2-WAY TRUNK CIRCUIT TO SWITCHBOARD NO. 3CL—(SD-2H110)—TESTS NO. 2 AND NO. 2B ELECTRONIC SWITCHING SYSTEMS

1. GENERAL

1.01 This section provides the procedure for testing a No. 2 and No. 2B Electronic Switching Systems (ESS) 2-way trunk circuit to the No. 3CL switchboard in a distant building.

1.02 This section is reissued to include the EF-2 and 2B-EF-2 generic programs.

1.03 ▶New (conventional) service order codes were adopted for use with the EF-2 and 2B-EF-2 generic programs. However, the translations can be configured with the old (No. 2 ESS unique) service order codes as an option. These old codes are common to all previous No. 2 and No. 2B ESS generic programs. The EF-2 and 2B-EF-2 generic programs can be arranged to recognize either option. In this section the term "conventional (new)" or "No. 2 ESS unique (old)" is used to identify the service order code for the keywords in each TTY input message given.◀

1.04 The purpose of the SD-2H110 circuit is to provide the functions required to handle incoming and outgoing calls between a No. 3CL switchboard and a No. 2 or No. 2B ESS office. This circuit is associated with a peripheral decoder applique circuit (SD-2H170, if in a range extended office, or SD-2H117, if in an office without range extension) used for applying audible ring tone toward the calling party or the operator, depending on whether the call is outgoing or incoming, and for switching control of a bridging switched-gain repeater for use in range extended offices.

1.05 The tests covered are:

A. Circuit State and Scan Point Operation

B. Operation of Bridging Switched-Gain Repeater

Note: All tests require the assistance of an operator at the No. 3CL switchboard. Just prior to beginning the tests, a test call to the operator at the No. 3CL switchboard should be set up to facilitate the tests.

1.06 The 2-way trunk circuit tests are to be performed when a malfunction of the circuit is suspected.

1.07 Whenever the term TOUCH-TONE® telephone service is used, it refers to the equipment required to provide this service to the customer.

1.08 The tests will be performed from the trunk test panel (TTP) in conjunction with the display buffer and teletypewriter (TTY). The keys on the TTP may be either a locking or 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. For more detailed information about the TTP and its operation, refer to Section 232-130-301, Trunk Test Panel—Method of Operation.

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

1.09 ***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 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.

2.01 No. 262C-type plug (Test A).

2.02 Transmission measuring set (TMS) option on TTP or 23A transmission measuring set (Test B). Equivalent apparatus must be capable of measuring power in a 900-ohm circuit at 1 kHz. The accuracy must be ±0.1 dB at 1 kHz at normal room temperature and the range must be from -15 dBm to +10 dBm at 1 kHz.

3. PREPARATION

3.01 Refer to the office records to obtain the following information about the circuit to be tested:

(a) trunk group number (TGN),

(b) member number (MEMN),

(c) scan point number (SPN)

(d) directed scan point number (DSP)

(e) the protector block assignment for the two-way trunk circuit at the protector frame.

3.02 Refer to the office records to obtain the location of the SD-2H117 or SD-2H170 circuit associated with the SD-2H110 circuit being tested. Visual verification of relay states in the peripheral decoder applique circuit is necessary. The associated relay is indicated by parentheses under VERIFICATION in Part 4.

3.03 Verify the scan point numbers obtained from the office records as follows:

At maintenance TTY, type in

A VY:TRK:aaa bbb!

aaa = TGN
bbb = MEMN

The system will respond with the following TTY message:

The system response for offices using No. 2 ESS unique (old) code is as follows:

AR VY TRK aaa bbb
.
.
.
SPN ss rrbb

The system response for offices using conventional (new) code is as follows:

AR VY TRK aaa bbb
.
.
.
SP ss rrbb

ss = scanner number
rr = scanner row
bb = bit in row

The bb bit represents the first ferrod sensor (0) in the scanner row that is associated with the specific circuit. All other ferrod sensors follow in consecutive order, ie, (0, 1, 2, etc). Refer to output message manual OM-2H200 for an explanation of other data fields, if required.

3.04 Use the following procedure to make the trunk circuit traffic busy, connect it to the TTP, and display the ferrod sensors associated with the circuit on the DISPLAY BUFFER.

STEP	ACTION	VERIFICATION
1	At telephone set on TTP— Operate access trunk 1 key.	
2	Lift handset off-hook or operate TRFR key at TEL CKT on TTP if using headset.	At telephone set— Access trunk 1 lamp lighted. At ACCESS TRUNK 1 CONTROL— SUPV lamp lighted.

STEP	ACTION	VERIFICATION
		At TEL CKT— TRFR lamp lighted if TRFR key is operated.
3	At TOUCH-TONE dial— Dial 1 + TGN + MEMN + ST.	At ACCESS TRUNK 1 CONTROL— EQPT ST lamp lighted steadily or flashing at a rate of 120 interruptions per minute. At MISC TEST CONTROL— P & E lamp lighted steadily if connection was successful. ***Note:*** If the EQPT ST lamp is flashing and the P & E lamp is not lighted steadily, the TTP is not connected to the circuit to be tested.
4a	If P & E lamp is not steadily lighted— At ACCESS TRUNK 1 CONTROL— Depress RLS key.	
5a	Repeat Steps 3 and 4a until connection is successful.	
6	Place handset on-hook or release TRFR key.	At telephone set— Access trunk 1 lamp extinguished At TEL CKT— TRFR lamp extinguished. At TRANSMISSION MEASURING CONTROL— CS lamp when lighted indicates on-hook at far end of trunk connected to access trunk 1 when LP key is not operated.

4. METHOD

4.01 If the verification procedure fails or if a malfunctioning circuit is indicated during any part of these tests, proceed as follows.

(1) Discontinue the test.

(2) Troubleshoot the circuit which failed.

(3) Replace faulty circuit components using standard repair procedures.

(4) Repeat the test that failed. If verification is successful, continue the test.

STEP	ACTION	VERIFICATION
A. Circuit State and Scan Point Operations		
7	At STATE CHANGE CONTROL— Set PD GROUP switch to 0-5 position.	
8	At PERIPHERAL DECODER POINTS— Operate 0 and 3 key.	At PERIPHERAL DECODER POINTS— 0 and 3 lamps lighted.
9	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	Audible ring tone received. Relays A (SD-2H110) and A (SD-2H117 or SD-2H170) operated.

STEP	ACTION	VERIFICATION
10b	If audible ring tone is received in Step 9— At PERIPHERAL DECODER POINTS— Release 0 and 3 keys.	At PERIPHERAL DECODER POINTS— 0 and 3 lamps extinguished.
11	Depress AT 1 key.	Audible ring tone removed. Relays A (SD-2H110) and A (SD-2H117 or SD-2H170) released.
12	Place handset on-hook, or release TRFR key if handset was used.	
13	At ACCESS TRUNK 1 CONTROL— Depress VM key.	At ACCESS TRUNK 1 CONTROL— VM lamp lighted. At VOLTMETER CONTROL— 100K lamp lighted.
14	At VOLTMETER CONTROL— Operate GRD key.	At VOLTMETER CONTROL— GRD lamp lighted. At VOLTMETER— Meter indicates 0. A deflection on voltmeter indicates a resistance between the tip and ring leads.
15	At VOLTMETER CONTROL— Release GRD key.	At VOLTMETER CONTROL— GRD lamp extinguished. At VOLTMETER— Meter indicates 0.
16	At VOLTMETER CONTROL— Depress FEMF key.	At VOLTMETER CONTROL— FEMF lamp lighted. 100K lamp extinguished. At VOLTMETER— Meter indicates 0.
17	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted.
18	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At VOLTMETER— Meter indicates between 42 and 53 on 120 volt scale. At circuit under test— Relay B operated.
19	At VOLTMETER CONTROL— Operate TR REV key.	At VOLTMETER CONTROL— TR REV lamp lighted.
20	At VOLTMETER CONTROL— Momentarily operate 100K key.	At VOLTMETER CONTROL— 100K lamp lighted. FEMF lamp extinguished. At VOLTMETER— Meter indicates between 97 and 103 on 120 volt scale.

STEP	ACTION	VERIFICATION
21	At VOLTMETER CONTROL— Release TR REV key.	At VOLTMETER CONTROL— TR REV lamp extinguished.
22	At VOLTMETER CONTROL— Depress MET VM key.	At VOLTMETER CONTROL— MET VM lamp lighted. 100K lamp extinguished. At VOLTMETER— Meter indicates between 42 and 53 on 120 volt scale.
23	At PERIPHERAL DECODER POINTS— Release 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp extinguished.
24	At PERIPHERAL DECODER POINTS— Operate 0 and 2 keys.	At PERIPHERAL DECODER POINTS— 0 lamp lighted. 2 lamp lighted.
25	Via the test call— Notify the operator at the No. 3CL switchboard to expect a seizure signal; request the operator not to respond to the seizure signal.	
26	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Relays A and C operated. Relay B released.
27	At VOLTMETER CONTROL— Operate and release VM REV key.	At VOLTMETER CONTROL— VM REV lamp lighted and extinguished. At VOLTMETER— Meter indicates between 97 and 103 volts on 120-volt scale.
28	At VOLTMETER CONTROL— Momentarily operate 1K key.	At VOLTMETER CONTROL— 1K lamp lighted. MET VM lamp extinguished. At VOLTMETER— Meter indicates between 9.2 and 10.4 volts on the 24 volt scale.
29c	If required voltage is not met in Step 28— Refer to 4.01 for procedures to follow.	Malfunction of C relay and/or its controlling circuit indicated.
30	At PERIPHERAL DECODER POINTS— Release 0 and 2 keys.	At PERIPHERAL DECODER POINTS— 0 lamp extinguished. 2 lamp extinguished.
31	From the TTY printout obtained in 3.03, determine the trunk scanner and the number of the scanner row associated with the scan points assigned to the circuit under test.	

STEP	ACTION	VERIFICATION
32	At maintenance TTY— For No. 2 ESS offices type in: UBRL TS:RSN:ssrr! ss = Number of trunk scanner in decimal (00-11) rr = Number of scanner row to be displayed in decimal (00-63). For No. 2B ESS offices type in: MON:TSSN ssrr:RDT LAMPS! ss = ⧫Number of trunk scanner in decimal (00-11 for the EF-1 generic program) or (00-30 for the 2B-EF-2 generic or later programs)⧫ rr = Number of scanner row to be displayed in decimal (00-63) RDT LAMPS = direct the result to the DISPLAY BUFFER.	Scanner row containing specified scan point displayed on DISPLAY BUFFER lamps. Lamp associated with ferrod sensor 0 lighted.
33	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted.
34	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Relay B operated. Relay A and C released.
35	At front of writing shelf on TTP— Insert No. 262C type plug into ACCESS TRK 1-jack.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished.
36	Remove No. 262C type plug from ACCESS TRK-1 jack.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 lighted.
37	At PERIPHERAL DECODER POINTS— Release 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp extinguished.
38	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Relay B released.
39	At maintenance TTY— For No. 2 ESS offices type in: UB SY:CLB! For No. 2B ESS offices type in: STOP:UTIL!	At DISPLAY BUFFER— Scanner row display removed.
40	Via the test call— Request operator to terminate trunk at office impedance.	At TRANSMISSION MEASURING CONTROL— CS lamp extinguished.
41	Via the test call— Request operator to remove terminating impedance.	At TRANSMISSION MEASURING CONTROL— CS lamp lighted.

STEP	ACTION	VERIFICATION
42	At telephone set— Operate green release key.	Access trunk 1 released.
43	At ACCESS TRUNK 1 CONTROL— Operate RLS key.	At ACCESS TRUNK 1 CONTROL— SUPV, EQPT and VM lamps extinguished. At MISC TEST CONTROL— P & E lamps extinguished. At TRANSMISSION MEASURING CONTROL CS lamp extinguished.

B. Operation of Bridging Switched-Gain Repeater

Note: Refer to Fig. 1 for equipment setup for Test B. If transmission measuring set option is not provided on TTP, the 23A transmission measuring set or equivalent may be used for this test. The INPUT switch on the 23A TMS must be set to 900 and the ADD DBM switch to 0 position. The circuit under test may be accessed through the ACCESS TRK 1 jack on the writing shelf by test equipment not provided on TTP.

7	At PERIPHERAL DECODER POINTS— Set PD GROUP switch to 0-5 position.	
8	At PERIPHERAL DECODER POINTS— Check PERIPHERAL DECODER POINTS keys to ensure that none are operated; release PERIPHERAL DECODER POINTS keys that are operated.	At PERIPHERAL DECODER POINTS— All lamps are extinguished.
9	Via the test call— Request operator to key in 1000 HZ (continuous) TRANSMISSION TEST.	
10	At ACCESS TRUNK 1 CONTROL— Operate XMSN key.	At ACCESS TRUNK 1 CONTROL— XMSN lamp lighted.
11	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted.
12	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	Relays B (SD-2H110) operated.
13	At STATE CHANGE CONTROL— Set SEND switch to OFF position.	
14	At TRANSMISSION MEASURING CONTROL— Set TEST SET switch to TMS.	

STEP	ACTION	VERIFICATION
15	At TRANSMISSION MEASURING CONTROL— Set MEASURE switch to MEAS-1.	TMS meter registers the trunk far-to-near loss.
16	At TRANSMISSION MEASURING SET— Record TMS meter reading. ***Note:*** This value shall be used as the reference value.	
17	At PERIPHERAL DECODER POINTS— Operate 2 and 4 keys.	At PERIPHERAL DECODER POINTS— 2 and 4 lamps lighted.
18	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	Relay C (SD-2H110) operated. Relay A (SD-2H170) operated. TMS meter registers the trunk far-to-near loss after insertion of the bridging switched-gain repeater.
19	At TRANSMISSION MEASURING SET— Record TMS meter reading.	The difference between this TMS meter reading and the reference value should be 5.8 ±0.4 dB. This is the gain of the bridging switched gain repeater.
20d	If gain in Step 19 is within specified limits— Via the test call— Request operator to remove test signal.	
21	At PERIPHERAL DECODER POINTS— Release 1, 2, and 4 keys.	At PERIPHERAL DECODER POINTS— 1, 2, and 4 lamps extinguished.
22	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	Trunk circuit idled. Relay A (SD-2H170) released. Relays B and C (SD-2H110) released.
23	At telephone set on TTP— Operate green release key and place handset on-hook.	Access trunk 1 released.
24	At ACCESS TRUNK 1 CONTROL— Operate RLS key.	At ACCESS TRUNK 1 CONTROL— SUPV, EQPT ST, and XMSN lamps extinguished At MISC TEST CONTROL— P & E lamps extinguished. At TRANSMISSION MEASURING CONTROL— CS lamp extinguished.

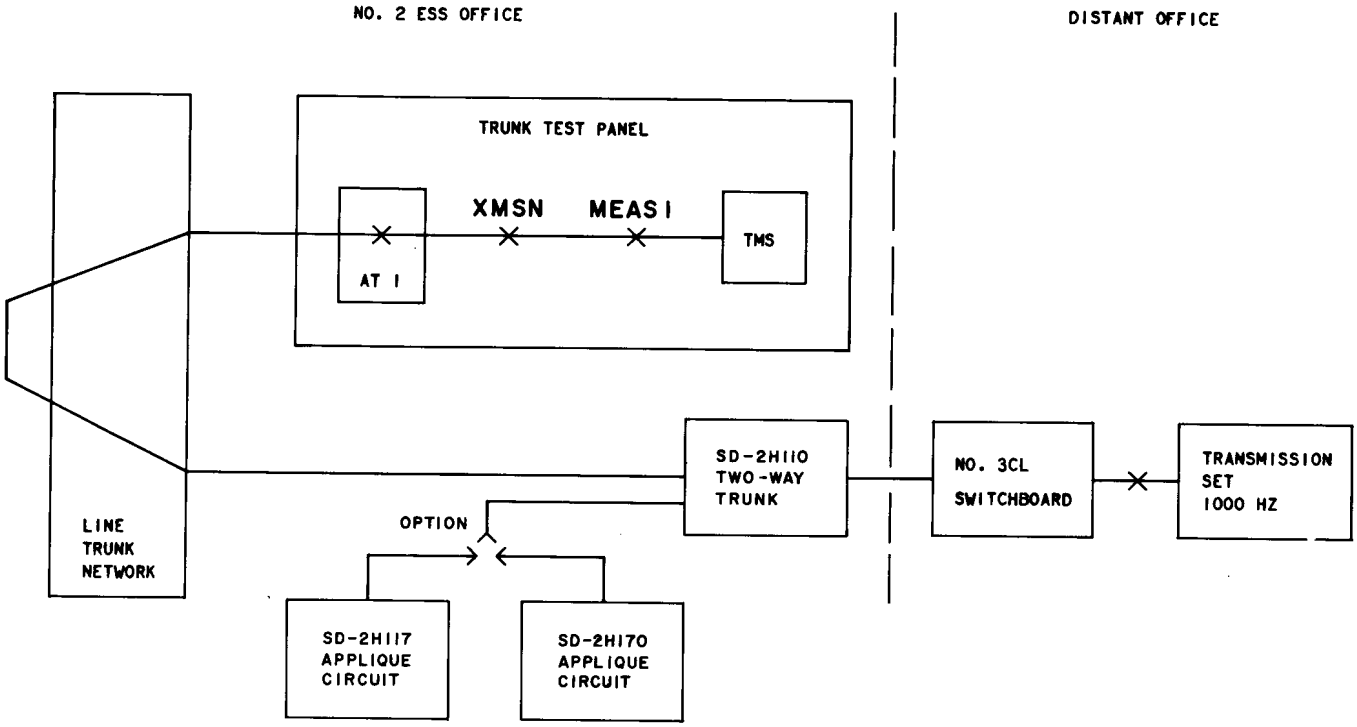

Fig. 1—Equipment Setup for Measuring the Gain of the Bridging Switched—Gain Repeater