL CROSSTALK

This section provides information for testing and identifying certain A5-type channels, and gives details on the modification procedure employed to increase the coupling loss between the two directions of these A5-type channel equipments. This information is provided only for application where crosstalk is found to be excessive for some services and (1) the band filter is identified as an early-production unit and (2) tests, made per Section 356-015-500, meet requirements.

(A) GENERAL

In the following, the unwanted intrachannel coupling will be referred to as ***equal-level crosstalk loss.*** The test points used for determining the amount of coupling between two circuits, generally have a level difference that must be taken into account. In a general discussion involving crosstalk coupling, it is difficult to refer to magnitudes without relating these coupling values to the levels at the test points at which the coupling is measured. Such a discussion may be simplified by reducing the magnitude of coupling to a common basis by computing the coupling that would be measured between equal-level points on the disturbing and disturbed circuits; the computed value is known as the ***equal-level crosstalk loss.*** This concept is applied in Part D.

The near-end equal-level coupling loss between the two directions of transmission on early-production A5 channels, generally is worse than 55 db and may average around 45 db. In normal message circuit applications of these early-production A5 channels, resultant near-end intrachannel crosstalk appears as sidetone and is not considered to be an adverse condition even in the worst case. However, for TASI or for other special system arrangements with more stringent requirements than for message service, crosstalk interference may be intolerable. An example of such a system arrangement is a data or similar application involving two different kinds of services operating in opposite directions at the same time over the same circuit (full duplex operation). The main source of the adverse coupling (45-55 db equal-level) is at the far end where there is an unfavorable level difference between the two directions of transmission. The poor coupling was found to be due primarily to the omission of a necessary shield between modulator and demodulator band filter elements in the factory product. The equal-level coupling loss on later filters with shielding, generally is between 60 to 80 db, but may be found to be 55 db on occasional filter units. It was found, subsequently, that further improvement in coupling could be obtained by rerouting the cabling to the filters.

(B) CHANNEL BANDPASS FILTER IDENTIFICATION

A5 Channel Banks manufactured prior to December, 1960 lack the shielding, as originally specified, between the transmitting and receiving paths of the Type 561 Channel Bandpass Filters. As a result, the average equal-level coupling (sidetone loss) measured was only about 45 db.

During the period between December, 1960 and February, 1961, channel banks containing ***both*** shielded and unshielded filters were shipped. ***The shielded filters bear a star imprinted between and slightly to the left of terminals 2 and 3 of the filter.*** Channels with starred filters produce a sidetone loss of approximately 55 db.

(C) CROSSTALK COUPLING IN LOCAL CABLE

Another source of high coupling was found to be due to crosstalk in the local cable. Certain leads associated with the receiving high-frequency path of the channel banks were rerouted from the local cable group; this improved the coupling as much as 10 db. As a result, this wiring change was incorporated in all Type A5 Channel Banks shipped as of October, 1961.

(D) MEASURING INTRACHANNEL CROSSTALK

If excessive intrachannel crosstalk is experienced or suspected, the following test can be made to determine the amount of equal-level coupling.

APPARATUS:

J68827A (27A) Sending Console
J68827B (27B) Receiving Console
P2BJ Patch Cords
262B (600-ohm) Plugs

or

Siemens Oscillator Rel 3W518 (Level Oscillator)
Siemens Selective Analyzer Rel 3D335 (Level Meter)
Attenuator KS-13964 or Siemens Rel 3D112b, or equivalent
Special Siemens Cords equipped with Western Electric Plugs
P2BP Patch Cords
262B (600-ohm) Plugs
J64034A (34A) Transmission Measuring Set (for use with the 75 to 135-ohm impedance matching coils)

STEP	PROCEDURE
1	Remove channel bank from service.
2	Terminate MOD IN and DEMOD OUT jacks with 262B plugs.
3	Set up test arrangement shown in Fig. 1.

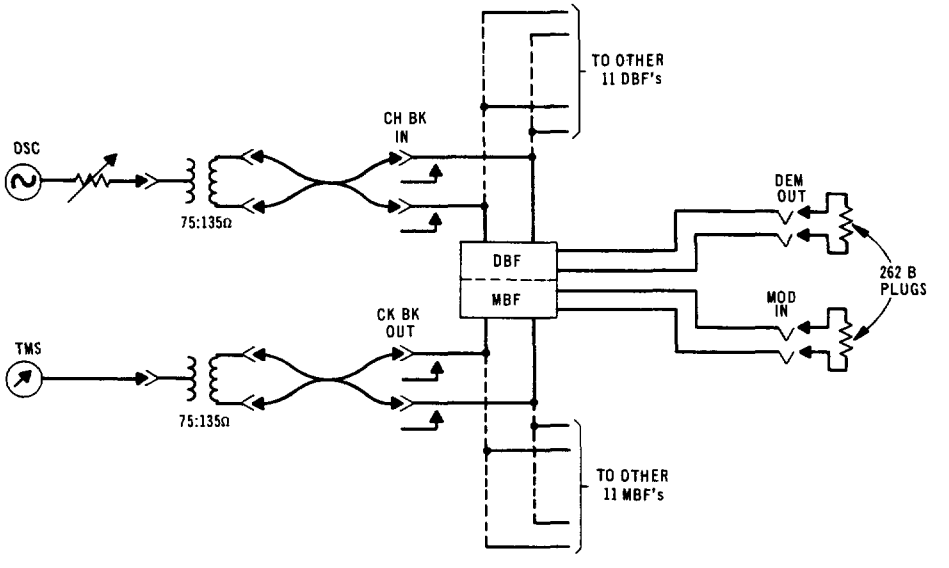

Fig. 1 – Measuring DBF/MBF Coupling Loss

STEP	PROCEDURE
4	Send test frequency at −4.7 dbm at the 1000-cycle point of the proper channel frequency (107 kc, 103 kc - - - - 63 kc).
5	Measure at CH BK OUT jacks at the same frequency being used at CH BK IN jacks. ***Requirement:*** −97.3 dbm or better (−100 dbm is better). This requirement corresponds to an equal-level loss of −55 db (corrected). Since tone was sent at the correct test level (−5 dbm) at CH BK IN, it is the equivalent of having been sent at 0 dbm at the far-end terminal of the circuit assigned to the channel. If we were to measure the amount of crosstalk tone at the same circuit terminal at 0 db TLP, we would encounter an apparent gain of 42 db between the CH BK OUT (−42 TLP) and the circuit terminal (0 db TLP); hence, [(−97 db) − (−42 db)] = −55 db equal-level coupling loss.
6	If the requirement in Step 5 is not met, modifications may be made, as described in Part E.

(E) MODIFICATIONS OF TYPE A5 CHANNEL BANKS MANUFACTURED PRIOR TO OCTOBER, 1961 TO CONFORM WITH PRESENT STANDARDS

The need for replacing filters and/or wiring must be determined locally. However, all unstarred filters ***must*** be replaced with starred filters ***before*** modification of local cabling is undertaken. The following procedure covers the full modification.

STEP	PROCEDURE
1	Remove channel bank from service.
2	Unsolder all leads connected to terminals 1 and 2 of the unstarred 561-type filters and cut them back at the point where they enter the cable form.
3	Unsolder the three pairs of twisted leads connected to terminals 1 and 2 of the RCVG NET. One pair of these leads connects to ED-50077-30 pad assembly. Unsolder this pair where it connects to the pad assembly and remove it from the cable form. Cut back the other two pairs formerly connected to terminals 1 and 2 of the RCVG NET at the point where they enter the cable form.
4	Unsolder the leads connected to terminals 5 and 6 of the RCVG HY. These leads also connect to the pad assembly via the cable form. Unsolder them where they connect to the pad assembly and remove them from the cable form.
5	Remove unstarred 561-type filters and replace with starred filters.
6	Prepare and connect 24 ga. twisted pair leads to form the D3 wiring path shown in Fig. 2. Form the leads as shown in Fig. 3, using tape where indicated. Note that a complete loop is formed from terminal 1 (or 2) of the RCVG NET to terminal 1 (or 2) of each filter and returns to terminal 1 (or 2) of the RCVG NET.
7	Repeat test in Part (D).
8	Make tests in accordance with Section 356-015-500.

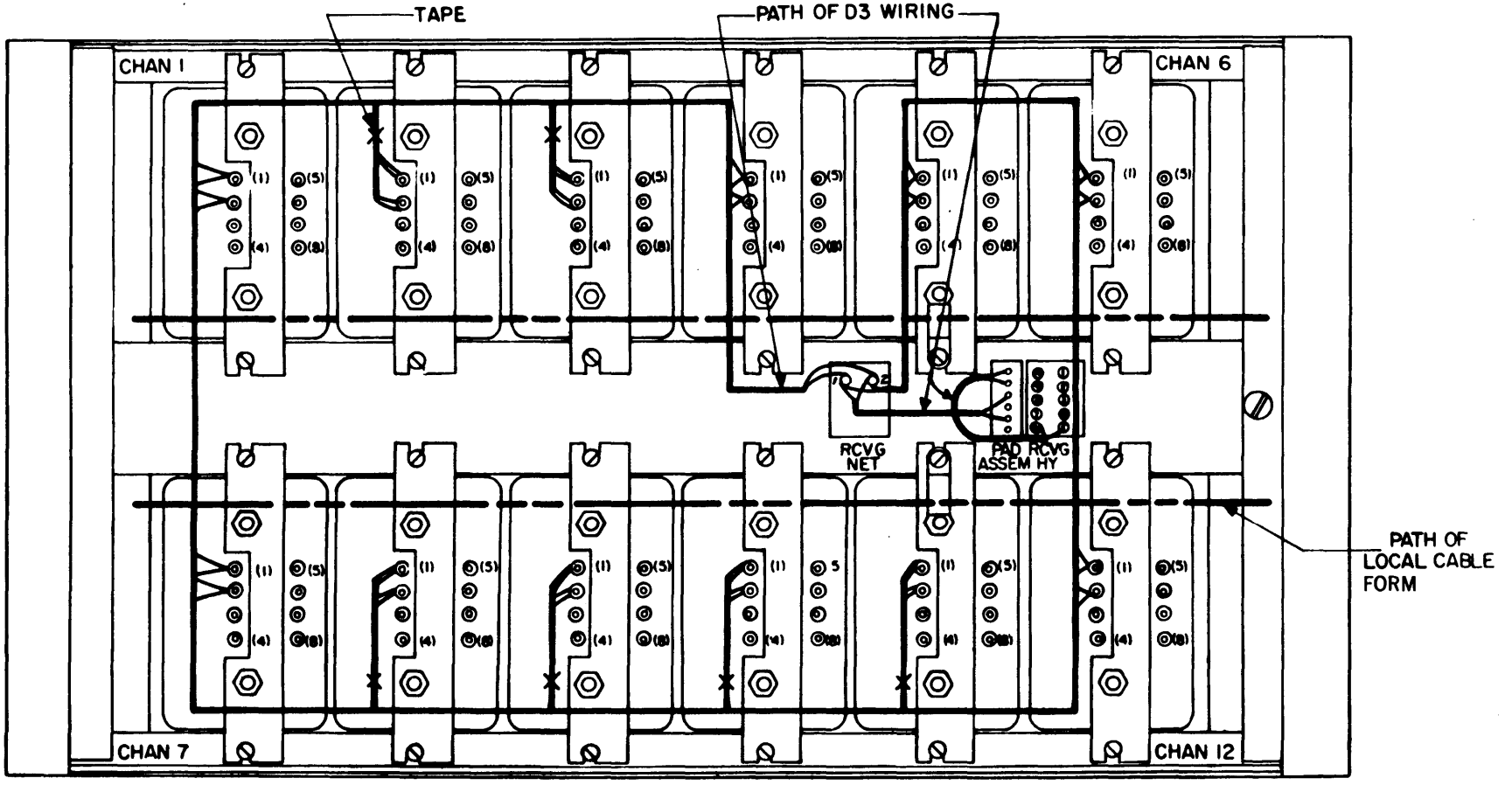

Fig. 2 – Path of Receiving High-Frequency Leads in A5 Channel Bank

(Banks Manufactured After October 1, 1961)

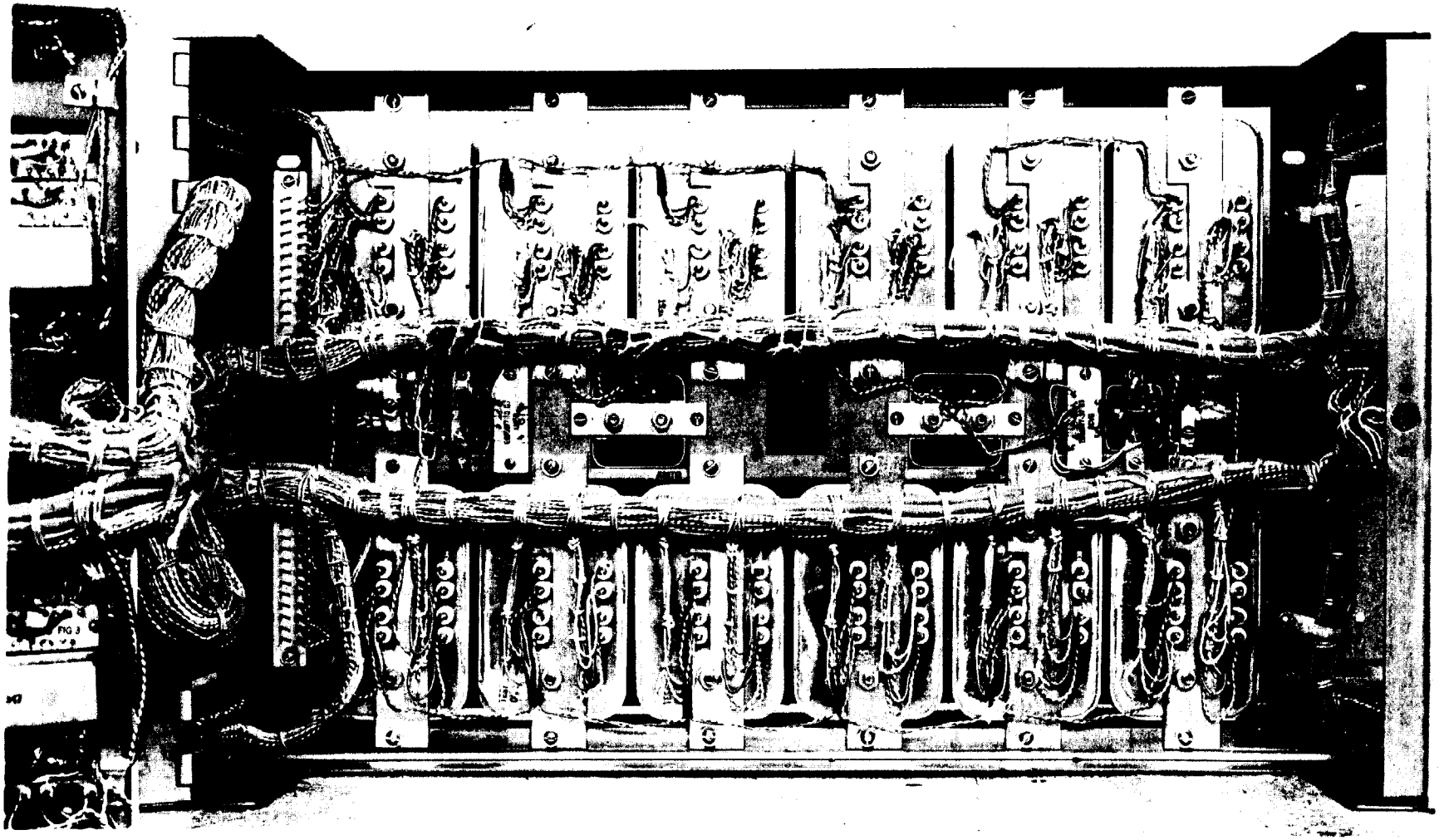

Fig. 3 – Cable Layout in A5 Channel Bank

(Banks Manufactured After October 1, 1961)