CIRCUIT ORDER OR TRUNK ORDER TESTS — TESTING METHODS
ADJUSTMENT OF TRANSMISSION LEVELS ON COMBINATION TRUNKS — INTERMEDIATE OFFICES

Interconnection arrangements and losses between VF patch bays as required by circuit orders or trunk orders are normally accomplished by the use of 1C pad sockets with 89-type resistor combinations or by fixed loss pads as shown in Fig. 1.

With 89-type resistors available in 0.25 db steps up to 23.0 db, adjustment of transmission levels to within specified limits using 1C pads with 89-type resistors should present no problem. Where fixed pads are used, procedures for reducing their losses, when required, are outlined below.

STEP	PROCEDURE
	GENERAL INFORMATION When transmission levels are to be adjusted on combination trunks that are in service, the trunks should be temporarily removed from service at both ends. The ***MOD IN*** and ***DEM OUT*** jacks of the carrier channels assigned to the trunks should be terminated in 600 ohms during the tests. Make sure that all milliwatt supply outlets which will be used are adjusted accurately and that the transmission measuring systems are calibrated correctly. Where a 1000 +7 or (+4) 600Ω outlet is not provided at the VF patch bay as shown in Fig. 1, a 21A transmission measuring set which has been calibrated using a 22A milliwatt reference meter can be used to obtain 1000-cycle test power at the correct level of +7 or (+4) db. Measurements and adjustments should be made in each direction of transmission between voice-frequency patch bay or repeater bay appearances as shown in Fig. 1. The measurements should include all equipment and office cabling and/or interoffice tie cabling losses.
	1C PADS WITH 89-TYPE RESISTORS
1	***At the transmitting end*** — patch from ***EQ IN*** jack to ***1000 +7 or (+4) 600Ω*** jack as indicated by (1) in Fig. 1.
2	***At the receiving end*** — patch from ***EQ OUT*** jack to ***TST 600Ω*** jack as indicated by (2) in Fig. 1. Operate sensitivity switch on the measuring circuit to B + 10 and read the meter. The difference between this reading and −16.0 or −13.0 (depending upon the transmission levels used at the VF patch bay in which the channel terminates) is the change required in the 89-type resistor.

STEP	PROCEDURE
	Select the proper 89-type resistor to provide a ***final*** transmission level measurement of −16.0 or −13.0 ±0.13 db. The maximum allowable deviation in any 89-type pad value from that originally indicated on the circuit layout record card shall not exceed ±1.0 db. In those cases where a pad adjustment or repeater gain change exceeds the maximum allowable deviation of ±1.0 db, the circuit should be investigated for trouble. If, after investigation the condition still exists, the control office shall be so advised prior to referral via lines of organization to determine if design changes are possible.
3	Repeat Steps 1 and 2 for the opposite direction of transmission. The adjusted value of 89-type resistors should be recorded and dated in ink on all circuit layout record cards and other locally prepared records and treated as a new specified value.
	17 DB FIXED LOSS SQUARE PADS — SD-64303-01 Fig. 7 of SD-64303-01 and Fig. 18 of T-64303-32 details the schematic wiring arrangements for 17 db fixed loss square type pads consisting of 19-type resistors. Where these fixed loss pads are used, transmission level measurements and adjustments should be made as outlined below.
4	***At the transmitting end*** — patch from ***EQ IN*** jack to ***1000 +4 600Ω*** jack as indicated by (1) in Fig. 1.
5	***At the receiving end*** — patch from ***EQ OUT*** jack to ***TST 600Ω*** jack as indicated by (2) in Fig. 1. Operate sensitivity switch on the measuring circuit to B + 10 and read the meter. The difference between this reading and −13.0 db is the change required in the loss of the 17 db fixed loss pad. To reduce the loss of 17 db pads, refer to Table B of Fig. 1 for selection of 145A resistors which should be connected in parallel with series elements of 19-type resistors. See Fig. 1 for details.
6	Appropriate 145A resistors connected in parallel with series elements of 19-type resistors should provide a ***final*** transmission level measurement of −13.0 ±0.13 db. The maximum allowable deviation in any 17 db fixed pad value from that originally indicated on the circuit layout record card shall not exceed ±1.0 db. In those cases where a pad adjustment or repeater gain change exceeds the maximum allowable deviation of ±1.0 db, the circuit should be investigated for trouble. If, after investigation the condition still exists, the control office shall be so advised prior to referral via lines of organization to determine if design changes are possible.
7	Repeat Steps 4, 5 and 6 for the opposite direction of transmission. The adjusted value of 17 db fixed loss pads should be recorded and dated in ink on all circuit layout record cards and other locally prepared records and treated as a new specified value.

STEP	PROCEDURE
	23 DB FIXED LOSS SQUARE PADS — SD-64303-01
	Fig. 11 of SD-64303-01 and Fig. 18 of T-64303-32 details the schematic and wiring arrangements for 23 db fixed loss square type pads consisting of 19-type resistors. Where these fixed loss pads are used, transmission level measurements and adjustments should be made as outlined below.
8	***At the transmitting end*** — patch from ***EQ IN*** jack to ***1000 +7 600Ω*** jack as indicated by (1) in Fig. 1.
9	***At the receiving end*** — patch from ***EQ OUT*** jack to ***TST 600Ω*** jack as indicated by (2) in Fig. 1.
	Operate sensitivity switch on the measuring circuit to B + 10 and read the meter. The difference between this reading and −16.0 db is the change required in the loss of the 23 db fixed loss pad.
	To reduce the loss of 23 db pads, refer to Table A of Fig. 1 for selection of 145A resistors which should be connected in parallel with series elements of 19-type resistors. See Fig. 1 for details.
10	Appropriate 145A resistors connected in parallel with series elements of 19-type resistors should provide a ***final*** transmission level measurement of −16.0 ±0.13 db. The maximum allowable deviation in any 23 db fixed pad value from that originally indicated on the circuit layout record card shall not exceed ±1.0 db.
	In those cases where a pad adjustment or repeater gain change exceeds the maximum allowable deviation of ±1.0 db, the circuit should be investigated for trouble. If, after investigation the condition still exists, the control office shall be so advised prior to referral via lines of organization to determine if design changes are possible.
11	Repeat Steps 8, 9 and 10 for the opposite direction of transmission.
	The adjusted value of 23 db fixed loss pads should be recorded and dated in ink on all circuit layout record cards and other locally prepared records and treated as a new specified value.
	17 AND 23 DB FIXED LOSS PADS — SD-59329-01
	Fig. 5 of SD-59329-01 details 17 or 23 db fixed loss square type pads which may be assembled with 19-type resistors or with 145A resistors.
12	When 19-type resistors are used to provide 17 or 23 db pads, the information outlined in Steps 4 through 7 and 8 through 11 respectively applies.
13	When 145A resistors are used to provide 17 db or 23 db pads, there is a different wiring arrangement as detailed in Fig. 2 of T-59329-31. The 145A resistor values listed in Tables A and B are used for reducing the loss for this arrangement but the method of mounting them is different. For example, when it is desired to reduce the loss of the first pad circuit, the paralleling resistors should be appended between terminals 2A and 2B and 3A and 3B. When it is desired to reduce the loss of the second pad circuit, the paralleling resistors should be appended between terminals 11A and 11B and 12A and 12B.

STEP	PROCEDURE
	The maximum allowable deviation in any 17 or 23 db fixed pad value from that originally indicated on the circuit layout record card shall not exceed ±1.0 db. In those cases where a pad adjustment or repeater gain change exceeds the maximum allowable deviation of ±1.0 db, the circuit should be investigated for trouble. If, after investigation the condition still exists, the control office shall be so advised prior to referral via lines of organization to determine if design changes are possible. The adjusted value of 17 or 23 db fixed loss pads should be recorded and dated in ink on all circuit layout record cards and other locally prepared records and treated as a new specified value.

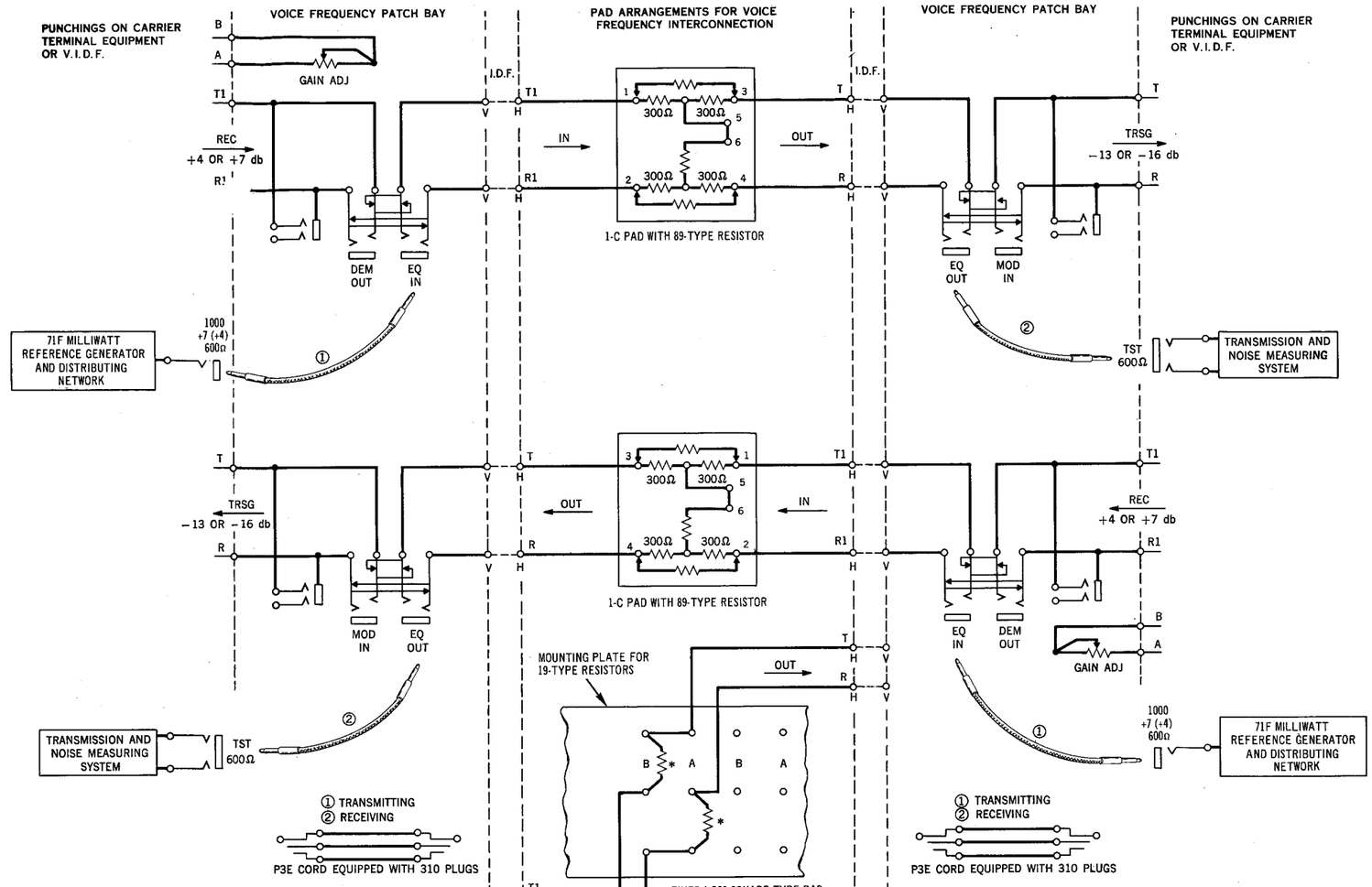

TABLE A

LOSS OF 23 DB FIXED LOSS SQUARE TYPE PADS COMPOSED OF SERIES ARMS OF APPROXIMATELY 2100-OHMS AND SHUNT ARMS OF APPROXIMATELY 690-OHMS CAN BE REDUCED OVER RANGES INDICATED BY PARALLELING SERIES ARMS WITH APPROPRIATE RESISTORS.

LOSS REDUCED BY	CALCULATED VALUE - OHMS	145A RESISTOR PREFERRED VALUE - OHMS
.1	143,452	143,000
.2	70,672	70,600
.3	46,412	46,400
.4	34,282	34,400
.5	27,004	27,100
.6	22,152	22,100
.7	18,686	18,700
.8	16,087	16,000
.9	14,065	14,000
1.0	12,448	12,400
1.1	11,125	11,100
1.2	10,022	10,000
1.3	9,089	9,090
1.4	8,289	8,250
1.5	7,592	7,590

TABLE B

LOSS OF 17 DB FIXED LOSS SQUARE TYPE PAD COMPOSED OF SERIES ARMS OF APPROXIMATELY 1040-OHMS AND SHUNT ARMS OF APPROXIMATELY 795-OHMS CAN BE REDUCED OVER RANGES INDICATED BY PARALLELING SERIES ARMS WITH APPROPRIATE RESISTORS.

LOSS REDUCED BY	CALCULATED VALUE - OHMS	145A RESISTOR PREFERRED VALUE - OHMS
.1	61,809	61,900
.2	30,384	30,500
.3	19,909	19,000
.4	14,671	14,700
.5	11,529	11,500
.6	9,436	9,420
.7	7,952	7,960
.8	6,815	6,810
.9	5,942	5,970
1.0	5,244	5,230
1.1	4,673	4,700
1.2	4,197	4,170
1.3	3,794	3,790
1.4	3,448	3,440
1.5	3,149	3,160

Fig. 1 – Adjustment of Transmission Levels on Combination Trunks — Intermediate Offices