

MULTIFREQUENCY TERMINATING SENDER AND ASSOCIATED RECEIVER

TESTS USING AUTOMATIC TERMINATING SENDER TEST CIRCUIT SD-25159-01 NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section covers methods of testing multifrequency terminating senders and associated receivers in No. 1 crossbar offices using the automatic terminating sender test circuit SD-25159-01.

1.02 This section is reissued to include methods of testing multifrequency terminating senders arranged for DID operation to PBX stations using LLP. Part 5 has been added to show the functions of jacks, keys, and lamps. Part 6 has been added to provide a test chart. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests and features covered are:

Sender Tests—

A. Regular Call: This test checks that the sender will complete a regular call with minimum and maximum open and closure of pulses, slow pulses, and the premature advance of the SPF lead.

B. Special Call: This test checks the ability of the sender to accept a demand by the incoming trunk for a special marker and will cause the sender under test to be connected to a special marker.

C. Trouble Release by Link: This test checks the ability of the sender to release on a trouble release signal from the terminating sender link controller circuit.

D. Trouble Release by Marker: This test checks the ability of the sender to release on a trouble release signal from the marker.

E. Trunk Disconnect: This test checks that the sender will restore to normal when a premature disconnect by an incoming trunk is encountered.

F. Timeout: This test checks the timeout feature of the sender.

G. Test of Sender S Lamp: This test checks that the sender will light its associated S lamp at the terminating trouble indicator frame.

H. Reorder on Timeout: This test checks that the sender will time out and call in a marker to route the call to reorder if the pulsing is interrupted.

I. Preliminary Start Signal: This test checks the ability of the sender to route a call to reorder in case of premature start signal.

J. Double Office Indication Test: This test checks that the sender will block upon receiving a double office indication.

K. DID Operation: This test checks that the sender functions properly on a DID-LLP call to a PBX station. On this test the sender records and translates an office indication into a DID number series indication.

MF Receiver Tests

L. Low-Input Test: This test checks the ability of the receiver to operate on weak pulses of minimum duration.

M. Three Frequencies Present: This test checks the ability of the receiver to recognize a third frequency in a digit signal.

N. Keypulse Signal Test: This test checks the ability of the receiver to recognize a false key pulse signal, i.e., a keypulse signal which comes in after the circuit has unlocked and prepared itself for the reception of a digit signal. It also checks that the unlocking circuit has adequate speed and sensitivity.

O. High-Input Test No. 1: This test checks the ability of the receiver to recognize the third frequency in the keypulse signal, that the volume limiting amplifier is operating properly, and that the 700- and 1300-hertz channels are not too sensitive.

P. High-Input Test No. 2: This test checks the ability of the receiver to function properly when the 1500-hertz power is attenuated more than the 700-hertz power and that the sender will transfer properly from one digit to the next on the minimum open period between digits. It also checks the ability of the receiver to disregard a single frequency signal.

1.04 Keys are provided for setting up various operating conditions in order that any possible service call condition may be simulated and the resulting operations checked. The functions of these keys, as well as functions of locating, progress, and trouble lamps, are described in Part 5.

1.05 Arrangements are provided for making a particular test of all MF senders and passing other types of terminating senders if so desired.

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	Restore all test frame keys to normal.	
2	Operate RN key.	All lamps extinguished.
3a	If test circuit does not restore to normal— Momentarily operate CA key.	
4a	Operate RN key.	All lamps extinguished.
5	Restore RN key.	
6b	If <i>end-of-group</i> feature is provided, and is required— Operate EG- key.	

Testing may start with the first or any intermediate sender and testing each sender either once or twice. A test can also be repeated indefinitely on one sender.

1.06 When desired, senders which test busy for a predetermined time may be passed by automatically.

1.07 Lettered Steps: The letters a, b, c, etc, are added to a step number to indicate that the steps cover an action which may or may not be required, depending on local conditions. The conditions under which a lettered step or series of steps should be made are given in the ACTION column, and all steps governed by the same condition are designated by the same letter. Where a condition does not apply, the associated steps should be omitted.

2. APPARATUS

All Test

2.01 Sender test circuit J28051 (SD-25159-01).

Tests B, E, and F

2.02 322A (make-busy) plugs.

Test F

2.03 KS-3008 stopwatch (or equivalent).

STEP	ACTION	VERIFICATION
	<i>Note:</i> The operation of an EG- key will cause the test circuit to block with the EG lamp lighted when all senders associated with the operated EG- key have been tested. Upon receiving the EG lamp during any test, consult the office records and reset the test frame keys as required. Restore the EG- key to allow the test frame to advance.	
7c	If the <i>pass-group</i> feature is provided and it is desired to pass senders having different operating conditions than those for which the test frame is set up— Operate PG- key or keys.	
8	Operate MFS key.	
9	Operate F- key.	
10d	If senders serve more than 10 incoming frames— Operate FA- key.	
11e	If senders serve multioffice terminating units— Operate office indicating keys per Table A.	

TABLE A

TRUNK ARRANGEMENT	OPERATE KEY	OPERATE OFFICE INDIC'G. KEY	TO INDIC. OFFICE
Individual Trunks Only	LOA		A
	LOB OAB		B
Common Trunks Only	None	Yes*	A
	OAB	Yes*	B
Simulating Individual (Both Common and Individual Trunks)	LOC		A
	LOB OAB		B
Simulating Common (Both Common and Individual Trunks)	LOC	Yes*	A
	LOC OAB	Yes*	B

Note: In some multioffice terminating units where there are not more than 10 incoming trunk frames the FA-0 and FA-1 keys are used to indicate office A and office B.

* *Note:* In Tests K through O operate the same office key number as the thousands indication.

SECTION 216-303-501

4. METHOD

STEP	ACTION	VERIFICATION
A. Regular Call		
12	Operate keys as shown on test chart.	
13	Operate ST key. <i>Note:</i> Test 3 using LT key should only be made during light traffic.	Test circuit proceeds to test senders to which it has access. EC lamp lighted. Minor alarm sounds.
14	Restore ST key.	
15	Momentarily operate RN key.	All lamps extinguished. Minor alarm silenced.
B. Special Call		
12	Operate keys as shown on test chart.	
13	Make all special markers busy. <i>Note:</i> Making all special markers busy prevents all special calls from completing.	
14	Operate ST key.	Test circuit blocks with TC lamp lighted.
15	Release one special marker.	Test circuit advances. TC lamp extinguished.
16	Make busy all markers again.	
17	Repeat Steps 15 and 16 for all other senders to be tested.	EC lamp lighted. Minor alarm sounds.
18	Restore ST key.	
19	Momentarily operate RN key.	All lamps extinguished. Minor alarm silenced.
C. Trouble Release by Link		
D. Trouble Release by Marker		
12	Operate keys as shown on test chart.	

STEP	ACTION	VERIFICATION
13	Operate ST key. <i>Note:</i> Test C holds the sender subgroup busy almost continually; Test D holds the marker busy through two marker timeout periods. These tests should be made when traffic conditions permit.	Test circuit proceeds to test senders to which it has access. EC lamp lighted. Minor alarm sounds.
14	Restore ST key.	
15	Momentarily operate RN key.	All lamps extinguished. Minor alarm silenced.

E. Trunk Disconnect

12	Operate keys as shown on test chart.	
13	Place make-busy plugs in HLD jacks of senders to be tested.	
14	Operate ST key. <i>Note:</i> Since this test holds the sender subgroup busy continually, it should be made when traffic conditions permit.	When all senders have been tested— EC lamp lighted. Minor alarm sounds.
15	Remove make-busy plugs from HLD jacks of senders.	
16	Restore ST key.	
17	Momentarily operate RN key.	All lamps extinguished. Minor alarm silenced.

F. Timeout

12	Operate keys as shown in test chart.	
13	Place make-busy plugs in HLD jacks of senders to be tested.	
14	Operate ST key.	KP and RC lamps lighted. Within 14 to 29 seconds— Sender TL lamp lighted. RC lamp extinguished. Within 5 to 12 seconds— Minor alarm sounds.
15	Momentarily operate MGB key.	

SECTION 216-303-501

STEP	ACTION	VERIFICATION
16	Remove make-busy plug from HLD jack of sender tested.	TL lamp extinguished. Minor alarm silenced. S lamp lighted.
17	Momentarily operate AV key.	S and KP lamps extinguished. Test circuit proceeds to test next sender.
18	Repeat Steps 15 through 17.	EC lamp lighted. Minor alarm sounds.
19	Restore ST key.	
20	Operate RN key.	All lamps extinguished. Minor alarm silenced.
G. Test of Sender S Lamp		
H. Reorder on Timeout		
I. Preliminary Start Signal		
12	Operate keys as shown on test chart.	
13	Operate ST key.	At TTI frame, sender S lamp momentarily lighted when sender is seized (Test G only). EC lamp lighted. Minor alarm sounds.
14	Restore ST key.	
15	Momentarily operate RN key.	All lamps extinguished. Minor alarm silenced.
J. Double Office Indication		
12	Operate keys as shown on test chart.	
13	Operate ST key.	Test circuit blocks. RL lamp lighted. Major alarm sounds.
14	Momentarily operate CA key.	Major alarm silenced. RL lamp extinguished. Test circuit advances to next sender and blocks.
15	Repeat Step 14 for all senders to be tested.	EC lamp lighted. Minor alarm sounds.
16	Restore ST key.	
17	Operate RN key.	All lamps extinguished. Minor alarm silenced.

STEP	ACTION	VERIFICATION
K. DID Operation		
L. Low-Input Test		
M. Three Frequencies Present		
N. Keypulse Signal Test		
O. High-Input Test No. 1		
P. High-Input Test No. 2		
12	Operate keys as shown on test chart.	
13	Operate ST key.	Test circuit proceeds to test senders to which it has access. EC lamp lighted. Minor alarm sounds.
14	Restore ST key.	
15	Momentarily operate RN key.	All lamps extinguished. Minor alarm silenced.

5. INTERPRETATION OF JACK, KEY, AND LAMP DESIGNATIONS

5.01 Jacks

JACK	PURPOSE
RC	Remote Control: These jacks are located on the sender frames. Momentary insertion of a make-busy plug causes the CA feature to operate. Used in conjunction with a 32A test set, depression of the red button operates the CA feature. Depression of the white button controls the SS advance.

5.02 Keys

KEY	PURPOSE
ACO	Alarm Cutoff: To prevent or silence the audible alarm.
APB	Automatic Pass Busy: To automatically pass by senders if they remain busy for 29 seconds minimum to 59 seconds maximum.
AV	Advance: To manually advance the test circuit on a step-by-step basis when the SS key is operated, or to advance the test frame to the next sender during timeout tests.
CA	Control Advance: To manually advance the test circuit to the next sender or to restart a repeat test of the same sender, depending upon the position of the REP key.
CL (0-9)	Class: To provide for setting up various classes of test.
DPR	Double Pulse Registered: This key causes pulses with a minimum open period to be transmitted for all digits.
EG (1-4)	End of Group: Operate the key 1-4 associated with the type of sender to be tested. When the test frame has completed the test on the last sender of this type, the EG lamp will light.

KEY
F (0-9)

PURPOSE
Frame: Operate the key (0-9) that corresponds to the units digit of the desired incoming frame indication which is to be transmitted to the sender.

FA (0-2)

Frame Auxiliary: Operate one key (0-2), when provided, to supplement the F key.

FA-O (a) Operate when testing senders arranged to serve more than 10 incoming frames and it is desired to transmit to the sender an incoming frame number of nine or below.

(b) Operate when testing senders arranged to serve 10 or less incoming frames and the associated markers and terminating sender test frame are both arranged to work with senders arranged to serve more than 10 incoming frames.

(c) Operate to indicate to the sender, that office unit A is desired where there are more than 10 incoming trunk frames and the F00 and F10 leads from the link and the F10 lead to the marker are used for indicating the desired office unit.

FA-1 (a) Operate when testing senders arranged to serve more than 10 incoming frames and it is desired to transmit to the sender an incoming frame number of 10 or above.

KEY	PURPOSE	KEY	PURPOSE
	(b) Operate to indicate to the sender, that office unit B is desired where there are more than 10 incoming trunk frames and the F00 and F10 leads from the link and the F10 lead to the marker are used for indicating the desired office unit.	LT	Light Traffic: To check, during periods of light traffic, the TT (regular test) leads of the terminating sender link sender subgroup circuit. Also to check for a premature advance of the P (preference) leads of that circuit. With this key normal, only the RT (reserve test) leads are checked.
FA-2	(a) Operate when testing senders not equipped with F00 and F10 relays and where the associated markers are not equipped with FLO relays, but the terminating sender test frame is arranged to work with other senders and markers which are arranged to serve more than 10 incoming frames.	LL	Low Loss: To remove a high loss pad (HL) from the MF pulsing circuit to provide a high input to the receiver.
		MFS	Multifrequency Sender: To test only MF senders.
		MGB	Make Group Busy: To make busy the sender subgroup to which the test frame is connected, thereby giving preference to the test frame for this subgroup of senders.
		NS (0-9)	Number Series: To check the number series leads grounded to the marker on a DID call.
FKP	False Keypulse: To cause two KP signals to be transmitted to test that the sender will block in case a false preliminary KP signal is received.	OAB	Office A or B: To check that the sender gives the proper office unit indication to the marker when an office unit B indication has been transmitted to the sender.
G (0-1)	Group: To select the associated sender connector switch when the test frame has access to more than 10 sender subgroups.	OI (0-9)	Office Indication: Where the senders are equipped with office indication register, the OI keys are used to transmit an office indication digit in advance of the thousands digit. When this key is used, LOC key must be operated.
H (0-9)	Hundreds: To set up the hundreds registration.	PCR	Particular Circuit Run: To cause the test circuit sender connector switch to advance automatically as long as this key is operated.
IL	Increase Limiter: To cause an increase in the power from the volume limiter of the MF receiver circuit, making the receiver more sensitive to transients.		
LOA LOB LOC	Local Office Indication: To set up the desired office unit information.		

LAMP	PURPOSE
RL	RL Lead: Indicates that the test circuit is waiting for the sender to connect ground to the RL lead.
S	S Lead: Indicates that the test circuit is waiting for the sender to connect ground to the S lead. Also lights, during Test J, when ground is removed from the S lead.
SEL	Selection: Indicates that the test circuit is waiting for the S- relay to operate and connect ground to the S- lead.
SPF	Sender Preference: Indicates that the test circuit is waiting for the operation of the SB- relay to advance the P lead to the next sender in the subgroup chain.
TA	Time Alarm: Indicates that the test was not completed within the allowable interval.

LAMP	PURPOSE
TC	Trunk Closure: Indicates that the test circuit is waiting for the sender to be connected to a marker.
TENS (0-9)	Tens: With units lamp, indicates location of sender being tested.
UNITS (0-9)	Units: With tens lamp, indicates location of sender being tested.

6. PREPARATION OF TEST CHART

- 6.01** Complete the test chart to show the test frame keys to be operated for each test as directed in Table A and the following paragraphs.
- 6.02** Operate one key (0-2), when provided, in the FA group. The functions of the FA keys are described in 5.02.
- 6.03** Tests 1 through 10 check the ability of the receiver and sender to properly register any number in any digit.
- 6.04** Select F- and FA- keys to simulate each equipped sender link frame.

TEST CHART
MULTIFREQUENCY TERMINATING SENDER AND RECEIVER

BSP TEST	TEST NO.	TITLE	TH	H	T	U	F	FA	TEST CLASS	LOA	LOB	LOC	OAB	MISC.
A	1	Regular Call	9	9	9	9	9		0					
	2		8	8	8	8	8		0					SKP
	3		7	7	7	7	7		0					LT
	4		6	6	6	6	6		0					
	5		5	5	5	5	5		0					
	6		4	4	4	4	4		0					
	7		3	3	3	3	3		0					
	8		2	2	2	2	2		0					
	9		1	1	1	1	1		0					
B	10	Special Call	0	0	0	0	0		1					
C	11	Trouble Release By Link	9	9	9	9	9		3					
D	12	Trouble Release By Marker	8	8	8	8	8		4					
E	13	Trunk Disconnect	7	7	7	7	7		5					DPR, REP-2
	14		6	6	6	6	6		9					REP-2
	15		5	5	5	5	5		0					TFT, REP-2
F	16	Timeout	4	4	4	4	4		6					TA
G	17	Sender S Lamp	3	3	3	3	3		0					BAT KEY AT TTI
H	18	Reorder On Timeout	2	2	2	2	2		8					RO
I	19	Preliminary Start Key	1	1	1	—	1		0					LL, RO, DPR (Units key normal)
J	20	Double Office Indication	0	0	0	0	0		0					Note 1
K	21	DID Operation							0					Note 2 NS-, 0I- and LOC or LOA, or LOB + OAB
	22								0					RO + unassigned 0I Note 3
L	23	Low Input Test	1	3	7	7	7		0					
M	24	Three Frequencies Present	4	4	4	4	4		0					RO, LL, TFD
N	25	Key Pulse Signal	3	3	3	3	3		0					RO, FKP
O	26	High Input Test No. 1	7	7	7	7	7		0					TF, IL, LL
P	27	High Input Test No. 2	7	7	7	7	7		0					DPR, LL, TWT, SF

Note 1: If senders serve two terminating units and each unit has its own individual trunks, operate LOA and LOB keys.
If senders serve two terminating units and the trunks are arranged in both common and individual groups, operate LOA and LOC keys.

Note 2: Set up NS-, TH-, H-, T-, U-keys in combination with office indication keys according to local cross-connection records.

Note 3: Set up TH-, H-, T-, U-keys in combination with any unassigned office indication keyed according to local cross-connection records.