

RANGE EXTENSION CIRCUIT (SD-2H145)—TESTS

NO. 2 ELECTRONIC SWITCHING SYSTEM

1. GENERAL

1.01 This section describes the method of testing the range extension (RE) circuit (SD-2H145) used in the No. 2 Electronic Switching System (ESS).

1.02 The RE circuit is used with the unigauge plan to increase the range of the central office to 2500 ohm loop resistance. The circuit provides the required voice amplification and increased battery voltage for the operation of such lines.

1.03 The following tests will be performed.

A. Battery Voltage Increase: This test checks the ability of the RE unit to provide increased battery voltage of 65.75 VDC to 79.5 VDC.

B. Voice Frequency Amplification and Bypass State: This test checks the RE unit for the proper voice frequency amplification of 5 dB in the active state and that minimum loss is present when the circuit is in the bypass state.

1.04 The RE tests are to be performed on a periodic basis in accordance with equipment test list procedures or when malfunction of the circuit is suspected.

1.05 The tests are performed from the trunk test panel (TTP). For more detailed information about the operation of the TTP, refer to Section 232-130-301, Trunk Test Panel—Method of Operation.

1.06 The keys on the TTP may be either a locking or a nonlocking type. In order to differentiate between the two types of keys, the use of a locking type key shall be identified by the words "operate" and "release" and the use of

a nonlocking type key shall be identified by the word "depress" in the ACTION column.

Note: Nonlocking keys require a depression of at least one-half second to insure system recognition.

1.07 Lettered Steps: A letter a, b, c, etc, added to a step number in Part 3 or 4 of this section indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

Note: Equivalent apparatus may be substituted. The test equipment in 2.01 and 2.02 will not be required if the TTP is equipped with this equipment.

2.01 Transmission measuring set (TMS), 23D.

2.02 Variable frequency oscillator (VFO), KS-19353 L4.

2.03 Two 2P4A cord assemblies consisting of a P2B cord 3 feet long with two 310 plugs.

3. PREPARATION

3.01 Refer to the office records to obtain the network number (NN), concentrator group (CG), concentrator (C), B-link (B), and grid (G) of the RE circuit to be tested.

3.02 The following is a step-by-step procedure to make the circuit traffic busy and connect it to the TTP.

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Note: Both sides of the RE unit to be tested are connected to the TTP. The connection must be initiated on access trunk (AT) 1, and AT 2 must be idle. AT 1 will control the peripheral decoder points of the RE unit, and AT 2 will control the peripheral decoder points of the circuit junctor the RE unit is connected through to the TTP. (See Fig. 1.)

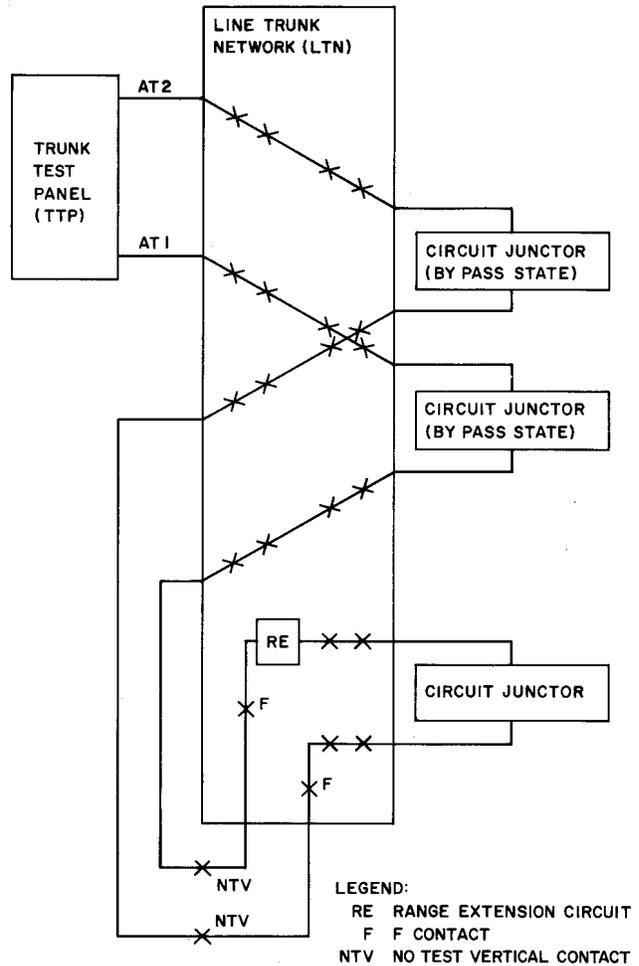


Fig. 1—Test Configuration Using Trunk Test Panel to Test a Range Extension Circuit

STEP	ACTION	VERIFICATION
All Tests		
1	At telephone set on TTP— Operate access trunk 1 key.	
2	Lift handset off-hook, or operate TRFR key at test and control unit if using headset.	Access trunk 1 key lamp lighted. Dial tone received. At ACCESS TRUNK 1 CONTROL— SUPV lamp lighted. TRFR lamp lighted if TRFR key is operated.
3	At TOUCH-TONE® dial— Dial 4 + NN + CG + C + B + G + ST.	At ACCESS TRUNK 1 CONTROL— EQPT ST lamp lighted: Steady—circuit idle. 60 ipm—circuit traffic busy. 120 ipm—circuit maintenance busy.

STEP	ACTION	VERIFICATION
		At ACCESS TRUNK 2 CONTROL— SUPV lamp lighted. At MISC TEST CONTROL— P & E lamp lighted if connection was successful. At TRANSMISSION MEASURING CONTROL— RET lamp lighted.
		Note: If the EQPT ST lamp is flashing at 60 ipm, the P & E lamp is not lighted and the TTP is not connected to the RE unit to be tested.
4	Place handset on-hook, or release TRFR key.	
5a	If P & E lamp is not lighted— Operate RLS key.	
6a	Repeat Steps 2 and 3 until connection is successful.	
4. METHOD		(2) Troubleshoot the circuit which failed.
4.01 If the verification procedure fails or if a malfunctioning circuit is indicated during any part of these tests, proceed as follows.		(3) Replace fully circuit components using standard repair procedures.
(1) Discontinue the test.		(4) Repeat the test that failed. If verification is successful, continue the test.

STEP	ACTION	VERIFICATION
A. Battery Voltage Increase		
7	At ACCESS TRUNK 1 CONTROL— Depress VM key.	VM lamp lighted. At VOLTMETER CONTROL— 100K lamp lighted.
8	At VOLTMETER CONTROL— Operate MET VM key.	MET VM lamp lighted. 100K lamp extinguished.
9	At STATE CHANGE CONTROL— Set PD GROUP switch to 0-5 position.	
10	At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	PERIPHERAL DECODER POINTS 0 and 1 lamps lighted.
11	Depress AT 2 key.	Relays A and B of circuit junctor the RE unit is connected to TTP through operated.
12	At TRANSMISSION MEASURING CONTROL— Depress and hold RET key.	At VOLTMETER— Meter indicates between 42.75V and 52.5V volts. Record this reading for reference use.

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STEP	ACTION	VERIFICATION
13	Release RET key.	At VOLTMETER— Meter indicates 0.
14	At PERIPHERAL DECODER POINTS— Release 1 key.	PERIPHERAL DECODER POINTS 1 lamp extinguished.
15	Depress AT 1 key.	RE unit under test activated.
16	At TRANSMISSION MEASURING CONTROL— Depress and hold RET key. <i>Note:</i> This reading is the increased battery provided by the RE unit.	At VOLTMETER— Meter indicates 25V + 2V higher than in Step 12.
17	Release RET key.	At VOLTMETER— Meter indicates 0.
18	At PERIPHERAL DECODER POINTS— Release 0 key.	PERIPHERAL DECODER POINTS 0 lamp extinguished.
19	Depress AT 1 and AT 2 keys.	RE unit under test and circuit junctor RE unit is connected to TTP through are in bypass state.
20	At ACCESS TRUNK 1 CONTROL and ACCESS TRUNK 2 CONTROL— Depress RLS keys.	At ACCESS TRUNK 1 CONTROL— VM lamp extinguished. SUPV lamp extinguished. At ACCESS TRUNK 2 CONTROL— SUPV lamp extinguished. At MISC TEST CONTROL— P & E lamp extinguished.

B. Voice Frequency Amplification and Bypass

- 7b If TTP is equipped with a VFO and TMS—
Set SEND switch to VFO position; set MEASURE
switch to MEAS 2 position; set TEST SET
switch to TMS position.
- 8c If the TTP is not equipped with a VFO and
TMS—
Connect the 23D TMS to the TM2 jack using
the appropriate cable and plugs. Set INPUT
switch to 900 position; set DIAL MEAS EXT
switch to MEAS position; the ADD DBM switch
will be set as applicable.
- 9c Connect the KS-19353 L4 VFO to the TM1
jack using the appropriate cable and plugs.
Set OUTPUT LEVEL DBM switches to 0
positions; set the FUNCTION switch to 900
position; set POWER switch to ON position.

STEP	ACTION	VERIFICATION
10	At ACCESS TRUNK 1 and 2 CONTROL on TTP— Depress XMSN keys.	XMSN lamps lighted.
11	At TTP or portable instruments— Set ADD DBM switch on TMS to -5 position. Adjust output vernier of VFO for an indication of -6 dB at TMS.	At TMS— TMS meter indicates -6dB.
12	At STATE CHANGE CONTROL— Set PD GROUP switch to 0-5 position.	
13	At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	PERIPHERAL DECODER POINTS 0 and 1 lamps lighted.
14	Depress AT 2 key.	Circuit junctor connected to RE unit in talk state. Relays A and B operated. At TMS— TMS meter indicates between -6 and -6.4 dB. Record this reading for reference use.
15	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— TMS meter indicates $5\text{dB} \pm 1\text{dB}$ higher than in Step 14. RE unit is activated. <i>Note:</i> The difference between this reading and that in step 14 is the gain of the RE unit.
16	Release 0 and 1 keys.	PERIPHERAL DECODER POINTS 0 and 1 lamps extinguished.
17	Depress AT 1 key.	RE unit in bypass state.
18	At TMS— Set ADD DBM switch to -5 position.	At TMS— TMS meter indicates between -6 and -6.4 dB.
19	At TRANSMISSION MEASURING CONTROL— Operate REV TEST key.	REV TEST lamp lighted. At TMS— TMS meter indicates between -6 and -6.4 dB.
20	At PERIPHERAL DECODER POINTS— Operate 0 key.	
21	Repeat Step 15 through 18.	Same as for Steps 15 through 18 except TMS meter indicates $+5\text{dB} \pm 1\text{dB}$ higher than in Step 19 as a verification for Step 15.

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		<i>Note:</i> The difference between the reading in steps 15 and 19 is the gain of the RE unit in the opposite direction from that of the first gain measurement.
22	At PERIPHERAL DECODER POINTS— Depress AT 2 key.	Circuit junctor connected to RE unit in bypass state. At TMS— TMS meter indicates -6 dB.
23	At TRANSMISSION MEASURING CONTROL— Release REV TEST key.	REV TEST lamp extinguished.
24	At ACCESS TRUNK 1 CONTROL and ACCESS TRUNK 2 CONTROL— Operate RLS keys.	XMSN lamps extinguished. SUPV lamps extinguished. At MISC TEST CONTROL— P & E lamp extinguished.
25c	Remove all external test equipment connections.	