DISTRICT JUNCTOR TESTS

CONTENTS

1. GENERAL

1.1 Description of Test: This section covers the routine and supplementary tests of subscriber district junctor circuits. The routine tests and certain supplementary operating tests are made with the automatic test circuit SD-25158-01.

1.2 Test Sequence: The following circuits are used in testing district junctors and should be in working condition before the routine tests of the district junctors are started: Subscriber sender link, subscriber sender, marker connector, originating marker, district link, office link, coin supervisory link, and coin supervisory circuits.

1.3 A circuit test is one of the single routine tests (charge or early disconnect or operator, etc.) applied once to one district junctor circuit.

1.4 Records: ID-1313, 1315 and 1334 trouble records are required to record the results of these tests. For further information on records see Handbook 50, Section 3.

1.5 Requirements: Section 3 lists all the tests to be made on these circuits together with the performance requirements.

2. TESTING EQUIPMENT

2.1 Test Sets and Accessories

Amt	Code	Description	With ITE
ϕ 1	ITE-4073	Z.R. Test Set	
1	ITE-4034	Ohmmeter	
≠ 1	ITE-9627	Remote Control Cord	4023
As Req	298A	Make Busy Plugs	4023
1	ITE-8253	Contact Protection Test Set	4023

ϕ Optional, may be used at same time as the test frame to speed up testing of local timing.

≠ The 32A test set furnished with the test frame may be used in place of ITE-9627.

2.2 Cords Required with ITE-4073

Amt	ITE	Lgth	Cdrs	One End	Other End	With ITE
2	9598	12'	2	110 Plug	110 Plug	%4023
3	9639	12'	3	110 Plug	3-ITE-2455 Plugs	%4034
1	9775	12'	6	2-110 Plugs	325 Type Plug	4073
2	9952	12'	20	2-Recep. Plugs	20 Pt. Fixt.	4073
1	9547	12'	1	ITE-2455 Plug	ITE-2455 Plug	%4023
1	9601	12'	3	310 Plug	310 Plug	%4023

% Crossbar Test Accessory Set.

3. MANUAL SUPPLEMENTARY TESTS

3.1 Fusing

Talking Battery Filter Fuses

NOTE: The talking battery filter circuit is shown on the miscellaneous circuit for district junctor frames. It is not advisable to place these fuses until the power plant is operating on a 24 hour basis.

3.11 Before placing the 20 ampere fuses of the filter circuit or the 1-1/3 ampere fuses (FC1 and FC2) on the frame fuse panel, connect a 25 or 60 watt, 110 volt, lamp across the fuse posts for the 20 ampere fuse. When the lamp dims appreciably disconnect the lamp and install the 20 ampere fuse. Then install the associated 1-1/3 ampere fuse (FC1 and FC2).

20 Ampere Fuses

3.12 Before placing the 20 ampere fuse for each side of the frame check that the fuse contacts are free from crosses and ground.

Circuit Fuses

3.13 Check each fuse post for crosses and ground.

3.14 Verify at one point that each fuse is associated with its proper circuit.

NOTE: Include the test of A switchboard district junctor circuit fuses.

Ground Bar

3.15 In order to detect imperfect or missing ground connections on district junctor frames perform the following tests on each district junctor frame.

NOTE: On district junctor frames which include operators districts such as SD-25021-01 or SD-25481-01 all SL relays in the unit must be blocked operated to eliminate any back up over the register lead thru the normal contacts of the SL relays. The test may be made in conjunction with the tests per Handbook 61, Section 124 Paragraph 4.23 or Section 125, Paragraph 6.11 respectively.

3.151 Using a receiver R-9572, connect one end to 48V battery thru a fuse. Touch the other end to the vertical ground bar several times on each equipped unit on the district junctor frame. Do not place receiver directly on ear when making this test. Loud clear clicks should be heard. The absence of loud clear clicks indicate missing ground connections.

3.152 Move the connection from the battery to a solid ground, preferably the horizontal ground bar at top of frame, making sure that good contact is made. Again touch the pick to each unit ground bar. No click or noise of any kind should be heard in the test reciever. If no clicks are heard in the receiver it should be placed directly on the ear and the test per this paragraph repeated. If any click or noise is heard in the receiver when performing this test, it is an indication of a poor connection or missing strap between units or in the connection from the vertical bar to the horizontal ground bar at the top of the frame.

3.152 If the tests described in Paragraphs 3.151 and 3.152 indicate imperfect or missing ground connections, the contact surfaces involved shall be cleaned, screws tightened, or missing connections added, as necessary.

3.2 Contact Protection and Number Check Path (Figure 1)

3.21 Check the following contact protection circuits using the method described in Section 2 of Handbook 50. The condensers and resistances composing the following contact protection circuits are located on the sender link frame and the interrupter checking circuit associated with the district junctor frame. Insulate the B and F contacts of the CH interrupter while making this test. The following circuits are equivalent circuits and may be checked one against the other, except the B condenser which can be checked against an equivalent B circuit.

C.P. Cond.	Ckt. Rest.	Type of Circuit	Connect to
OB	160W	Normally Charged	1T & 2T, Relay OB
EB	160W	"	" " " " EB
OF	160W	"	" " " " OF
EF	160W	"	" " " " EF
B	B	"	4T " Z

3.22 On district junctors arranged for number checking (Figure 1, SD-25210-011) test the number checking path with the contact protection test set. Test as a normally discharged contact protection circuit (Figure 7 of Section 2, Handbook 50). Block OT2 relay operated. Insulate 8T and connect to 7T of OT2 relay.

3.3 Check of 10 Ohm Sleeve Resistance

3.31 Set the Switches of the ohmmeter for DC and RES. Connect cords to terminals R and X of the ohmmeter.

3.32 Connect one lead of the ohmmeter to the number 2 punching (sleeve) on the vertical terminal strip on the unit. Connect the other lead to the sleeve lead at ind. punching 10 on the vertical T.S. on unit (ind. punching 16 when arranged for local timing and zone registration and for coin districts).

3.33 Observe that the ohmmeter reads:

Min. 9 ohms - Max. 11.0 ohms.

3.34 When this circuit (SD-25210-011) is arranged for number checking (R wiring) perform test operations 3.31 to 3.33 and then connect one lead of the ohmmeter to the ind. punching 16 on vertical T.S. on unit and the other lead to the 1B contact of the OT2 relay. Observe that the ohmmeter reads min. 18 ohms - max. 21 ohms.

3.4 Check of 650 Ohm Winding of F Relays

NOTE: This test is not made on coin district junctor circuits.

3.41 Set the switches of the ohmmeter for DC and RES. Connect cords to terminals R x 10 and X of the ohmmeter.

3.42 Connect one lead of the ohmmeter to the number 14 punching (lead MR) or 15 punching (lead MR1), MISC punchings for the odd numbered district link primary switches on the unit, or to the number 6 or 7 punching, MISC punchings for the even numbered district link primary switches, on the horizontal terminal strip on the unit. Each of these connections is used for testing 10 districts on the unit. Connect the other lead of the ohmmeter to the 4 bottom or 13 top (winding) spring of each F relay in turn in the group of 10 being tested.

3.43 Observe that the ohmmeter reads:

Max. 725 ohms - Min. 570 ohms

3.5 District Junctor Interrupter Checking Circuit

3.51 Block the first interrupter relay OB in the nonoperated position to prevent the 1 and 2 bottom springs from making when operate ground is applied to the relay. Observe that the PC lamp lights and the alarm operates. Remove the block and momentarily operate the RL key to extinguish the PC lamp and to retire the alarm.

3.52 Block the first OF relay in the operated position. This prevents the first OB relay from operating and causes the PC lamp to light and the alarm to sound as described in 3.51. Remove the block and retire the alarm.

3.53 All OB relays on a district junctor frame have their 1 and 2 bottom springs wired in a chain checking circuit and their operate paths thru break contacts of similarly numbered OF relays. These circuits should be verified as described in 3.51 and 3.52.

3.54 Repeat the tests per 3.51 and 3.52 on the EB, OF and EF interrupter relays on the district frame. These relays have their 1 and 2 bottom springs wired in a chain checking circuit and the OF relays operate through break contacts of the OB relays, the EB relays through break contacts of EF relays and the EF relays through break contacts of EB relays.

3.6 Automatic Release & False Automatic Release

3.61 Non Coin Junctors

3.611 At the subscriber sender link frame insert a make busy plug into the MB jack associated with the group of twenty district junctors to be tested. At the unit vertical terminal strip, using bare strap wire or alligator clips, short-circuit the tips and rings of the twenty circuits. This may be done with continuous wire since it is not necessary to separate the circuits.

3.612 Insulate the F contact of the RF interrupter. Verify the ST lead from each district junctor to the associated timed release circuit by momentarily operating the CH relay of the district junctor and checking that ground is present on spring 1B of relay RL of the release circuit while relay CH is operated. Note that the ground may be removed by manually operating CS relay. Observe that the RL relay does not operate.

3.613 Manually operate each T and CH relay of the twenty circuits in the group and note that they lock. Remove the insulation from the RF interrupter. The RL relay will operate and lock when the RF interrupter contact makes. Observe that the twenty circuits restore to normal when the RB interrupter contact makes after the operation of the RL relay. This action will be delayed about 1 minute if the interrupters are equipped per Figure G or about 2 minutes if the interrupters are equipped per Figure F. If one of the interrupters is reversed or the B lead falsely grounded the circuits will release immediately after the operation of RL relay. If the two interrupters are reversed the circuits will release within 2 to 4 seconds.

3.614 Remove strap wire and the make busy plug.

3.62 Coin Junctors

3.621 At the subscriber sender link frame insert a make busy plug into the MB jack associated with the group of twenty district junctors to be tested. Block the CC relays of the twenty circuits normal to prevent calling in the coin supervisory circuit. Strap tips and rings of twenty circuits at punchings 0 and 1 on the unit vertical terminal strip.

3.622 Insulate F contact of RF interrupter. Check the ST lead from each district junctor by manually operating the associated CH relay and checking ground is present at 1B contact of relay RL while the CH relay is operated. Note that ground may be removed by manually operating relay CS. Release each CH relay before operating the next. This may be done by momentarily operating the SP relay of the same circuit. Disregard the operation of the T relays when CH is operated. Observe that the RL relay does not operate.

3.623 On district junctors arranged for coin overtime repeat the test of the ST leads by momentarily operating the OM relay and checking for ground at 1B of RL relay while the OM relay is operated.

3.624 Manually operate each CH relay of the twenty circuits in the group. The CH relays lock and the T relays operate. If any RL lead is falsely grounded the associated OT relay will operate and lock.

3.625 Remove the insulation from the RF interrupter. The RL relay will operate and lock when the RF interrupter contact makes. Observe that the OT relay in each circuit operates and locks and the S relay releases when the RB interrupter contact makes after the operation of the RL relay. This action will be delayed about 1 minute if the interrupters are equipped per Figure H or about 2 minutes if the interrupters are equipped per Figure G. If one of the interrupters is reversed or the B lead falsely grounded the OT relays will operate immediately after the operation of the RL relay. If the two interrupters are reversed the OT relays will operate within 2 to 4 seconds.

3.626 Manually operate the SP relays to release the circuits. Remove relay blocks, straps, and make busy plug.

3.7 Crosses at Relays EB, OB, EF and OF

NOTE: 1T and 2T contacts were tested for false continuity in Paragraph 3.5.

3.71 Test that the relay contacts in the following chart are free from resistance battery. This checks false continuity through the relay contacts to the I relays. Momentarily ground the contacts as indicated and observe the results. When making TEST 1 observe that the I relay operates as indicated and that the associated CH relay does not operate. Also observe that the I relays do not operate in the other circuits of the sub-group. When making TEST 2 observe that CH relay operates as indicated and that the CH relays do not operate in the other circuits of the sub-group.

NOTE: When making TEST 2 on coin junctors release the CH relay by momentarily operating the associated SP relay before grounding the next contact.

Momentarily Ground Contact of EB or OB	TEST 1 EB or OB Operated		TEST 2 EB and EF or OB and OF Operated	
	I Relay	CH Relay	I Relay	CH Relay
12T	0	-	0	0
10T	1	-	1	1
8T	2	-	2	2
6T	3	-	3	3
4T	4	-	4	4
4B	5	-	5	5
6B	6	-	6	6
8B	7	-	7	7
10B	8	-	8	8
12B	9	-	9	9

NOTE: When testing on EB the relays in the even sub-group are operated and when testing on OB the odd sub-group is used.

3.8 Check of T Wiring

3.81 Check for absence of ground on contact 3 of coin timers.

3.9 Miscellaneous Circuits

3.91 Check miscellaneous circuits not checked on other tests as follows: (1) test battery supply, (2) fuse alarm. Check that the fuse alarm is not stopped when the FA, FC1, FC2 or 20A lamps are burned out or removed, (3) spare jack to MDF, and (4) frame line circuit.

4. CH INTERRUPTER TEST

4.1 Insulate the front and back contacts of the CH interrupters associated with the district junctor frame under test.

4.2 Ground the back contact of the odd interrupter and observe that the OB relays operate. Remove ground.

4.3 Ground the front contact of the odd interrupter and observe that the OF relays operate. Remove ground.

4.4 Repeat operations of Paragraphs 4.2 and 4.3 using the back and front contacts of the even interrupter, observing that the EB and EF relays operate respectively.

4.5 Remove insulation from CH interrupters.

5. ROUTINE TEST

NOTE: To reduce testing time, test set ITE-4073 may be used to make charge call and timing tests. With the setup per Paragraph 6 the test frame and the ITE-4073 test set may be used without interference.

5.1 Failure Indications

5.11 If a trouble is encountered the test circuit stops and TA lamp lights. Refer to the lamp signals provided on the test frame and to Section 121 for indications regarding the character of the trouble. Where a particular trouble or progress lamp is not lighted, note the class of test, class of district junctor circuit, and position of the TST selector on the test frame.

5.2 Charge Call

5.21 When testing two-party districts every other routine cycle should be made with the TPC key operated and the LC key normal, or if both keys are operated two cycles of test are made on these districts. When testing districts equipped for zone service every other cycle should be made with the Z key operated and the LC key normal, for if both keys are operated, two cycles of test are made on these districts.

5.22 When testing coin districts observe that each coin supervisory circuit is used at least once. The lighted (COIN-L)O-39 lamp indicates the coin supervisory circuit used.

5.23 Operate the LC key, the TPC or Z key as described in Paragraph 5.21 and then operate the ST key. The EC lamp lights at the end of the cycle unless a trouble is encountered. Restore the test circuit to normal when the EC lamp lights.

5.3 Early Disconnect

5.31 The purpose of this test is to check the operation of the district junctor circuit in those cases where the call is abandoned after the office code has been dialed and the originating marker circuit has completed its functions, but before the sender circuit has made trunk. test.

5.32 Operate the DSC key and then operate the ST key. The EC lamp lights at the end of the cycle unless trouble is encountered. Restore the test circuit to normal when the EC lamp lights.

NOTE: In offices where the senders are of the timed release type, on one cycle of test a visual check shall be made to verify the correct operation of the I relay.

5.4 Operator and Condenser Tests

5.41 Operator call test (Paragraph 5.43) and condenser test (Paragraph 5.44) shall be made on alternate routine cycles.

5.42 On one cycle of test (either the operator or condenser test) use the emergency controller circuit at each sender link frame in order to check the district junctor test frame leads through the emergency sender link controller circuit. When the test is completed at a sender link frame reconnect the regular controller circuit. The emergency circuit should be cut in at only one sender link frame at a time.

5.43 Operate the OPR key and then operate the ST key. The EC lamp lights at the end of the cycle unless a trouble is encountered.

5.44 Operate the CDR and then operate the ST key. The EC lamp lights at the end of the cycle unless a trouble is encountered.

5.45 Restore the test circuit to normal when the EC lamp lights.

5.5 Coin Overtime Call on coin district junctor circuits arranged for overtime charging.

5.51 When making this test observe by the (COIN-L)O-39 lamps that each supervisory circuit is used at least once.

5.52 Use Paragraph 5.53 and 5.54 on alternate routine cycles.

5.53 Operate the LC and T keys and then operate the ST key. After the operate test is applied to the CS relay as indicated by the BB lamp lighting, the test circuit times approximately the first 4-1/2 minutes of the talking period. The test circuit then checks that coin collect current of the proper duration and magnitude is applied at the end of the 4-1/2 minute talking period. The test circuit then applies a circuit condition to the T and R leads to satisfy the line test at the end of the first five minutes of the talking period. Shortly after the second talking period is begun, disconnection is simulated and a second coin collection test is made.

5.54 Operate the LC, T and SUB DISC keys and then operate the ST key. This test is the same as the test per Paragraph 5.53, up to and including coin collection at the end of the 4-1/2 minute period. Between 4-1/2 and 5 minutes a subscriber disconnect is simulated and a check is made that coin return current is received from the district.

5.6 Local Timing

5.61 This test is applied to non-coin district junctors arranged for overtime registration of non-zone calls.

5.62 Perform tests per Paragraphs 5.63 and 5.64 on alternate cycles.

5.63 Operate the LC and T keys, and then operate the ST key. After the initial charge is checked the test circuit measures the initial talking period of approximately 5 minutes and 7 seconds, during which time the test circuit checks that no additional charge is received. After the initial talking period has elapsed, the test circuit checks the first overtime charge and disconnects. The EC lamp lights when the test has been made of all circuits.

5.64 Operate the LC, SUB-DISC and T keys and then operate the ST key. After the initial charge is checked the test circuit measures the initial talking period, during which time the test circuit checks that no additional charge is received. Immediately before the end of the initial talking period, the test circuit releases the district junctor CS relay, indicating that the called subscriber has disconnected and then checks that no overtime charge is sent out by the district junctor circuit. The EC lamp lights when the test has been completed on all circuits.

5.7 Non-Charge Call

5.71 When checking coin district junctors observe that each coin supervisory circuit is used at least once. The lighted (COIN-L) O-39 lamp indicates the supervisory circuit used.

5.72 Operate the FC key and then operate the ST key. A test is made on each circuit that no charge is received when a free call code is dialed. The EC lamp lights at the end of the cycle.

6. ROUTINE TESTS USING ITE-4073 TO SUPPLEMENT THE TEST FRAME

NOTE: Due to the small number of coin district junctors installed, coin districts are to be tested using the test frame.

6.1 Setup for Test (See Figure 1)

NOTE: With the following test setup the district junctor test frame and the ITE-4073 test set can be used without interference. However tests cannot be made simultaneously on district junctors associated with the same sender link frame.

6.101 Locate the test set, ITE-4073, at the sender link frame whose associated district junctors are to be tested. Run a four conductor test cable from the district junctor test frame to the MISC. T.S. of any district link frame.

Referring to Note 201 on district junctor test frame schematic drawing SD-25158-0104, remove the straps between terminals 08 & 18, 28 & 38 and 48 & 58 during the time the ITE-4073 test set is connected. Connect punchings on the miscellaneous T.S. at the test and district link frames as follows:

Dist. Jctr. Test Frame (SD-25158) Misc. T.S. punch.	Shown on Misc. Ckt. SD-25204 District Link Frame Misc.T.S. punch:
18	160
28	161
38	162
58	163

6.102 Temporarily remove the TEL jacks of the district junctor frames from the frame line circuit by disconnecting the cross-connection at the H.M.D.F.

6.103 Connect the test set terminals to the TEL jacks of the district junctor frame, using two ITE-4109 spade tips, as follows:

Test Set	TEL Jack
Term. G	Jack A - sleeve
" BT	" A - tip
" BTA	" B - sleeve
" D	" B - tip

6.104 Strap the terminals of the test set as follows: GA to GRD, DA to DB, and LO to LOA.

6.105 Using an ITE-9952 cord, connect the fixture to punchings, 130-139 (leads G0-G9) and 140-149 (leads D0-D9) on the EM CONT terminal strip at the sender link frame. Connect plugs P1 and P2 to the test set connectors D and G respectively.

6.106 Using a second ITE-9952 cord, connect the fixture to punchings 40-49 (leads H0-H9) and 50-59 (leads S0-S9) on the MISC terminal strip and connect plugs P1 and P2 to the test set connectors H and S respectively.

6.107 Using cord ITE-9639 equipped with alligator clips connect the test set D3 jack to punchings on the EM CONT and MISC terminal strips as follows:

D3 Jack	Pchg.	T.S.	Lead
Ring	150	EM CONT.	TRL
Tip	151	EM CONT.	RL
%Sleeve	22	MISC.	ST (See Note)

% Extend, using ITE-9547 cord.

NOTE: The ST lead may be connected to punching 89 of the EM CONT TS instead of the punching shown above if the A and B transfer switches of the sender link are operated.

6.108 Connect the 1 and 2 plugs of ITE-9775 cord to the D1 and D2 jacks, respectively, of the test set. Connect the 325 plug of ITE-9775 to any vertical of the district junctor test connector switch on the SSL frame.

6.109 Select a small group of local charge trunks at the H.M.D.F. and change cross-connections on the marker route relays as required to gain access to these trunks. Determine the code of the trunk group selected.

6.110 Connect one trunk in the trunk group associated with the selected route relays to the distruct junctor frame B jack at the H.M.D.F. Make the remaining trunks of the group busy at the O.G.T. jack bay.

6.111 Patch the TL and S jacks of the test set to the B and A jacks, respectively, of the district junctor frame using ITE-9601 and ITE-9598 cords.

6.112 Using three 298 type plugs set up the office code to be dialed by inserting plugs into the A1-9 jack corresponding to the A digit and into the B1-9 and C1-9 jacks corresponding to the B and C digits. If no plug is inserted 0 will be dialed for the particular digit.

6.2 Failure Indications

6.21 If a trouble is encountered the test circuit stops. Refer to lamp signals provided on the test set and TMO-4073 for indications regarding the character of the trouble.

6.3 Charge Calls

6.31 When testing two-arty districts operate the (2-PY) (0-1), (2-PY) (2-3), etc. keys corresponding to the two party district junctor groups before starting the test; on every other routine cycle operate the TPC key. When testing districts equipped for zone service every other cycle should be made with the ZR key operated and the D key normal.

6.32 Operate the (2 PY), TPC and ZR or D keys as required per Paragraph 6.31 and then the ST key. The EC lamp lights on the test set at the end of the cycle unless a trouble is encountered. Release the ST key to restore the test circuit to normal when the EC lamp lights.

6.4 Local Timing

6.41 This test is applied to non-coin district junctors arranged for overtime registration of non-zone calls.

6.42 Perform tests per Paragraphs 6.43 district junctors arranged for overtime registration of non-zone calls.

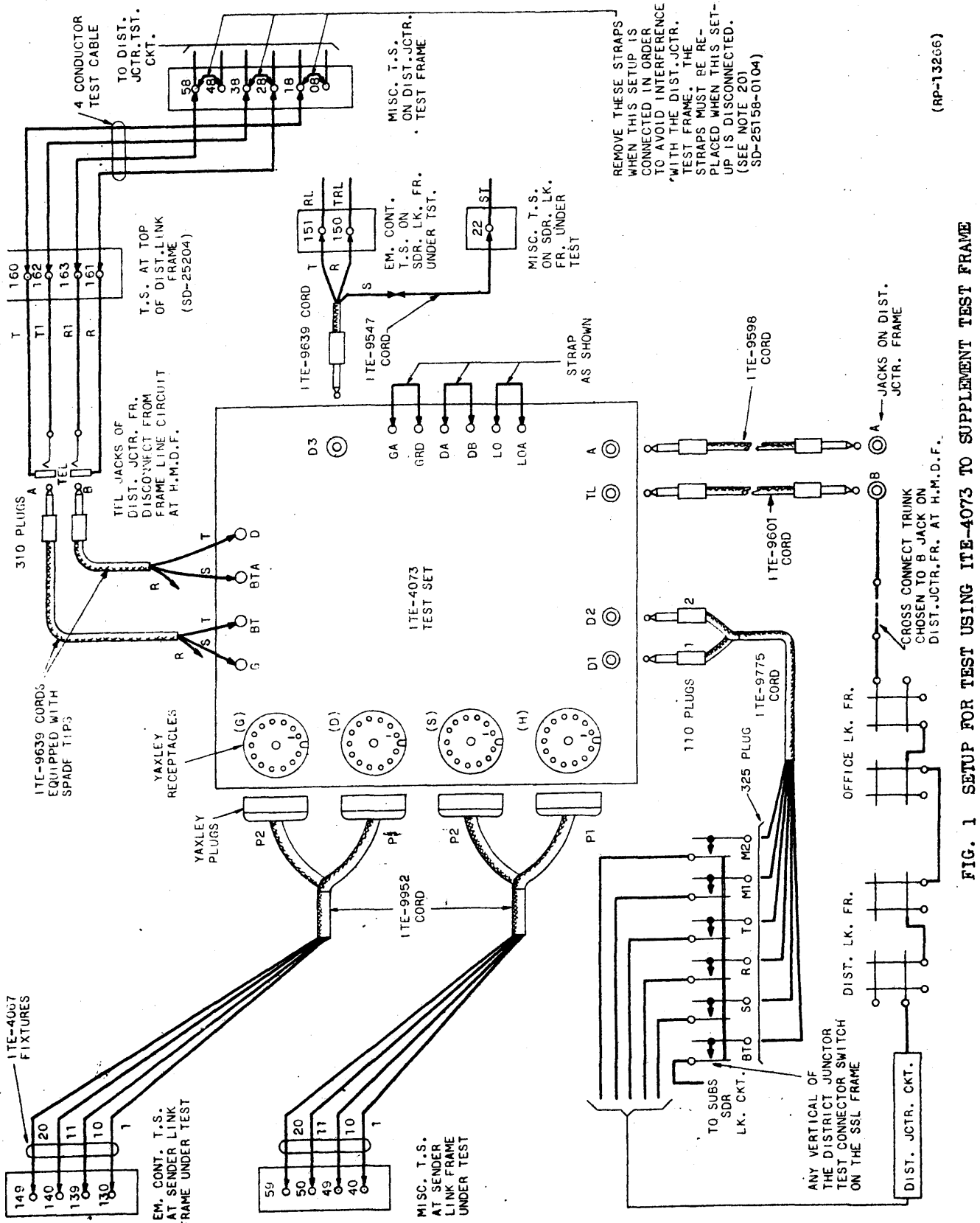

FIG. 1 SETUP FOR TEST USING ITE-4073 TO SUPPLEMENT TEST FRAME

6.43 Operate the D and T keys, and then operate the ST key. After the initial charge is checked the test circuit measures the initial talking period of approximately 5 minutes and 7 seconds, during which time the test circuit checks that no additional charge is received. After the initial talking period has elapsed, the test circuit checks the first overtime charge and disconnects. The EC lamp lights when the test has been made of all circuits. Release the ST key to restore the test set to normal.

6.44 Operate the D, SUB-DISC and T keys and then operate the ST key. After the initial charge is checked the test circuit measures the initial talking period, during which time the test circuit checks that no additional charge is received. Immediately before the end of the initial talking period, the test circuit releases the district junctor CS relay, indicating that the called subscriber has disconnected, and then checks that no overtime charge is sent out by the district junctor circuit. The EC lamp lights when the test has been completed on all circuits. Release the ST key to restore the test set to normal.

→ Arrowed lines indicate new or changed information.

7. SUPPLEMENTARY TESTS USING THE AUTOMATIC TEST CIRCUIT

NOTE: The tests per Paragraphs 7.1 and 7.2 need be made on only one district junctor in each group.

7.1 Automatic Release

7.11 Operate the AR key and then operate the ST key. A test is made on each circuit for its ability to release the calling subscribers line if the called subscriber disconnects and the calling subscriber does not. The AR lamp lights during the timing of the release interval. The EC lamp lights at the end of the cycle.

7.2 False Automatic Release

7.21 Operate the AR and FAR keys and then operate the ST key. A test is made on each circuit that the release circuit does not release the district junctor during momentary release of the district CS relay. The EC lamp lights at the end of the cycle.

R. E. RAHMES

Engineer of Installation

Reason for Reissue:
To add ground bar test in Paragraph 3 and change note in Paragraph 6.1.

Replaces Section 122 dated 10-19-50.