

LINE FINDER AND DISTRICT SELECTOR CIRCUITS — SENDER SELECTOR TYPE TESTS USING AUTOMATIC TEST CIRCUIT SD-21438-01 OR ES-239515 PANEL OFFICES

1. GENERAL

1.01 This section describes a method of testing subscriber sender selector type district circuits and particular elements of associated line finder circuits by means of the automatic district selector test circuit ~~SD-21438-01~~ or ES-239515.

1.02 This section is reissued to include the use of recorder circuit ~~SD-21958-01~~ and unguarded interval test set SD-21986-01, and to bring the section up to date. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests covered are:

A. Repeat Coil Out — Call to Operator: This test checks the operation of the district circuits on a repeat coil out basis. The following features are checked: (1) A test is made for reversal of the tip and ring leads to the sender. (2) A test is made for nonstart and overstep of the line finder selector and for an open sleeve. (3) A test is made for false charge. (4) Operate test of the DC relay. (5) A test is made for tip and ring closure through the sender TG relay. (6) A test is made for tip and ring closure in talking to operator position. (7) Tests for sleeve make-busy ground on the back contact of the L relay, either on the district or office circuit, depending upon where the test lines are located. (8) A soak and release test on supervisory relay DC. (9) A test is made to determine that the CS relay releases and that the district selector returns to normal.

Where the test circuit is not arranged for checking an overstep in talking selections, a positive 83-ohm soak is applied to the CS relay of the district circuit, operating this relay and advancing the district circuit to talking to operator position. Where the test circuit is arranged

for checking an overstep in talking selection but not the D adjustment of the CS relay in the district circuit, a negative soak is applied to the CS relay before the test circuit functions to operate it and advance the district circuit to talking to operator position. Where the test circuit is arranged for checking the D adjustment of the CS relay, a resistance capacitor network is placed across the district circuit CS relay and a negative soak is applied to it, after which the test circuit functions to operate this relay and advance the district circuit to the talking to operator position.

B. Repeat Coil In — Charge Test: This test checks the operation of district circuits on a repeat coil in basis and includes a check of the initial features where the district circuits are so arranged. On 2-party district circuits, except flat rate nonmultiple charging district circuits, two tests are made automatically to check the charging arrangements of both parties. On 2-party flat rate nonmultiple charging district circuits, (arranged for flat rate and message rate operation) two tests are made when checking the message rate operation, provided the test circuit is arranged for testing two classes of service in a line group. The following features are checked: (1) An operate test of the DC relay. (2) A hold test of the D relay. (3) A soak and release test of the DC relay. (4) A test of the message register pulse (excepting flat rate district circuits not requiring a message register pulse) and on coin districts, for the coin collect current.

In offices where the test circuit is arranged to check the district circuit for overstep in talking selections, a negative soak is applied to the district circuit CS relay prior to its operating current. In offices where the test circuit is arranged for checking the D adjustment of the district circuit CS relay, a negative soak is applied to this relay along with a resistance capacitor network, prior to its oper-

ating current. The network remains across the CS relay winding during its operation and release.

Note 1: When district circuits are arranged for local control zone registration or non-zone overtime, a test is made for the message register pulse prior to the hold test of the D relay.

Note 2: On flat rate district circuits not requiring a message register pulse, the test circuit is arranged to proceed without making a test for message registration.

Note 3: A second test is made when testing 2-party message rate district circuits and 2-party flat rate district circuits arranged for multicharging. A second test is also made when testing the message rate function of 2-party flat rate district circuits not arranged for multicharging where the test circuit is arranged for testing two classes of service in a line group. In the second test, the test circuit checks the circuit through the district circuit T relay and the message register current for the second party.

C. Repeat Coil In — False Charge Test: This test checks for a false charge condition by simulating a busy-back condition on the CS relay. In case of 2-party district circuits where message registers are involved, a second test is made automatically to check whether the 2-party district circuit recognizes a false permanent ground on the tip side of the line and prevents charging on either register.

D. Remote Control Charge — Operate Test of District Tube: The purpose of this test is to make an operate test of the tube in district circuits arranged for remote control zone registration and a test for false charge. The test proceeds as in Test B. The test circuit avoids making a second test where 2-party district circuits are involved. When the district circuit advances to the first talking position, a test is made of the operating time of tube V and SX relay. After a measured interval, this is followed by a second test of tube V and SX relay. Before release of the district circuit, a check is made to determine that there are no further charges.

E. Remote Control Charge — Nonoperate Test of District Tube: The purpose of this test is to make a nonoperate test of tube V in district circuits arranged for remote control zone registration. The test proceeds as in Test B. When the district circuit advances to the first talking position, a nonoperate test is made on tube V.

F. District Release Test: The purpose of this test is to check the automatic release feature of the district circuit from the time alarm position. The test proceeds as in Test B except after the charge condition is set up, the path through the CS relay in the district circuit is opened and the DC relay in the district circuit is held operated. The test circuit then checks to determine that the district circuit advances out of the talking position within the proper time interval.

G. Repeat Coil In — Timing Test — Initial Interval: The purpose of this test is to determine that the proper number of initial registrations is made, that the initial time interval is correct and that the proper registrations are received at the end of the initial period. This test is made on coin overtime, non-zone overtime, and local control zone registration district circuits. An initial message registration check only is made on 2-party district circuits. On coin district circuits arranged for overtime after the coin collect current has been received at the end of the initial period, a check is made by the test circuit to determine that coin return current is received before the district circuit is released. On nonzone overtime district circuits, a check is made of the holding contact on the district timer.

H. Repeat Coil In — Timing Test — Initial and Overtime Interval: The purpose of this test is to determine that the proper number of initial message registrations is made, that the initial time interval is correct, that registration is made at the beginning of the overtime period, that the overtime interval is correct and that registration is made at the completion of the overtime interval. This test is made on coin overtime, nonzone overtime and local control zone registration. On coin district circuits arranged for overtime and nonzone overtime, only the first charge inter-

val is measured because the succeeding intervals are produced in the same manner. On these district circuits the T1 or T2 key performs the same functions. The check for registration at the beginning of the overtime period will detect failure to charge, an overcharge, but not an undercharge when more than one registration is involved. On 2-party district circuits when testing the second party feature, only a check for the initial message registration is made. On coin district circuits arranged for overtime, after the coin collect current has been received at the end of the initial interval, a check is made by the test circuit to determine that coin return current is received before the district circuit is released. On nonzone overtime district circuits, a check is made of the holding contact on the district timer.

I. Subscriber Disconnect Test: The purpose of this test is to determine on nonzone overtime district circuits, that no overtime charge is received if the called party disconnects immediately prior to completion of the initial period. This test proceeds as described in Test G except that immediately prior to the completion of the initial period, the test circuit opens the circuit to the district circuit CS relay, simulating called party disconnection. The test checks to determine that no subsequent registration takes place, which indicates satisfactory release of the holding contacts on the district timer.

J. Early Wipe-Out Test: The purpose of this test is to check that the district circuit restores to normal in a predetermined interval on a call abandoned after the first digit is dialed. It is primarily a test to detect district D relays which are slow releasing; it will also indicate slow sequence switches.

K. No-Charge Test: The purpose of this test is to check that the district circuit does not charge on calls using the no-charge talking position. The test is made during Test 2 or during Tests 2 and 3 in case of 2-party district circuits.

L. Brush Continuity Test: The purpose of this test is to check for brush continuity of the district selectors. The test will proceed as on a repeat coil in test except that the dis-

trict circuit will not be directed to a test line but will select a trunk either directly or through the medium of an office circuit. The test will proceed on a late release basis, that is, the test circuit will wait a sufficient length of time to permit the district circuit to reach the selection beyond position and will then abandon the call by opening the tip and ring circuit. The return of the district circuit to normal will be the indication to the test circuit that the brush continuity has been found satisfactory.

1.04 Recorder circuit SD-21978-01 is designed to start and control the test circuit on an automatic basis or to control it when started on a manual basis. Detailed information on the operation and functions of the recorder circuit is covered in Section 215-181-501.

1.05 Unguarded interval test set SD-21986-01 is used in conjunction with the test circuit to test for excessively long unguarded intervals on the sleeve terminal of the test line after it has been selected. The test set recognizes, by a signal over the sleeve from the test circuit, when the test line has been selected and when it is made busy by the district circuit. If the selector under test should cause an unguarded interval on the sleeve terminal of the test line in excess of the time limit established by the unguarded interval test set, the unguarded interval test set will indicate a failure and block the test circuit. When this test is made, the test circuit should be arranged to make a repeat coil in test.

Calibration and timing requirements for the unguarded interval test set are covered on SD-21986-01 timing requirements sheet.

Detailed information on the operation and functions of the unguarded interval test set is covered in Section 215-171-301.

1.06 Local instructions should be followed with reference to recording and reporting any register operations caused by performing these tests.

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

SECTION 215-304-501

a series of lettered steps should be made is give 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.

1.08 The remote control feature is provided to observe the actions of a line finder circuit or district circuit under test.

1.09 The test circuit will not function with a line finder emergency start circuit.

1.10 The T-R (tip-ring) jack on the test circuit is provided in order that a check may be made for acoustical disturbances on 2-party district circuits during the progress of a test. When it is required to make this test, connect the listening-in set to the T-R jack.

2. APPARATUS

2.01 Automatic district selector test circuit SD-21438-01 or ES-239515.

2.02 32A test set.

2.03 184B (make busy) plugs, as required.

2.04 Listening-in set, consisting of one R2CF cord, equipped with a 310 plug and two 130 cord tips (2W4A cord), and one 716E or 528 receiver.

2.05 Recorder circuit SD-21978-01.

2.06 Unguarded interval test set, SD-21986-01 and patching cords: one P3K cord, 6 feet long, equipped with two 310 plugs (3P15A cord), one P2J cord, 6 feet long, equipped with two 310 plugs (2P9C cord).

3. PREPARATION

3.01 When using test circuit ES-239515 where both toll diversion and nontoll diversion district circuits are tested with the same test circuit, it will be necessary to operate the TD key when testing nontoll diversion district circuits.

3.02 When using test circuit ES-239515, Tests D, E, G, H and I cannot be made.

3.03 When using test circuit SD-21438-01, Test A can be combined with one of Tests B through I and K. When using test circuit ES-239515, Test A can be combined with one of Tests B, C, F or K. When Test A is combined in this manner, the operation of the RCO-RCI key is not necessary and it will only be required to operate the other keys called for in the individual test to be combined. When tests are combined, it will be necessary to insert 184B plugs as indicated in individual test chart.

3.04 When making Test D or E, it should be determined that the operate test battery or nonoperate test battery is within the required voltage limits as indicated on test battery circuit SD-21902-01.

STEP	ACTION	VERIFICATION
All Tests		
1	Operate LP key.	
2a	If sequence switches or 200-type selectors are off-normal — Operate RN key.	Off-normal sequence switches or 200-type selectors restored to normal. N lamp lights.
3a	Restore RN key.	
4b	If particular circuit test is required — Operate PC and ST keys in order named.	
5b	Determine from particular circuit chart the numbers to be dialed for selecting the district circuit to be reached.	

STEP	ACTION	VERIFICATION
6b	Dial the numbers, momentarily operating STP key each time a dash is shown after a number. Where the particular circuit chart comprises three numbers, after the second number has been dialed and STP key operated momentarily, it will be necessary to dial a 1 and momentarily operate STP key to set the test circuit for proper class of call. When it is necessary to dial a number above 10, dial zero and remainder of the number before operating STP key.	Proper master group and connector progress lamps light.
	<i>Note:</i> To select a particular circuit when recorder circuit is used in conjunction with test circuit on an automatic start basis, it will be necessary to set the test circuit connector switch one terminal ahead of the circuit to be tested.	
7c	If recorder circuit is to be used in conjunction with test circuit — If test circuit is to be started manually — At recorder circuit — Operate associated MST- key.	At recorder circuit — Associated TF- lamp lights when ST key on test circuit is operated.
8d	If test circuit is to be started automatically by recorder circuit — At recorder circuit — Set CL timer for time test circuit is required to start testing.	
9d	Operate associated AST- key. <i>Note:</i> When recorder circuit is used in conjunction with test circuit on an automatic start basis, ST key at the test circuit must be left normal.	At recorder circuit — Associated TF- lamp lights when CL timer contacts close.
10e	If unguarded interval test set is to be used in conjunction with test circuit — Patch unguarded interval test set TST1 jack to test circuit TST1 jack, using P3K cord.	
11e	Patch BAT-GND jack of unguarded interval test set to A jack of test circuit, using P2J cord.	
12e	Operate TMG key of unguarded interval test set for particular unguarded interval required.	

SECTION 215-304-501

STEP ACTION VERIFICATION

13e Operate ST key of unguarded interval test set.

14f If it is required to pass by busy circuit — Operate APB key.

~~Note: If recorder circuit is used in conjunction with test circuit, on either an automatic or manual start basis, the recorder circuit will cause the test circuit to pass by busy circuits on a test circuit time-out basis.~~

15g If repeat tests are required — Operate REP1, REP2, or REP3 key as required. See table below:

TESTS	TEST INDICATING LAMP	REPEAT KEY	REMARKS
A	1	REP 1	
L J K	2	REP 1 REP 2	Using SD-21438 01 Using ES-239515
B to I	2	REP 2	For 2-party districts the lamp and key are for the first party test feature.
B C G H	3	REP 3	Applies only to 2-party districts for second party test feature.

Note: When using the REP 1 or REP 2 key, the PB key must be in the normal position.

16h If remote control is required to observe actions of a particular district circuit — Operate REP- key.

17h Insert plug of 32A test set into D jack of either line finder selector frame or district selector frame.

18h Momentarily operate white button of 32A test set. Test circuit makes repeat tests on district circuit.

4. METHOD

STEP	ACTION	VERIFICATION
Tests A Through L		
19	Operate test keys and insert plugs into office code and zone jacks as indicated in individual test chart.	
20b	If making a particular circuit test — Release PC key.	Test circuit proceeds to test district circuits to which it is directed. BLF lamp lighted indicates a busy district circuit. BY or ALM lamp lights and minor alarm sounds if district circuit is busy for a predetermined time. When all circuits are tested — EC lamp lights. Minor alarm sounds.
21d	If making a particular circuit test, and recorder circuit is used in conjunction with test circuit on an automatic start basis — Release PC and ST keys.	When CL timer contacts close at recorder circuit — Test circuit proceeds to test particular circuits to which it is directed. If end of cycle is reached — Test circuit restored to normal under control of recorder circuit. At recorder circuit — Associated TF- lamp extinguished.
22	If not making a particular circuit test — Operate ST key.	Test circuit proceeds to test district circuits to which it has access. BLF lamp lighted indicates a busy district circuit. BY or ALM lamp lights and minor alarm sounds when district circuit is busy for a predetermined time. When end of cycle is reached — EC lamp lights. Minor alarm sounds.
23d	If not making a particular circuit test, and recorder circuit is used in conjunction with test circuit on an automatic start basis — Release ST key.	When CL timer contacts close at recorder circuit — Test circuit proceeds to test district circuits to which it has access. When all circuits are tested — Test circuit restored to normal under control of recorder circuit. At recorder circuit — Associated TF- lamp extinguished.
24	When testing is finished — Restore ST key.	
25	Operate RN key.	Test circuit restored to normal.
26	Restore RN key.	

SECTION 215-304-501

STEP	ACTION	VERIFICATION
27c	If recorder circuit is used with test circuit on a manual start basis. At recorder circuit — Restore associated MST- key.	
28d	If recorder circuit is used with test circuit on an automatic start basis — At recorder circuit — Restore associated AST- key.	
29e	If unguarded interval test set is used with test circuit — Remove patching cords from A jack and TST1 jack.	
30e	At unguarded interval test set — Restore ST key.	

INDIVIDUAL TEST CHART

TEST	OFFICE CODE	ZONE	KEYS
A	None	None	RCO
B	Notes 1, 5-7	Notes 2, 3 and 4	RCI Note 5
C	Note 1	None	RCI FCH
D	None	None	RCI FCC
E	None	None	RCI RCC FCH
F	Notes 1, 5-7	Notes 2, 3 and 4	RCI DR Note 5
G	Note 8	Notes 9 and 10	RCI T1
H	Note 8	Notes 9 and 10	RCI T2
I	As required	0, 1 or X	RCI SUB DISC T1
J	Local code	None	EWO
*K	Note 11	None	NCH
L	Note 13	None	BC

* See Note 12

Note 1: Insert 184B plugs into proper office code jacks to determine the code to be dialed. For remote control zone registration or nonzone overtime district circuits, test circuit cross connections will determine office code.

Note 2: Nonzone overtime district circuits and district circuits arranged for local control zone registration:

Insert 184B plugs into zone jacks as required to record the proper initial and overtime charge and the time duration of

both initial and overtime period for the code dialed.

Note 3: For message rate district circuits in local control zone registration offices and nonzone overtime district circuits arranged for one initial charge:

Insert 184B plugs into zone jack 0, 1 or X.

Note 4: Flat rate district circuits in local control zone registration offices can be tested for two initial charges by inserting a 184B plug into zone jack 2 or X.

Note 5: When a group of district circuits is arranged for two kinds of service in the same subscriber line group, keys 1, 2 and 3 are provided for control of dialing, giving an indication to the district circuit as to the class of service involved and setting the test circuit to properly test the service arrangement of the district circuit.

It is necessary to send two different non-charge codes to the sender from the test circuit, one which results in a noncharge condition on a flat rate limited service district circuit and one that will result in advancing the district to the charge position when ground is supplied to the FR lead. These two codes will be termed local and extended service codes respectively.

Note 6: Flat rate, nonmulticharge on non-overtime district circuits:

The local codes are dialed by placing 184B plugs into office code jacks.

For the various classes of nonmulticharge nonovertime districts tested, Table A indicates the service arrangement of the district circuit, code sent, whether or not the Z relay in district circuits handling two classes of service is operated, the setting of the test circuit for class of call, the position of key 1, 2 or 3, and the number of test cycles required.

Note 7: Local control zone registration circuits:

Insert 184B plugs into office code jacks for local and extended codes. Either code may or may not result in a charge condition depending upon the service arrangement of the district circuit under test.

For various classes of local control zone registration district circuits, see Table B for the service arrangement of the district circuit, code sent, whether or not the Z relay in district circuits handling two classes of service is operated, the setting of the test circuit for class of call, the zone jack used, the position of key 1 or 3, and the number of test cycles required.

The selection of the code to be sent, the zone jack to be used and the position of key 1 or 3 for testing one condition on a particular type

of district circuit, may cause the test circuit to block when certain other types of district circuits are encountered. In such cases it will be necessary to shift the plug to the proper zone jack as indicated in Table B, for the particular type of district circuit that caused the test circuit to block. The choice of test condition which will result in the least amount of blocking will depend upon the type of district circuits involved in each given office.

Note 8: Coin district circuits arranged for coin overtime or local control zone registration district circuits:

Insert 184B plugs into proper office code jacks.

Note 9: Nonzone overtime districts and districts arranged for local control zone registration:

Insert 184B plug into proper zone jack.

Note 10: Local control zone registration flat rate district circuits arranged for no overtime charges to zone 1 or message rate district circuits arranged for no overtime to zone 0, 1, or X:

Insert 184B plug into zone jack 1.

These features may be tested in Test G or H because the T1 or T2 key performs the same functions in this connection.

Note 11: Insert 184B plugs into proper office code jacks to set the district circuit in no-charge talking position.

Note 12: This test may be used to test district circuits arranged for flat and message rate service in the same line group. Where the flat rate indication is given to the sender by the district circuit Z relay operated, key 3 is also operated. A code, that sets the district circuit in the no-charge talking position for message rate, is also set up on the office code jacks.

Note 13: Select any office code used by customers and insert 184B plugs into corresponding office code jacks. Codes other than those to call indicator or operator trunk should be used to avoid the momentary lighting of an assignment lamp.

TABLE A
FLAT RATE, NONMULT. CHARGE OR NONOVERTIME DISTRICTS

KEY OPERATED SERVICE ARRANGEMENT OF DISTRICT	NONE			# 1			# 2			# 3			MAX. NO. OF TEST CYCLES REQUIRED
	CODE SENT	Z RELAY	TEST FRAME CLASS										
Flat Rate Limited Service	(A)Local	None	Flat Rate	(A)Local	None	Flat Rate	(A)Local	None	Flat Rate	(B)Extended	None	Message Rate	2
Flat Rate Extended Service	(A)Local	None	Flat Rate	(A)Local	None	Flat Rate	(A)Local	None	Flat Rate	(B)Extended	None	Flat Rate	1 (Note 1)
Message Rate Service (District Advances to 2nd Talking Position)	(A)Local	None	Message Rate	1									
Flat Rate Limited and Flat Rate Extended Service	Local	Normal	Flat Rate	(A)Local	Operated	Flat Rate	(B)Extended	Normal	Flat Rate	(C)Extended	Operated	Message Rate	3
Flat Rate Limited and Message Rate Service	(A)Local	Normal	Flat Rate	(B)Local	Operated	Message Rate	(C)Extended	Normal	Message Rate	(B)Local	Operated	Message Rate	3
Flat Rate Extended and Message Rate Service	(A)Local	Normal	Flat Rate	(B)Local	Operated	Message Rate	(A)Extended	Normal	Flat Rate	(B)Local	Operated	Message Rate	2

General Note: For a particular type of district circuit, similarly bracketed letters indicate that a choice may be made of the key-operated conditions for one cycle of the number of test cycles required.

Note 1: If the sender group is arranged to handle only one type of flat rate service, one of conditions (A) or one of conditions (B) may be used. If the sender group is arranged to handle flat rate limited and flat rate extended service, one of conditions (B) should be used.

TABLE B

LOCAL CONTROL ZONE REGISTRATION DISTRICTS

KEY OPERATED	NONE				#1 (OR #3)				MAX. NO. OF TEST CYCLES REQUIRED
	SERVICE ARRANGEMENT OF DISTRICT	CODE SENT	Z RELAY	TEST FRAME CLASS	ZONE JACK	CODE SENT	Z RELAY	TEST FRAME CLASS	
Flat Rate Limited Service	(A) Local	None	Message Rate	0	(A) Local	None	Message Rate	0	2
	(B) Extended	None	Message Rate	1	(B) Extended	None	Message Rate	1	
Flat Rate Extended Service	(A) Local	None	Message Rate	0	(A) Local	None	Message Rate	0	1 (Note 1)
	(B) Extended	None	Message Rate	0	(B) Extended	None	Message Rate	0	
Message Rate Service (District Advances to 2nd Talking Position)	(A) Local	None	Message Rate	0, 1 or X	(A) Local	None	Message Rate	0, 1 or X	1
	(A) Extended	None	Message Rate	0, 1 or X	(A) Extended	None	Message Rate	0, 1 or X	
Flat Rate Limited and Flat Extended Service	Local	Normal	Message Rate	0	(B) Local	Operated	Message Rate	0	3
	(A) Extended	Normal	Message Rate	0	(C) Extended	Operated	Message Rate	1	
Flat Rate Limited and Message Rate Service	(A) Local	Normal	Message Rate	0	(C) Local	Operated	Message Rate	1	3
	(B) Extended	Normal	Message Rate	1	(C) Extended	Operated	Message Rate	1	
Flat Rate Extended and Message Rate Service	(A) Local	Normal	Message Rate	0	(B) Local	Operated	Message Rate	1	2
	(A) Extended	Normal	Message Rate	0	(B) Extended	Operated	Message Rate	1	

General Note: For a particular type of district circuit, similarly bracketed letters indicate that a choice may be made of the code sent or key-operated conditions for one cycle of the number of test cycles required.

The table indicates the zone jacks it is necessary to use to test the charge features of the district selector circuits. In addition to the tests outlined in the table, it will be necessary to test the district selector circuits using zone jacks 2 through 5 where these zoning arrangements are in use in order to test the zone and overtime features of the zone registration circuit associated with each district selector circuit.

Note 1: If the sender group is arranged to handle only one type of flat rate service, one of conditions (A) or one of conditions (B) may be used. If the sender group is arranged to handle flat rate limited and flat rate extended service, one of conditions (B) should be used.