

BELL SYSTEM PRACTICES  
Plant Series

This Practice Released on: \_\_\_\_\_

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SECTION 220-409-501PT  
APPENDIX 1  
Issue A, 2-13-57  
Pacific Tel.

RETURN LOSS TESTS  
USING DE-90071-01 TEST SET  
CROSSBAR TANDEM OFFICES

## 1. GENERAL

1.01 This appendix outlines the method of making preliminary return loss transmission tests using the portable test hybrid DE-90071-01 test set.

1.02 This test method is normally employed for testing toll connecting trunks prior to the installation of permanent test equipment in crossbar tandem offices. It may also be used to relieve congestion at the outgoing trunk test frame.

1.03 The tests covered are:

(A) Return Loss Tests - Incoming Toll Connecting Trunks.

(B) Return Loss Tests - Outgoing Toll Connecting Trunks.

1.04 An assistant is required at the distant office for testing incoming trunks and outgoing trunks to operators and when test terminations are applied at the frame. Test terminations at the frame may be applied by using the portable termination test set DE-90072-01 if available or a noninductive resistance of the proper value (Sprague type 5-NIT or equivalent).

1.05 For testing on trunk circuits where an impedance compensator will be involved, the equivalent circuit is provided in the DE-90071-01 test set. Jacks designated LINE IN, LINE B.O. and Z COMP. OUT are used for this circuit. When the impedance compensator is to be used, the trunk under test should be connected to the LINE IN jack. When the impedance compensator is not required, the trunk should be patched into the HYB IN jack.

1.06 A sketch of the return loss test equipment arrangement at the distant office and the crossbar tandem office is shown in Figure 1.

## 2. APPARATUS

2.01 The apparatus required for each test is shown in the following list. The details for each item are covered in the indicated paragraphs.

Apparatus	Paragraphs	No. Required For Tests	
		(A)	(B)
Transmission Measuring Set	2.02	1	1
Portable Test Hybrid	2.03	1	1
Patching Cord	2.04	2	2
Patching Cord	2.05	1	1
Patching Cord	2.06	1	1
Capacitor Box	2.07	1	1
Plug	2.08	1	1
Dial Hand Test Set	2.09	-	1
2.02 21A Transmission Measuring Set J94021A (SD-95115-01).			
2.03 Portable Test Hybrid Test Set DE-90071-01. (To be obtained from the transmission supervisor's office.)			
2.04 P2AA cord equipped with two 241A plugs (2P13B).			
2.05 W2S cord equipped with one 241A plug and 131 cord tips (2W14A). Install two KS-6278 clips locally.			
2.06 W2BP cord equipped with one 241A plug and No. 35 cord tips (2W15B).			
2.07 Decade Capacitor Box. (To be obtained from the transmission supervisor's office.)			
2.08 Plug 328D or equivalent.			
2.09 Dial hand test set 1011G equipped with 2W 39A cord.			

SECTION 220-409-501PT  
APPENDIX 1

3. PREPARATION

All Tests

3.01 Determine the return loss requirement of the trunk circuits to be tested from the trunk records, trunk order or circuit order.

3.02 Calibrate and operate the 21A transmission measuring set as described in the A702 subdivision entitled "21A Transmission Measuring Set J94021A."

3.03 Adjust the oscillator section of the 21A transmission measuring set as follows:

(a) Using a P2AA cord, patch the OSC OUT 600-ohm jack of the 21A transmission measuring set to the 4W IN jack on the DE-90071-01 test set.

(b) Using a P2AA cord, patch the DET IN 600-ohm jack of the 21A transmission measuring set to the 4W OUT jack on the DE-90071-01 test set.

(c) Operate the TALK-TEST key on the DE-90071-01 test set to the TALK position.

(d) Adjust the oscillator to obtain "O" reading on DB meter. The oscillator output should be between +6.5 to +7.0 dbm to obtain 0 DB on meter.

(e) Restore the TALK-TEST key on the test set to the TEST position.

Test (B)

3.04 If test is made through equipment at the terminating office provision is made to dial the test termination from the DE-90071-01 test set using the dial hand test set. Plug the handset cord into the TALK & DIAL jack and operate the TALK - TEST key to TEST.

4. METHOD

(A) Return Loss Tests - Incoming Toll Connecting Trunks.

4.01 If the test is being made at the distributing frame (cable head), patch the pair to the LINE IN jack. If the test is being made through the impedance compensator, patch to the HYB IN jack.

4.02 Set the NETWORK switch to 900 ohms.

4.03 When LINE IN jack is used, patch the decade capacitor box to the LINE BO jack. Adjust to capacity value specified for the buildout for cable head tests.

4.04 Insert 328D (600-ohm) plug into the HOLD A-B jack.

4.05 Set the IMPEDANCE switch to 900 ohms.

4.06 Set the SERIES PAD switch to O-DB.

4.07 Set the LINE & N CAPACITOR switch to position 1.07. Set the SERIES CAPACITOR switch to position 1.08 +LO -FREQ. CORR.

4.08 Request the assistant at the originating office to connect the test termination to the trunk to be tested as follows:

Dial Offices

(a) Step-by-step offices apply a 900-ohm termination to the input of the outgoing trunk relay equipment if available or through a proper ratio repeating coil at the distributing frame.

(b) No. 5 crossbar offices apply a 900-ohm termination at the OGT trunk test jack if available or at the distributing frame.

Switchboard

(c) SING test termination at switchboard with the switchboard talk key normal if available or with a 600-ohm termination applied through a repeat coil of the proper ratio at the distributing frame.

4.09 Sweep the oscillator of the 21A transmission measuring set from 300 to 3000 cycles and record the following measurements on Form P2421SC, Trunk Order Test:

(a) The minimum return loss between 300 and 750 cycles.

(b) The minimum return loss between 750 and 2000 cycles.

(c) The return loss at 2000 cycles and each "peak" and "valley" of return loss and the frequency at which they occur up to and including the return loss at 3000 cycles.

(d) Determine that the minimum return loss between 2000 and 3000 cycles equals or exceeds the minimum specified.

4.10 Request the assistant at the distant office to remove the termination, and when no other trunks are to be tested remove the plug and all cords from the test set.

(B) Return Loss Tests - Outgoing Toll Connecting Trunks.

4.11 If the test is being made at the distributing frame (cable head), patch the pair to the LINE IN jack. If the test is being made through the impedance compensator, patch to the HYB IN jack.

4.12 When LINE IN jack is used, patch the decade capacitor box to the LINE BO jack. Adjust to capacity value specified for the buildout for cable head tests.

4.13 Insert 328D (600-ohm) plug into the HOLD A-B jack.

4.14 Set the IMPEDANCE switch and NETWORK switch to 900 ohms.

4.15 Set the SERIES PAD switch to O-DB.

4.16 Set the LINE & N CAPACITOR switch to position 1.07 and set the SERIES CAPACITOR Switch to position 1.08 +LO FREQ. CORR.

4.17 Provide test termination as follows:

(a) If test is made through equipment at the terminating office, operate the TALK-TEST key on the DE-90071-01 test set to TALK and originate a call to the balance test termination or sing test termination. On switchboard trunks request the assistant to restore the talk key to normal. Return the TALK-TEST key on the test set to TEST.

(b) If test is made to the distributing frame in distant office, request the assistant to provide a test termination as follows: (See Figure 1)

(1) Trunks to dial offices - 900 ohms.

(2) Trunks to switchboards - 600 or 900 ohms through proper ratio repeating coil.

4.18 Sweep the oscillator of the 21A transmission measuring set from 300 to 3000 cycles and record the following measurements on Form P2421SC, Trunk Order Test:

(a) The minimum return loss between 300 and 750 cycles.

(b) The minimum return loss between 750 and 2000 cycles.

(c) The return loss at 2000 cycles and each "peak" and "valley" of return loss and the frequency at which they occur up to and including the return loss at 3000 cycles.

(d) Determine that the minimum return loss between 2000 and 3000 cycles equals or exceeds the minimum specified.

4.19 When applicable, request the assistant at the distant office to remove the termination and when no other trunks are to be tested remove the plug and all cords from the test set.

## 5. REPORTS

5.01 The record of these tests should be recorded on Form P2421SC.

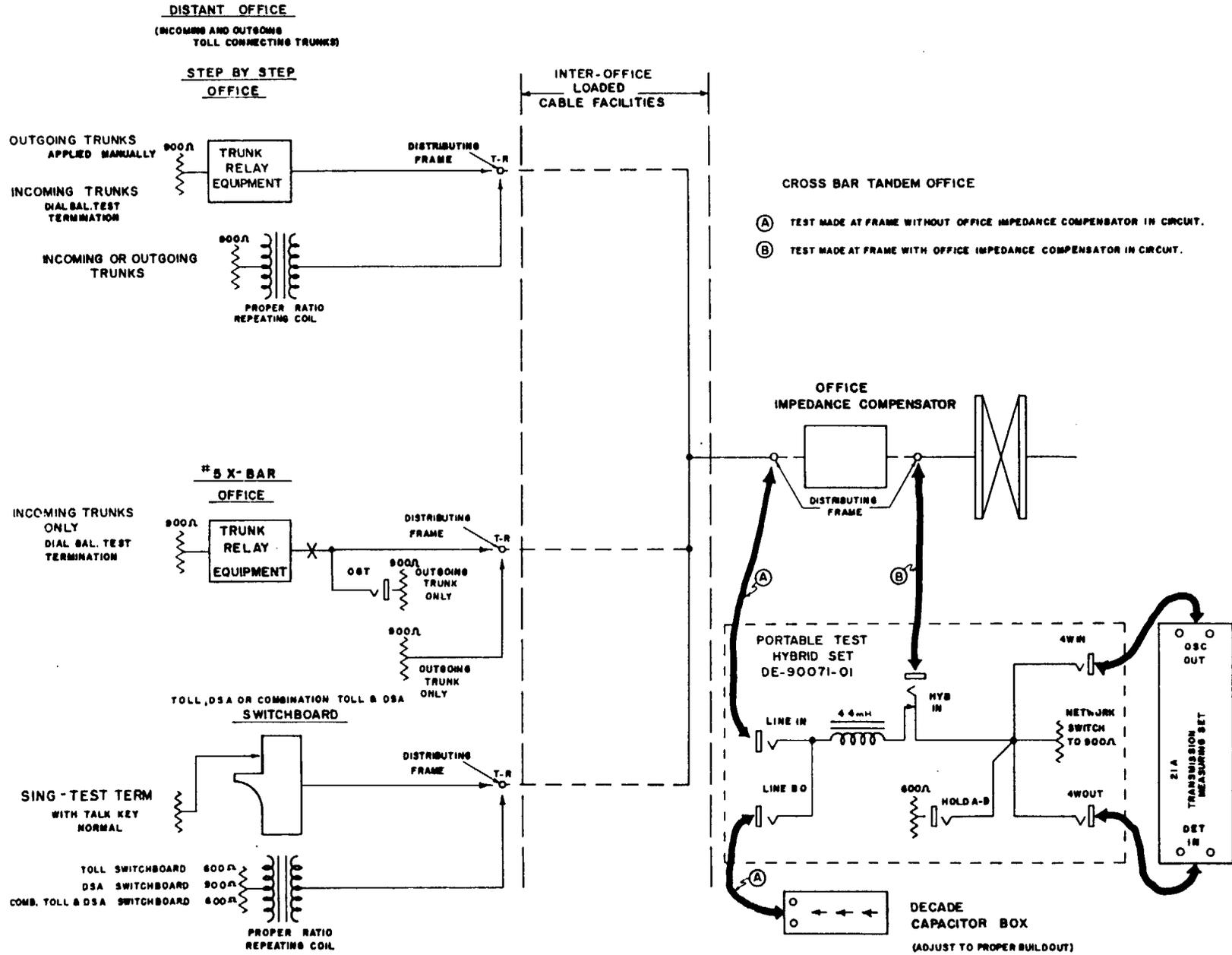


Figure 1 - Return Loss Tests - Test Equipment Arrangement