

PRIVATE LINE TELEPHONE SERVICE
SS-1 SELECTIVE SIGNALING SYSTEM
OVER-ALL TESTS

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1. GENERAL

1.01 This practice outlines the circuit order (service order) and routine transmission and dc tests to be performed on the SS-1 Selective Signaling System.

1.02 Transmission tests on the 4-wire facilities between Telephone Company offices should be performed in accordance with Section 310-405-500. The facilities used for the SS-1 System will be satisfactory if the requirements of the above section are met.

1.03 Transmission tests on the facilities between the Serving Test Center (STC) and the station, as well as transmission tests at the station, should be made in accordance with Section 310-405-500. The tests at the station included in this Section are in addition to any others which may be required in other Sections.

1.04 The SS-1 Selective Signaling System provides equipment arrangements for as many as 81, 2-digit codes. These codes may be assigned for use as station codes, for inter-system dialing between SS-1 Systems and for grouping predesignated stations together for conference calls.

1.05 When it is necessary to take a working SS-1 circuit, or part of circuit out of service for routine tests, notify the control office. It will be the responsibility of the control office to arrange for release periods with the customer.

1.06 The equipment tests on the Keyer, Decoder and SF units should be made in accordance with Section 310-425-501.

2. TESTING APPARATUS

2.01 The following testing equipment, or its equivalent, is recommended for use in the tests outlined in this section. **MAKE SURE THE TEST EQUIPMENT IS WORKING PROPERLY!** It should be calibrated in accordance with the sections covering the equipment. Ample time should be allowed for the apparatus to warm up as this will help to insure stable operation. **DON'T FORGET—A POOR TEST IS A WASTE OF TIME.**

SECTION 310-425-500

2.02 The following test equipment, or equivalent, should be used:

21A Transmission Measuring Set	Wheatstone Bridge
13A Transmission Measuring Set	Volt-Ohm-Milliammeter, KS-14510, L1
200CD Oscillator (Hewlett-Packard)	2B Signaling Test Set

3. D. C. TESTS

3.01 In order for the circuit to signal properly when all of the SS-1 signaling equipment *IS NOT* located at the station, it is important to insure that the TIP and RING conductors are not turned over between the STC and the station. DC continuity tests should therefore be made to the TIP and RING connections of the station equipment. This will insure that the 420G varistor in the signaling equipment is properly connected to the line.

(A) DX Signaling

3.02 DX Signaling is used on the customer's receiving pair when the Keyer is located at the central office and the Decoder is located at the station. The DX Signaling Circuit, SD-95487-01, is used at the station in conjunction with the Signal Lead Extension Circuit SD-95488-01 at the central office. The C, D, and E Resistors of the DX and Signal Lead Extension circuits should be strapped in accordance with the procedure outlined in Chart I. The arrangement for strapping the resistors is shown in Fig. 1. Before this test is performed, the operation of the R relays should be checked for proper per cent make and break in accordance with standard procedures using the 2B Signaling Test Set.

CHART I

STEP	PROCEDURE	REMARKS
1	Disconnect the TIP and RING of the receiving pair at the central office and station. Short the conductors at the station.	
2	Connect a volt-ohm-milliammeter or Wheatstone bridge across the pair at the central office.	Measure resistance and record reading. REQUIREMENT: 5000 ohms or less.
3	Strap C, D and E resistors of each circuit.	REQUIREMENT: Total resistance strapped in each circuit should equal value measured in Step 2 plus 1500 ± 250 ohms. See Fig. 1.
4	Restore circuit to normal.	

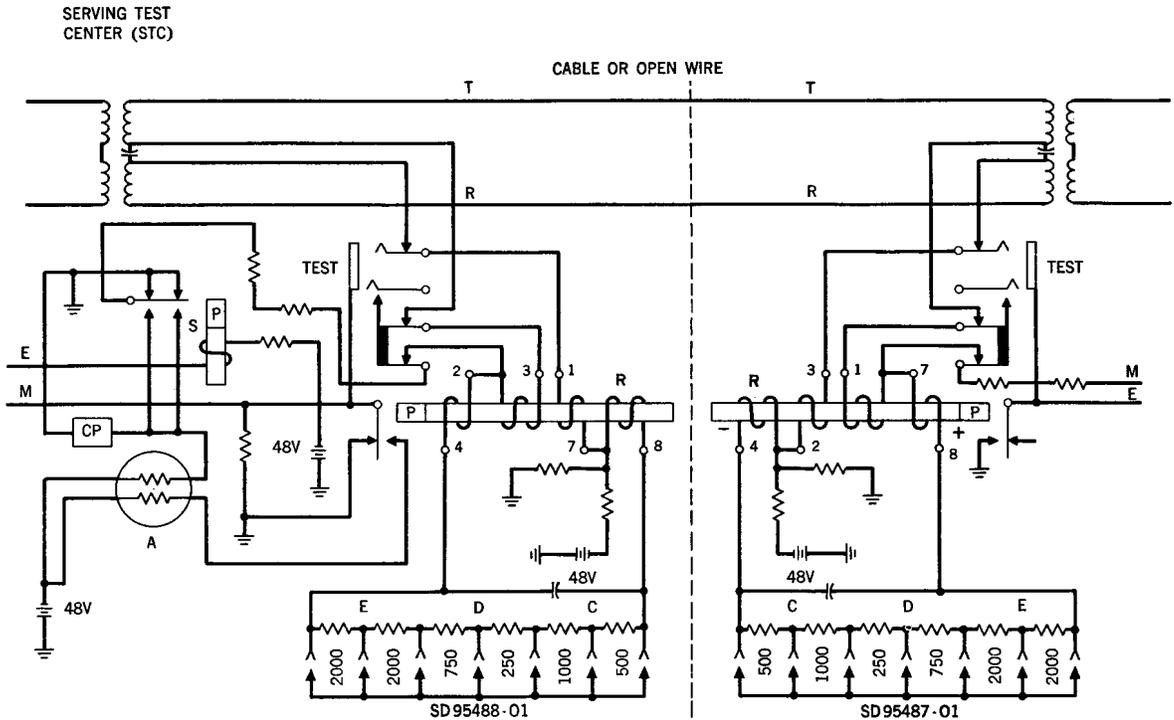


Fig. 1 – Strapping of Resistors in DX Signaling Circuit

(B) Loop Signaling

3.03 The resistance of the loop from the central office to the station should not exceed 4000 ohms. This is required to satisfactorily operate the R relay in the circuit shown in Fig. 2.

3.04 The line current in the loop should be measured and recorded in accordance with Fig. 2. The range selector switch on the volt-ohm-milliammeter test set should be adjusted to the 120 ma. position to protect the meter and then lowered, if necessary, to read the current.

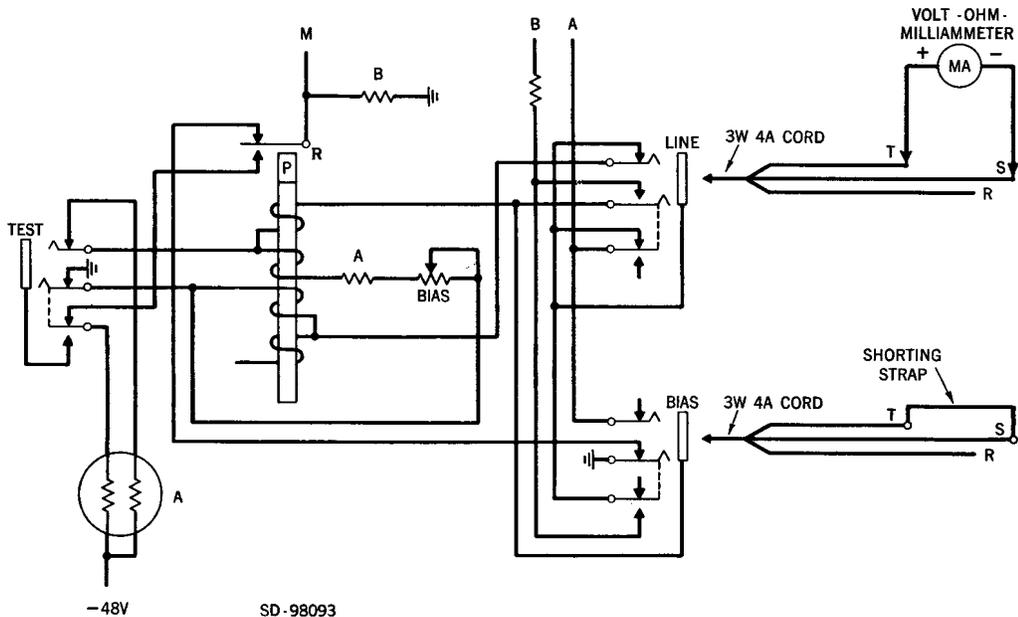
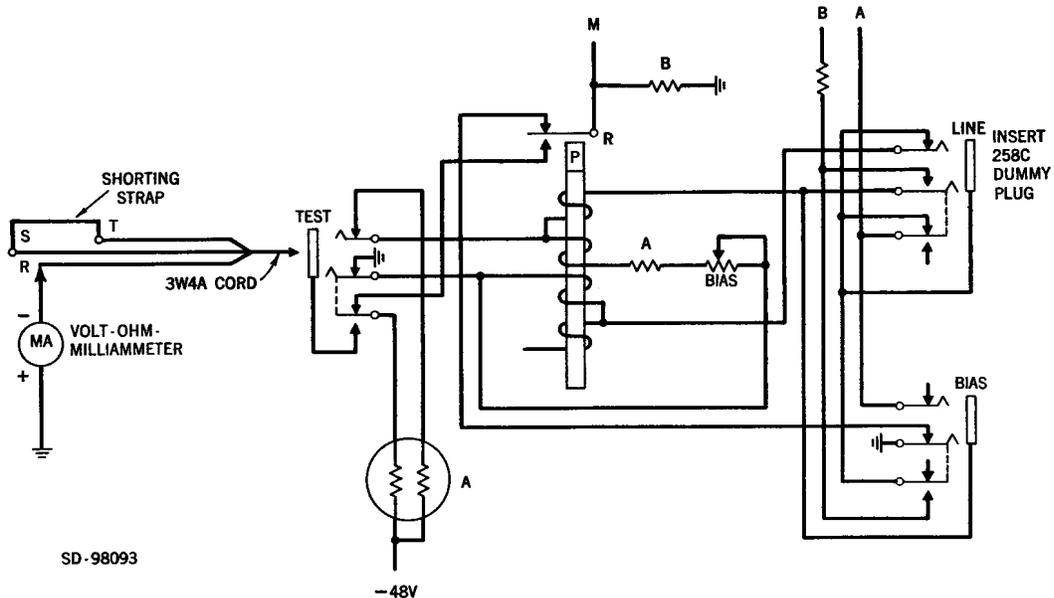


Fig. 2 – Measurement of D.C. Loop Current at the Receiving Relay Circuit



SD-98093

Fig. 3 — Adjustment of D.C. Bias Current on Receiving Relay Circuit

3.05 The D.C. bias current should be adjusted in accordance with the procedure in Chart II. Fig. 3 shows the test setup.

CHART II

STEP	PROCEDURE	REMARKS
1	Connect circuit as shown in Fig. 3.	
2	Insert dummy plug in LINE jack.	
3	Insert cord in TEST jack.	
4	Short TIP and SLEEVE of cord as shown in Fig. 3.	
5	Adjust volt-ohm-milliammeter to read current in milliamps. Connect negative terminal of meter to RING of cord and positive terminal of meter to ground.	REQUIREMENT: Using value of loop current recorded in Par. 3.04, obtain bias current from curve in Fig. 4. Adjust BIAS potentiometer until meter reads this current.
6	Restore circuit normal.	

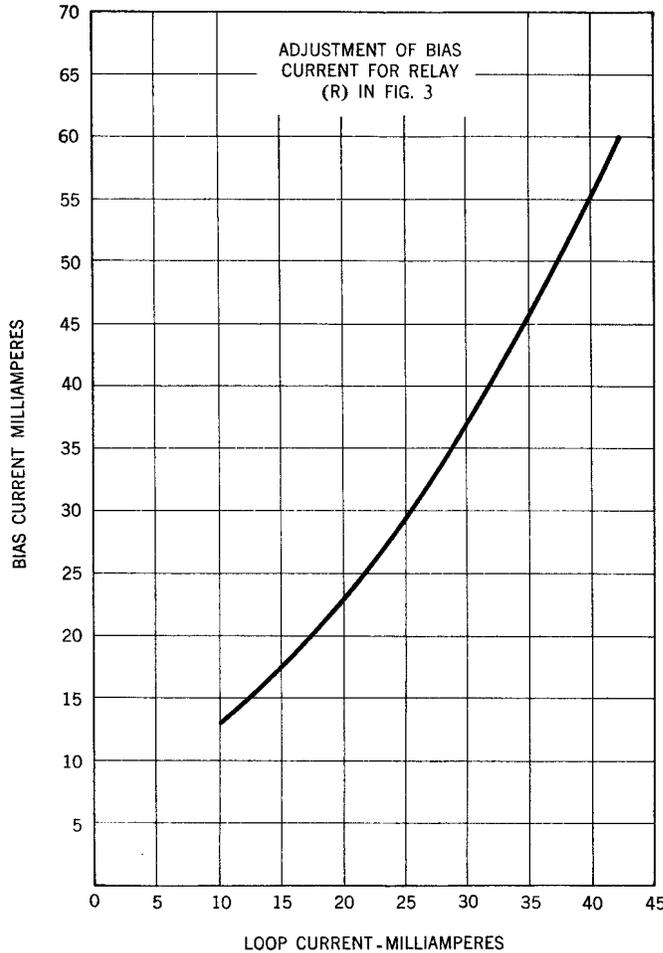


Fig. 4 - Bias vs. Loop Current

(C) Dial Leads

3.06 The maximum resistance of the local wiring for the dial leads should not exceed 200 ohms per conductor. This is the resistance between the sending relay circuit and the 6 TYPE dial, or the 300 TYPE SWITCHING SYSTEM and pertains to either loop or DX signaling.

4. OVER-ALL LOSS OF SIDE LEGS (LOOPS)

4.01 The 1000- and 2600-cycle net loss of the bare telephone facility should be measured between the STC and the customer's premises. **REQUIREMENT:** The measured loss should be within ± 1 db of the value shown on the circuit order card or sketch.

5. OVER-ALL LINEUP OF KEYER CIRCUIT

5.01 If the Keyer is located in the central office, its 2600-cycle level should be adjusted so that it coordinates with other SF tones in the central office. This test should be made in accordance with Chart III and Fig. 5.

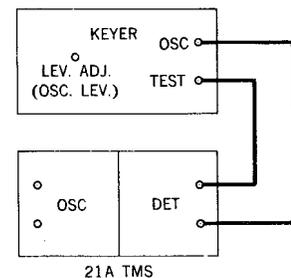


Fig. 5 - Test Setup for Keyer Tests

CHART III		
STEP	PROCEDURE	REMARKS
1	Connect 21A TMS to the OSC TEST jack.	See Fig. 5.
2	Adjust the LEV ADJ (OSC LEV) potentiometer of the Keyer.	REQUIREMENT: TMS shall read level shown on circuit order card or sketch.
3	Restore circuit to normal.	

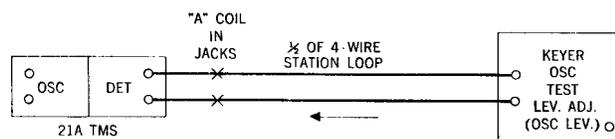


Fig. 6 - Test Setup for Adjusting Level of Keyer Located at Station

CHART IV		
STEP	PROCEDURE	REMARKS
1	Call the Serving Test Center (STC) and request the office to measure the 2600 cycle level of the Keyer.	Measure at "A" COIL IN jacks of 4-wire bridge.
2	Adjust the LEV ADJ (OSC LEV) potentiometer of the Keyer.	REQUIREMENT: See circuit order card or sketch for proper level. KEYER LEVEL AT STATION SHOULD NOT EXCEED 0-DBM.
3	Restore circuit to normal.	

5.02 If the Keyer is located at the customer's premises, the circuit should be lined up in accordance with Chart IV. It is assumed the Keyer meets the requirement of Section 310-425-501. Fig. 6 shows the test setup.

6. OVER-ALL SIGNALING TESTS

6.01 The central office which functions as the STC (Serving Test Center) should dial all stations served by that office prior to making over-all dialing tests with the control office. When the STC has two or more loops, all stations on those

loops should also dial each other to make sure the correct codes are received.

6.02 The control office should request each station to dial an adequate number of stations, grouping codes and inter-system switching codes, when provided, to insure satisfactory operation of the system. The control office should be equipped with the Monitor Circuit, shown in Fig. 26 of SD-98093-01. This will assist the control office in observing that all codes are properly dialed and transmitted and that the correct response to the code is received.

CHART V		
STEP	PROCEDURE	REMARKS
1	When the System is in the normal condition, connect a volt-ohm-milliammeter to the LINE IN (REC) and LINE OUT (TRANS) jacks of the 4-wire bridge at the office. These are the jacks associated with the inter-system switching circuit.	REQUIREMENTS: Meter should read about 600 ohms in both cases.
2	Remove meter.	
3	Dial the inter-system code.	Observe that relay SW operates and locks under control of D relay.
4	Measure the 1000-cycle net loss of the interconnected systems by sending tone in both directions. Test should be made between two most remote offices on the interconnection.	REQUIREMENT: See circuit order card or sketch for net loss.
5	Dial the disconnect code.	Check that D relay releases and then the SW relay.
6	Have several stations on each circuit, dial the inter-system code and station codes on each circuit as well as disconnect code.	Observe that SW relay locks under control of D relay on connect codes, and that correct stations are reached when station codes are dialed. Observe that D relay releases followed by SW relay when disconnect code is dialed.

7. MISCELLANEOUS EQUIPMENT FEATURE TESTS**(A) Inter-System Switching Circuit**

7.01 The purpose of this circuit is to connect two SS-1 Systems together by dialing a predesignated two-digit code. The circuit is shown in Fig. 15 of SD-98093-0107. The operation of the circuit should be checked in accordance with the procedure outlined in Chart V.

(B) Loop Cutoff Relay Circuit

7.02 The Loop Cutoff feature is provided where loop circuit conditions are noisy. This circuit may be used with DX signaling only and is shown in Fig. 16 of SD-98093-0107. Verify that the Loop Cutoff relay is functioning properly by removing hand set from switchhook at station. Observe that SR relay operates at the central office. This closes the transmitting path at the central office and removes a 600-ohm termination from the central office equipment. Replace the hand set on the switchhook at the station. Observe that SR relay opens the transmitting path of the loop and places a termination on the central office equipment.

(C) Central Office Alarm Circuit

7.03 The Keyer, Fig. 3 of Dwg. SD-98093-0104 is designed to transmit 2600/2400 cycle tone signals which follow the dial pulses. A trouble condition may operate the M1 relay of the alarm circuit when provided, causing a lamp to light if provided locally.

7.04 Check the operation of the alarm circuit in accordance with Chart VI.

(D) Station Equipment

7.05 The station equipment should be inspected and maintained in accordance with standard practices. Over-all transmission tests should be made in accordance with Section 310-405-500 to verify that the proper pads are in place and that the over-all losses are in accordance with the circuit order card or service order.

8. TESTING INTERVALS

8.01 The tests outlined in this practice should, where applicable, be performed on all circuit orders. It may be necessary to perform any one or all these tests when clearing trouble. Due to the design of the SS-1 signaling equipment, it is not necessary to perform routine tests on the signaling functions of the circuit.

8.02 Routine transmission tests should be made on the telephone facilities over which the SS-1 equipment operates, in accordance with Section 310-405-500.

8.03 The Single Frequency unit should be routined in accordance with the Section covering the type of S.F. used.

CHART VI

STEP	PROCEDURE	REMARKS
1	Disconnect the Keyer oscillator from the circuit by inserting a 258C dummy plug in the OSC TST jack.	This prevents tone from going out over circuits.
2	Using a 2B signaling test set with all keys normal, patch from D jack of 2B test set to A PLS jack of Keyer circuit.	
3	Operate the TWD key of the 2B test set to ON HK.	Observe that ON1 relay operates and releases after approximately 0.2 second. Relays M1, AUX and PA should operate and remain operated.
4	Operate the TWD key of the 2B test set to OFF HK.	Observe release of M1, AUX and PA relays.
5	Restore circuit to normal.	