# 17E TESTBOARD

# MEASUREMENT AND ADJUSTMENT OF OFFICE LOSSES

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## 1. GENERAL

**1.01** This section describes a method of accurately measuring and adjusting the office wiring losses between the voice-frequency patch bay and the link frames in a 2-wire No. 5 crossbar office. When properly accomplished, the procedure permits the required transmission level of —2 dbm at the line link or trunk link frame to be maintained within close tolerances. Possible significant deviations in the transmission levels, which may occur in using estimated wiring losses for determining pad values, are thus eliminated.

**1.02** Measurements are made between the VF patch bay and the testboards. When adjustments of the pads in the measuring circuits of the SD-95900-01 transmission measuring system have been properly made, the measuring system will accurately indicate the transmission level at the link frames. Section 310-281-300 describes the procedure for adjusting these pads.

**1.03** No adjustment of the transmitting (T) and receiving (R) pads should be made except by the procedure described here. Any adjustment to these pads made during over-all transmission tests may obscure equipment deficiencies or cause maladjustment in other sectors of the transmission path.

**1.04** In order to eliminate the possibility that maladjustment of plug-in SF signaling units might cause errors in making measurements and adjustments of the receiving pads, the units should be removed and replaced by a zero-loss connector during measurements and adjustments in the receiving paths. For electron tube units, a KS-14160 connector is substituted; for the transistorized E-type unit, a KS-16370, L3 connector is substituted. Straps are required on connector terminals as follows:

| KS-14160 | KS-16370, L3 |
|---|---|
| 0 and 6 | M and U |
| 1 and 7 | S and V |

**1.05** When permanently mounted signaling units are used, the loss of the receiving path of the unit should be carefully adjusted to 0 db at 1000 cycles just prior to performing the tests and adjustments described here. Refer to the applicable sections.

**1.06** In all cases, the signaling units should be left in place during measurements and adjustments in the ***transmitting*** paths.

**1.07** The measurement and adjustment procedure described here should be accomplished in advance of over-all transmission measurements with the distant office.

**1.08** All normally assigned trunk equipment except as noted in 1.04, should be in place when the measurements and adjustments described here are performed.

**1.09** All milliwatt test tone outlets to be used as sources of test signals during these tests should be checked with a 22A milliwatt reference meter, or equivalent, and adjusted in accordance with appropriate sections.

**1.10** All test sets and transmission measuring systems to be used in performing these tests should be calibrated and adjusted as required prior to performing the tests.

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**1.11** Test connections for making office wiring loss measurements on trunks in outgoing and incoming directions are shown in Fig. 1. Also shown is a loop-back arrangement which may be used for establishing correct connections through the switches without involving the distant terminal. This arrangement is used only for establishing the proper circuit and is not used during measurements. If such an arrangement is not available, assistance from the distant end will be required in establishing the circuits for measurements.

## 2. REFERENCES

**2.01** The following associated practices contain information supplementary to this section.

310-281-100 — 17E Testboard, General Description

310-281-300 — 17E Testboard, Measurement and Adjustment of Pads for the Transmission Measuring Circuit

310-281-501 — 17E Testboard, Operational Tests

## 3. APPARATUS

**3.01** The following apparatus is required to perform this procedure.

1 — 21A Transmission Measuring Set (or Equivalent, if No +7 Outlet is Available at VF Patch Bay)

1 — 22A Milliwatt Reference Meter (or Equivalent)

2 — VF Amplifiers, 23-db Gain (for Loop-Back Arrangement)

1 — KS-14160 Connector (Zero-Loss Connector Strapped per 1.04)

1 — KS-16370 Connector (Zero-Loss Connector Strapped per 1.04)

## 4. TESTS

### A. Measurements and Adjustments of Office Losses — Outgoing Direction

| STEP | PROCEDURE |
|---|---|
| | *Note:* If tests and adjustments are to be made on trunks already in service, the trunks should be removed from service at each end while this procedure is being performed. Terminate the carrier channels at the MOD IN and DEMOD OUT jacks with 600-ohm terminations. |
| 1 | ***At VF Patch Bay:*** Connect A and B patches shown in Fig. 1 making a loop-back circuit within the office. |
| 2 | ***At Testboard:*** Seize the outgoing trunk under test. Connect a TST cord to the trunk TST jack and operate associated TALK-MON and HOLD-CLOSE 3RD keys to TALK and CLOSE 3RD, respectively.<br>When cord supervisory lamp is lighted, pulse forward code 101. When pulsing is completed, depress ST key momentarily.<br>Answer the incoming call by connecting a CON cord (of a second cord pair) to the 101 trunk jack.<br>When an off-hook condition is observed on the TST cord, connect associated CON cord to testboard MEAS jack.<br>Operate the TALK-MON key associated with the TST cord to normal position. |

| STEP | PROCEDURE |
|---|---|
| 3 | ***At VF Patch Bay:*** Remove A and B patches made in Step 1. Terminate EQ IN jack of the outgoing trunk under test in 600 ohms. |
| 4 | If a plug-in unit is used in the outgoing trunk under test, replace the unit with the correct zero-loss connector. See 1.04. |
| 5 | Patch EQ OUT jack of outgoing trunk under test to TST-600 jack of transmission measuring system (C1 patch, Fig. 1). |
| 6 | ***At Testboard:*** To transmit 1000-cycle test tone, operate SEND-RCV key to SEND. |
| 7 | ***At VF Patch Bay:*** Measured signal level at EQ OUT jack should be −16 dbm. If required, substitute an 89-type resistor in the T pad to obtain a signal level of −16 ±0.13 dbm. If the required adjustment in signal level is greater than 1 db, investigate the possibility of equipment deficiencies before making the change. |
| 8 | ***At VF Patch Bay:*** Remove the patches previously made to the EQ IN and EQ OUT jacks of the outgoing trunk under test. Terminate the EQ OUT jack in 600 ohms. Patch the EQ IN jack to the calibrated 1000•+7•600 jack or to the OSC OUT jack (D1 patch, Fig. 1). If oscillator is used, adjust output to 1000 cycles at +7 dbm. |
| 9 | ***At Testboard:*** Operate SEND-RCV key to RCV. Read received signal level on meter and determine loss.<br><br>If the loss just determined differs from the computed value (EML), substitute an 89-type resistor in the R pad as required to obtain the EML, ±0.13 db. If a change in level greater than 1 db is required, investigate the possibility of equipment deficiencies before making the change. |
| 10 | If a zero-loss connector was substituted in the trunk circuit, remove this connector and replace the SF signaling unit. Repeat Step 8. If the difference in readings is 1 db or less, readjust the SF unit. If more than 1 db, check the SF unit using the appropriate section. |
| 11 | Remove patches to EQ IN and EQ OUT jacks. Remove terminations to carrier channels at MOD IN and DEMOD OUT jacks. |
| 12 | If trunks are in service, release to service at near end and notify distant end to release the trunks to service. |
| 13 | ***At Testboard:*** Disconnect testboard cords.<br><br>Record adjusted values of T and R pads in ink on circuit layout cards and line out computed values, if different. |

**B. Measurements and Adjustments of Office Losses — Incoming Direction**

| STEP | PROCEDURE |
|---|---|
| | *Note:* If tests and adjustments are to be made on trunks already in service, the trunks should be removed from service at each end while this procedure is being performed.<br><br>Terminate the carrier channels at the MOD IN and DEMOD OUT jacks with 600-ohm terminations. |
| 1 | ***At VF Patch Bay:*** Connect A and B patches shown in Fig. 1 making a loop-back circuit within the office. |
| 2 | ***At Testboard:*** Seize the outgoing trunk with a TST cord connected to trunk TST jack.<br><br>Operate associated TALK-MON and HOLD-CLOSE 3RD keys to TALK and CLOSE 3RD positions, respectively.<br><br>When cord supervisory lamp is lighted, pulse forward code 101. When pulsing is completed, depress ST key momentarily.<br><br>Answer the incoming call by connecting a CON cord (of a second cord pair) to the 101 trunk jack.<br><br>When an off-hook condition is observed on the TST cord, connect TST cord of second cord pair to MEAS jack. All keys associated with second cord pair should be in their normal positions. |
| 3 | ***At VF Patch Bay:*** Remove A and B patches made in Step 1. Terminate EQ IN jack of incoming trunk under test in 600 ohms.<br><br>Connect patch between EQ OUT jack of incoming trunk and TST-600 jack of transmission measuring system (C2 patch, Fig. 1). |
| 4 | ***At Testboard:*** To transmit 1000-cycle test tone, operate SEND-RCV key to SEND. |
| 5 | ***At VF Patch Bay:*** Measured signal level at EQ OUT jack should be −16 dbm. If required, substitute an 89-type resistor in the T pad to obtain a signal level of −16 ±0.13 dbm. If the required adjustment in signal level is greater than 1 db, investigate the possibility of equipment deficiencies before making the change. |
| 6 | If a plug-in SF unit is used in the incoming trunk under test, replace the unit with the correct zero-loss connector. See 1.04. |
| 7 | ***At VF Patch Bay:*** Remove the patches previously made to the EQ IN and EQ OUT jacks of the incoming trunk under test. Terminate the EQ OUT jack in 600 ohms. |

| STEP | PROCEDURE |
|---|---|
| | Connect EQ IN jack of incoming trunk under test to 1000•+7•600 jack or to OSC OUT jack (D2 patch, Fig. 1). If the oscillator is used, adjust the output to 1000 cycles at +7 dbm using 22A reference meter. |
| 8 | ***At Testboard:*** Operate SEND-RCV key to RCV. Read received signal level on meter and determine loss.<br><br>If the loss just determined differs from the computed value (EML), substitute an 89-type resistor in the R pad as required to obtain the EML, ±0.13 db. If a change in level greater than 1 db is required, investigate the possibility of equipment deficiencies before making the change. |
| 9 | If a zero-loss connector was substituted in the trunk circuit, remove this connector and replace the SF signaling unit. Repeat Step 8. If the difference is 1 db or less, readjust the SF unit. If more than 1 db, check the SF unit using the appropriate section. |
| 10 | Remove patches to EQ IN and EQ OUT jacks. Remove terminations to carrier channels at MOD IN and DEMOD OUT jacks. |
| 11 | If trunks are in service, release to service at near end and notify distant end to release the trunks to service. |
| 12 | ***At Testboard:*** Disconnect testboard cords.<br><br>Record adjusted values of T and R pads in ink on circuit layout cards and line out computed values, if different. |

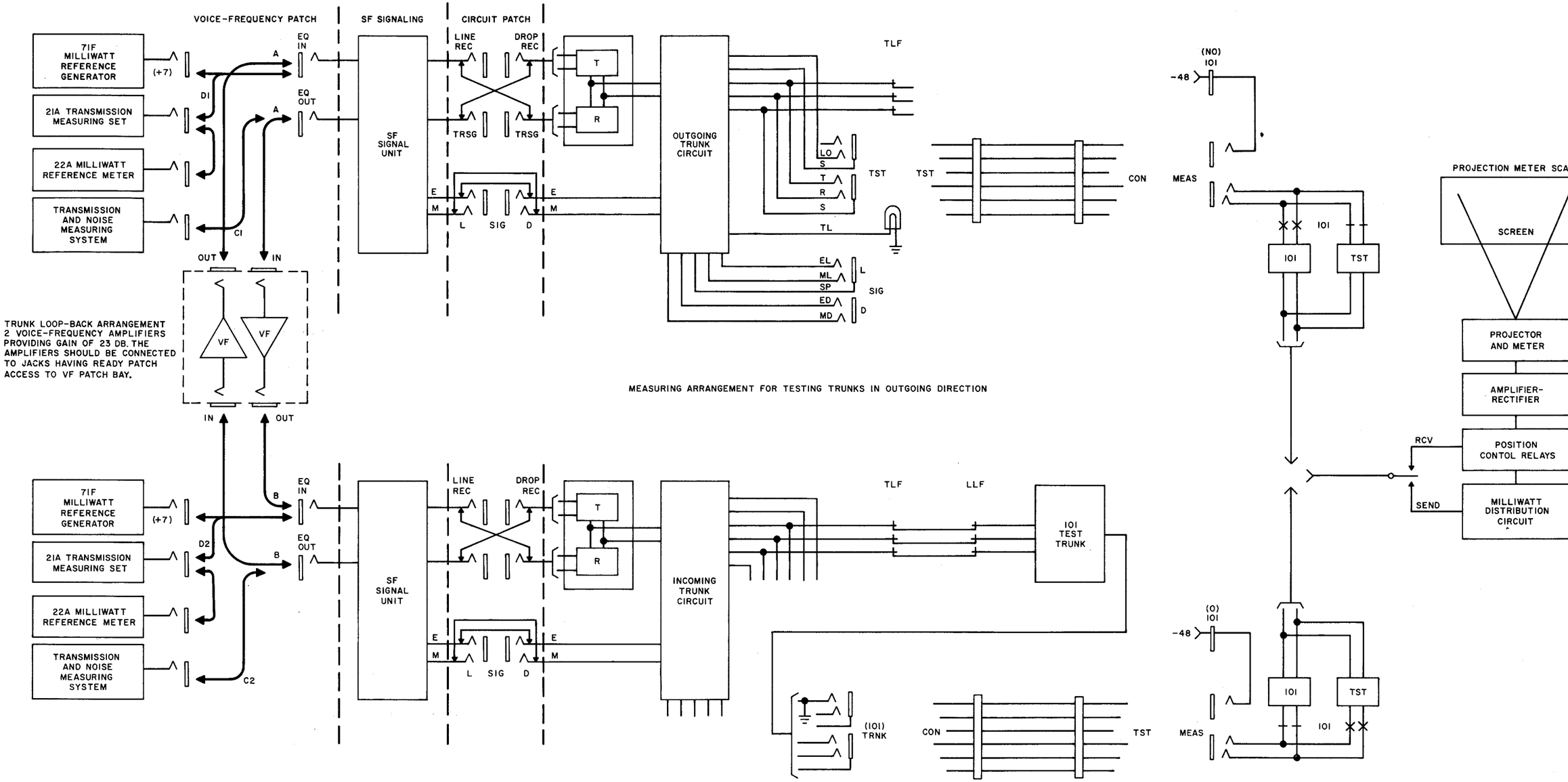


**Fig. 1 — Measurement and Adjustment of Office Losses**