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PANEL SYSTEM
TEST SET CIRCUIT
FOR MESSAGE REGISTERS
IN OFFICES HAVING SINGLE OR TWO-PARTY MESSAGE RATE SERVICE
WHERE LINE CIRCUITS
HAVE GROUND ON CUT-OFF RELAY

CHANGES

B. CHANGES IN APPARATUS

	Superseded	Superseded By
B.1	1 Cord (A) P3E with 2 - 110 plugs	1 Cord (A) J99813A-L6
B.2	1 Cord (B) W10 with 116 plug and 360 tool	1 Cord (B) J99811B-L5
B.3	1 Cord (C) P4A with 2 - 154 plugs	1 Cord (C) J99814A-L-13
B.4	1 Cord (T) P4D with 152 and 234 plugs	1 Cord (T) J99814A-L-10
B.5	1 No. 365 Tool	1 KS-6278 Tool with 108 Cord Tip
B.6	1 Jack (T) 221B	1 Jack (T) 223 type
B.7	1 Jack (T1) 221B	1 Jack (T1) 223 type
B.8	1 Jack (A) 238B	1 Jack (A) 238 type
B.9	1 Rheostat 52A	1 Rheostat 65A

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 The test operate value for the (L1) E-1553 relay is changed from .020 ampere to .0137 ampere.

C.2 The maximum external loop for the (L1) E-1553 relay is changed from 1000 ohms to 2000 ohms.

C.3 Test Note 3 is added to record the old test operate requirement of the (L1) E-1553 relay.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Circuit Note 102 is removed. It formerly read: "Patching cord (B) shall be 19'6" long unless otherwise specified. Patching cords (A) and (C) shall be 6' long unless otherwise specified."

D.2 Part of Note 103 is removed. It formerly read: "X wiring is obsolete and is superseded by 'Y' wiring and apparatus on Issue 3-B. Prior to Issue 3-B 'X' wiring was always furnished. Circuit Notes 102 and 103 were not shown. Patching cord (T) was equipped with 708 cord and 205 plug. The 708 cord and 205 plug are abandoned for use in this circuit and are superseded by 838 cord and 254 plug. Specification was not shown for the milliammeter."

D.3 Part of Note 104 is removed. It formerly read: "The manufacture of the 518A interrupter key for use in this circuit is discontinued. The 518B interrupter key supersedes the 518A interrupter key on Issue 4-D. Prior to Issue 4-D the 518B interrupter key was not shown and Note 102 specified (B) cord as 20 feet long."

D.4 A framework ground terminal is added.

D.5 The voltage rating of the No. 2 type lamps is removed.

D.6 Circuit Note 105 is added to explain the changes in the (A), (T), and (T1) jacks and the rheostat.

D.7 The code numbers of the patching cords are removed and the latest standard J specification numbers are shown.

D.8 The No. 365 tool is replaced by the KS-6278 tool and 108 cord tip, to provide the better tool.

D.9 The 52A rheostat is replaced by the 65A rheostat to provide a rheostat which will mount satisfactorily in the new metal test box.

All other headings under Changes, No Change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is for use in testing 5S message registers in the subscriber's line circuits in line finder offices having single or two-party message rate service where the cut-off relay is connected to ground, for checking the message register lead before making register test, for making check tests of register leads at line finder frames, and for making 100-operation test of traffic registers.

2. WORKING LIMITS

2.1 This circuit has an external circuit loop range of 2000 ohms maximum for supervision with minimum leak resistance 10,000 ohms.

3. FUNCTIONS

3.1 Provides for check test of register leads for open circuit.

3.2 Tests subscriber's line sleeves for busy and if busy indicates same by lamp signal.

3.3 Checks operation of test relay in test set and indicates by a signal if operation is satisfactory.

3.4 Puts busy condition on sleeve if found idle and indicates same by lamp signal.

3.5 Supervision is provided over the tip and ring of the subscriber's line during test of subscriber's register.

3.6 Subscriber's message registers are tested on "operate" current value.

3.7 Subscriber's message registers are tests on "non-operate" current value.

3.8 "100-operation" test is made on subscriber's message registers.

3.9 "100-operation" test is made on traffic registers.

3.10 Provides for making buzzer test of subscriber's register leads at the line finder frames for opens.

4. CONNECTING CIRCUITS

4.1 Battery and ground supply jack.

4.2 Subscriber's line circuit.

4.3 Test line circuit for testing message registers.

4.4 Traffic register circuits in conjunction with relay adjusting test set.

DESCRIPTION OF OPERATION

5. APPARATUS AND FUNCTIONS

JACKS

5.1 Jack (A) is for connecting battery and ground to the test set when testing subscriber's line registers and register leads, and for connecting the set to the relay adjusting test set when testing traffic registers.

5.2 Jacks (T) and (TI) are for connecting the test set to subscriber's line terminals on the I.D.F. for testing subscriber's line registers when the tests are made with set located at the I.D.F. and for connecting the set to the test line when set is located at the register cabinet so that test can be made by one person. Jack (TI) is also used for patching the test set to register leads at the line finder frames for making check tests of the leads.

CORDS

5.3 Patching cord (A) is for connecting jack (A) to 48 volt battery and ground supply jack for supplying battery and ground to the test set when making subscriber's register tests and register lead check tests and for connecting jack (A) to the relay adjusting test set when making 100-operation tests of traffic registers.

5.4 Patching cord (B) is for connecting jack (TI) to register leads at the line finder frames when making check tests on register leads.

5.5 Patching cord (T) is for patching jacks (T) and (TI) to the subscriber's line terminal at the I.D.F. when testing subscriber's line registers with the test set located at the I.D.F., and for connecting the test line jacks (T) and (TI) at the I.D.F. to the subscriber's line I.D.F. terminals when making register tests with the test set located at the message register cabinet so that the test can be made by one person.

5.6 Patching cord (C) is for patching jacks (T) and (TI) in the test set to jacks (T) and (TI) in the test line at the message register cabinet when making register tests with test set located at the message register cabinet so that the test can be made by one person.

KEYS

5.7 Key (TR) is locking and when operated prepares the test set circuit for making 100-operation tests of traffic registers.

5.8 Key (BUZ) is locking and is operated for applying check tests to register leads.

5.9 Key (DISC) (ST) is a three position locking key used in connection with the subscriber's line sleeve busy test and make busy feature. The normal position is designated (DISC), in this position the subscriber's line tip, ring and sleeve leads are open. The middle position of the key is used as a passing start position in which battery and ground are closed for operating the test relays. The position designated (ST) is for connecting the sleeve to the test relays for making busy test.

5.10 Key (OPR) is non-locking and when operated applies operate test current values to the subscriber's line register and closes path for adjusting rheostat slide (I) for making interrupter 100-operation test.

5.11 Key (NO) is non-locking and when operated applies non-operate test current values to subscriber's line registers.

LAMPS

5.12 Lamp (BY) is a busy lamp and lights for indicating a busy sleeve condition on the subscriber's line.

5.13 Lamp (SL) is a sleeve lamp and lights to indicate an idle sleeve condition on subscriber's line.

5.14 Lamp (SUB-BUZ) serves two purposes. With key (BUZ) in its normal position, the lamp serves as a subscriber's line signal and lights if the subscriber's receiver is removed from the hook after the start key is operated. With key (BUZ) operated, the lamp lights to indicate a closed circuit when check tests are made on register leads.

5.15 Lamp (TST) lights for checking that relays (T) and (TI) have operated when key (DISC) (ST) has been operated to (PASSING ST) position.

RHEOSTAT

5.16 The rheostat has two slides designated (1) and (2) respectively and is used in testing subscriber's line registers. Slide (1) is for adjusting the resistance for making operate tests and 100 operation interrupter tests. Slide (2) is for adjusting the resistance for making non-operate tests.

INTERRUPTER KEY

5.17 The interrupter key is used for making the 100-operating tests of subscriber's line registers and traffic registers.

6. CIRCUIT OPERATION

SUBSCRIBER'S LINE REGISTER TEST AT REGISTER CABINET - "Y" WIRING

6.1 Patching

When tests of subscriber's line registers are to be made with the message register test set located at the message register cabinet so that the tests can be made by one person, the following patching shall be made: Patch jack (A) in the test set to a 48 volt battery and ground supply jack at the message register cabinet by means of patching cord (A). Patch test set jacks (T) and (T1) to test line jacks (T) and (T1) at the message register cabinet by means of patching cord (C). Patch cord (T) into the (T) and (T1) jacks of the test line at the V.I.D.F. When testing single party lines attach the 234 plug end of the cord to the subscriber's line terminals on the I.D.F. When testing the first party on lines arranged for two-party register service, attach the 234 plug to the subscriber's line terminals on the bunching block of the first party. When testing the second party on lines arranged for two-party register service, attach the 234 plug to the subscriber's line terminals on the bunching block of the second party.

6.2 Register Reading

On working subscriber's lines, a register reading should be recorded just before starting and immediately on completion of an individual test.

6.3 Check Test

When a check test of the register lead is to be made before testing the register, key (BUZ) is operated. The operation of the key connects the winding of relay (LI) to the sleeve of jack (T1) which is patched to the subscriber's line register lead "M". If the circuit is closed to and through the register to ground, relay (LI) should operate. The path is traced from battery through winding of relay (LI), make contacts of key (BUZ) test set lead "M" sleeve of jack (T1) patching cord (C) sleeve of test line (T1) jacks, "M" lead of patching cord (T) subscriber's line register lead "M" on I.D.F. to and thru register winding to ground. A closed circuit is indicated by lamp (SUB-BUZ) which lights by a circuit closed thru the make contacts of relay (LI). If the register lead is open and free from ground relay (LI) should not operate and lamp (SUB-BUZ) should not light. This test does not check that the register lead terminates at the proper register or that it is not grounded. In offices where the buzzer circuit for use in checking message register I.D.F. cross-connections is extended to the message register cabinet, a test can be made to check that the register lead terminates at the proper register by patching buzzer circuit jack (BUZ-2) to the register terminal

to be tested by means of patching cord (B). If the lead is not grounded, the buzzer at the register cabinet should operate and the lamp (SUB-BUZ) in the test set should light. The path is similar to that described above, except as follows: The circuit thru the winding of relay (LI) after passing thru the register lead divides at the register into two paths, one path is thru the register which does not receive enough current to operate due to the high resistance of relay (LI) the other path is thru patching cord (B) buzzer circuit jack (BUZ-2) and relay (MR) to ground. Relay (MR) in operating closes a circuit for operating the buzzer.

6.4 Checking Operation of Test Relay

With the test set patched as described above in paragraph 6.1 a check test is made of the operation of the test relays as follows: Operate key (DISC) (ST) from the position designated (DISC) to the middle position designated (PASSING-ST). A circuit is closed for operating relay (TL) from ground on the key, thru resistance (C) winding of relay (TL) to battery on the key. Relay (TL) operated, causes relay (T) to operate from battery on the key, thru relay (S) resistances (D) and (E). Relay (S) does not operate due to the high resistance of relay (T). The operation of relay (T) causes lamp (TST) to light as a signal that the test set is functioning properly. Lamp (TST) forms part of a path for locking relay (TL) under control of relay (T).

6.5 Test of Line For Busy

Operate key (DISC)-(ST) to the (ST) position which opens the operating path for relay (TL) transfers relay (T) from local battery to the sleeve of the line, and removes the shunt from lamp (BY). If the line under test is busy, relay (T) will remain operated and hold relay (TL) operated. Lamp (BY) will light as an indication that the line is busy. Should the line be idle, relay (T) will release, in turn releasing relay (TL) which extinguishes lamp (TST). Lamp (BY) will not have sufficient time to light before relay (TL) releases. The release of relay (TL) causes relay (L) to operate and connects relay (S) to the sleeve of the line thus making it busy. Relay (S) operates in series with the (CO) relay of the line circuit and lights lamp (SL) as an indication that the line has been made busy, and test may proceed. Relay (L) operated, connects ground to the tip and battery through relay (LI) to the ring of the line. Should the subscriber attempt to originate a call, relay (LI) will operate and cause lamp (SUB-BUZ) to light as an indication that the test should be discontinued.

6.6 Operate Test

The "Operate Test" of the register is applied by first operating key (OPR) and moving its corresponding slide (1) on the rheostat to the point that will record the "Operate Current Value" on the milliammeter after which the key is restored to its normal position and then operated the necessary number of times to make the test.

6.7 Non-Operate Test

The "Non-Operate" test is made by first operating key (NO) and moving its corresponding slide (2) on the rheostat to the point that will record the "Non-Operate" current value on the milliammeter, after which the key is restored to its normal position and then operated the necessary number of times to make the test.

6.8 Interrupter 100-Operation Test

On the completion of the tests described above, a test is made by the use of the interrupter key which is operated by a lever that causes 100 pulses to be sent. This test is made in the following order: Operate key (OPR) and move its corresponding slide (I) on the rheostat to the point that records the test current value on the milliammeter and then restore the key to its normal position. Take register reading and then operate the interrupter lever: when the interrupter has completed the sending of impulses, the register reading should be 100 plus the reading taken before the lever was operated.

SUBSCRIBER'S LINE REGISTER TEST AT I.D.F.-"Y" WIRING

6.9 Patching

When tests of subscriber's line registers are to be made with the register test set located at the intermediate distributing frame, the patching should be made as follows: Patch jack (A) in the test set to a 48 volt battery and ground supply jack at the vertical side of the I.D.F. Patch cord (T) into jacks (T) and (T1). When testing single party lines, attach the 234 plug end of the cord to the subscriber's line terminals on the I.D.F. When testing the first party on lines arranged for two-party line register service, attach the 234 plug to the subscriber's line terminals on the bunching block of the first party. When testing the second party on lines arranged for two-party register service, attach the 234 plug to the subscriber's line terminals on the bunching block of the second party.

6.10 Register Reading

Before starting tests, record register reading as described in paragraph 6.2.

6.11 Check Test

When desired, a check test of the register leads can be made as described in paragraph 6.3 except that the test line is not used with the test set located at the I.D.F.

6.12 Checking Operation of Test Relay

This test is made similar to that described in paragraph 6.4.

6.13 Testing the Subscriber's Line for Busy

The subscriber's line is tested for busy similar to that described in paragraph 6.5 except that the test set is patched directly to the I.D.F. terminals instead of thru the test line to the I.D.F. terminals.

6.14 Operate Test

This test is similar to that described in paragraph 6.6.

6.15 Non-Operate Test

This test is similar to that described in paragraph 6.7.

6.16 Interrupter 100-Operation Test

This test is similar to that described in paragraph 6.8.

SUBSCRIBER'S LINE REGISTER TEST AT I.D.F. "X" WIRING

6.17 When using message register test set having "X" wiring and located at the I.D.F. the tests are made similar to that described in paragraphs 6.9, 6.10, 6.12, 6.13, 6.14, 6.15 and 6.16 except as follows: The path of lead "M" between jack (T1) and the milliammeter is through "X" wiring instead of "Y" wiring and key (BUZ) and the path between relay (L1) and the make contact of relay (L) is through "X" wiring instead of "Y" wiring and key (BUZ). When "X" wiring is used, check tests can not be made of register leads.

BUZZER TEST OF SUBSCRIBER'S LINE REGISTER LEADS AT LINE FINDER FRAMES - "Y" WIRING

6.18 When the message register test set is equipped with "Y" wiring and apparatus, the set can be used for making buzzer check tests of subscriber's line register leads at the line finder frames. When making this test the set is used in conjunction with the buzzer circuit for use in checking

message register I.D.F. cross-connections. The test is made as follows: By means of patching cord (A) patch jack (A) in the test set to the 48 volt battery and ground supply jack at the line finder frame. Insert the plug of patching cord (B) into jack (T1) connect the clip end of the cord to the register lead terminal on the terminal strip on the line finder frame or when required connect the clip to the relay spring to which the lead terminates. Operate key (BUZ) which connects the sleeve of jack (T1) to the winding of relay (LI). If the register lead is closed to and thru the line register relay (LI) should operate thru the register to ground and light lamp (SUB-BUZ). The register does not receive enough current to operate due to the high resistance of relay (LI). To check that the lead from the line finder frame connects to the proper I.D.F. terminal, the buzzer circuit is patched as follows: Insert the plug of patching cord "B" into jack (BUZ-2) at the I.D.F. and attach the clip end of the cord to the terminal on the I.D.F. to which the lead from the line finder frame terminates. The buzzer at the I.D.F. should operate. The path is traced from battery thru test set relay (LI) winding, key (BUZ) make contact lead "M" jack (TI) patching cord (B) terminal on terminal strip of the relay spring to which the lead terminates at the line finder frame to terminal on I.D.F. At this point the battery current is divided into two paths, one to and thru the line register to ground and the other thru buzzer circuit patching cord (B) jack (BUZ-2) and relay (MR) to ground, operating relay (MR) which closes a circuit for operating the buzzer. If the register lead is open between the line finder frame and the I.D.F. relay (MR) and buzzer will not operate. If the lead is grounded, relay (MR) will receive no current to operate therefore the buzzer will not operate. In offices where the buzzer circuit is extended to the message register cabinet, a test can be made to check that the leads from the line finder frame connects to the proper register by patching buzzer circuit jack (BUZ-2) to the terminal of the register by means of patching cord (B). The operation of the circuit is similar to that described above for testing between a line finder frame and the I.D.F.

TRAFFIC REGISTER TEST "Y" WIRING

6.19 When the message register sest set is equipped with "Y" wiring and apparatus, it is used in conjunction with the relay adjusting test set for testing traffic registers. On this test, the register test set is used only for providing an interrupter for applying the 100-operation test.

On this test the relay adjusting test set is patched in the usual manner, test set preparations are made as indicated in circuit requirements table for the circuit to be tested, and the rheostat slide is adjusted for applying the proper current to the register under test. After adjusting the slide key is operated and jack (3R) is patched to register test jack (A). The register reading is recorded and the interrupter key is operated similar to that described for subscriber's message registers, paragraph 6.8.

TALKING LINE

6.20 As a means of communication, when required, between testmen located at the I.D.F. and message register cabinet or between any other parts of the equipment when testing message registers of register leads, the frame talking line between all frames, message register cabinet and I.D.F. is used.

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