ORIGINATING MARKER CONNECTOR TEST

CONTENTS

1. GENERAL INFORMATION

1.1 Description of Test

1.11 This section describes a method of testing:

SD-25035-01 ORIGINATING MARKER CONNECTOR CIRCUIT

Tests are made to verify the control and chain circuits, make busy features, alarms and other miscellaneous features and circuits. The wiring on the connector multi-contact relays is verified by test calls covered on the originating sender test methods.

1.2 Testing Additions

1.21 New Connector

(a) Do not close down the sender and marker cables at the sender and marker frames until after the tests per Paragraphs 4 to 8 have been made.

(b) The tests per Paragraph 9 cannot be made. The chain circuit must be checked as the new chains are established.

(c) The tests per Paragraph 10 to 14 may be made after the cables are closed down.

1.22 New Sender or Marker Added to a Working Connector

(a) All testing must be made on a transition basis. The tests prepared herein will not apply. A continuity and cross test of the cables should be made and the cables closed down.

(b) Make the tests per Sections 162 and 163 covering the test of "Paths Through the Marker Connectors" and "Test of Compensating Resistance Leads and Unused Transmitting Leads." These tests are made from new senders and to new markers as equipped.

1.3 Test Procedure

1.31 These tests should be made before the subscriber or K.P. sender routine tests are started.

1.32 Associated equipment should be made busy as required to prevent interference in performing the tests described in this section.

CAUTION: When using the test receiver as described in this section do not place the receiver directly over the ear.

2. RECORDS AND REQUIREMENTS

2.1 Records

ID-1313 and ID-2215 are required to record the results of these tests. For further information on records see Section 3 of Handbook 50.

3. TESTING EQUIPMENT

3.1 Accessories Required

Amt	Code	Description	With Kit
1	R-1824	Portable Pencil Lamp	≠ITE-4023
1	365 Tool	Suspender Clip	≠ITE-4023
1	411A Tool	Test Pick	≠ITE-4023
As Req'd.	275A	Make Busy Tool	≠ITE-4023

≠ Crossbar Test Accessory Set

4. FUSING

4.1 Using a test receiver or volt-ohmmeter check each fuse post for absence of battery and grounds.

4.2 Using fuses of correct type, as indicated by circuit drawing and fuse panel designations, install the following fuses, one at a time, and check that each fuse is associated with the correct circuit and free from cross with other fuse posts.

Fuse	Equipment
(OM) 0-7	Relays (DMA, DMB and CB) 0-7. Resistance (CB) 0-7.
A	Relays MB, CA2, CA3, CA4, CA5, CA6, GT1, GR, GRA.
TBS	Tip jack A, terminal 48V of test post terminals both on originating marker connector circuit.

5. CONTACT PROTECTION

5.1 Using equivalent circuits on two connector circuits check the contact protection circuits in Table A using the method described in Section 2 of Handbook 50.

6. MISCELLANEOUS CIRCUITS

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

7. CONTINUITY AND CROSS TEST OF CABLES (ADDITIONS ONLY)

7.1 Continuity Test

7.11 Block operated all marker connector relays in the added circuit. Make a buzzer test for continuity of all leads testing from the cable conductor ends of the first marker through the contacts of the multi-contact relays to each of the other marker cable ends.

7.12 Block operated all sender connector relays. Test continuity from the first marker through the sender connector relays to the cable ends at the senders. If so desired this test may be made from one marker to one sender and then the test may be made from this sender to all other senders. Leads which do not appear at the connector relay contacts, for example the CBS lead to the senders, will not be checked at this time. A separate continuity test should be made to check these individual leads.

7.2 False Continuity Test

7.21 Bunch together the bare ends of the cable of the first marker and strap to ground with bare strap wire. Release the connector relays for one sender or marker at a time and check for absence of ground at all conductors in the associated cable. If any of the leads are grounded there is false continuity of the connector relay contacts. Reoperate the relays before releasing the next set. Do not release the relays associated with the grounded leads.

7.22 Release the relays associated with the grounded leads and check for absence of grounds at the cable ends associated with another operated relay or at the armatures of the relays.

7.3 Test for Crosses

7.31 Block all sender and marker connector relays operated and leave the grounds connected to the cable ends at the first marker.

7.32 Cut the leads at the grounded cable ends one at a time and check that the lead is free of ground. A grounded lead may be grounded legitimately at the connector relay contact or may be crossed with another lead. Restore any grounded lead to the strapped group of leads. When all leads have been checked the ground strap will still be connected to the crossed leads and the leads grounded at the relay contacts. Refer to the drawings for the legitimately grounded leads.

TABLE A

Designation	Location on SD Dwg.	Type of Ckt.	Test at Terminals	Block or Insulate	Option STd.
Net (DMA)0-7	Figs. 6,7,8	1	T wdg. (DMA)0-7	-	J
Net (DMB)0-7	Figs. 6,7,8	1	T wdg. (DMB)0-7	-	J
Net (C2)	Fig. B	2	Arm. 1 any DMA	-	B(A&M)
Net (C1)	Fig. B	2	Arm. 0 any DMA	-	B(A&M)
Net (C3)	Fig. B	2	Arm. 8 any DMA	-	B(A&M)
Net (C4)	Fig. B	2	Arm. 9 any DMA	-	B(A&M)
Net (SA)0-9	Figs. 3,4,5	3	T&B wdg.(SA)0-9	-	N
Net (SB)0-9	Figs. 3,4,5	3	T&B wdg.(SB)0-9	-	N
Net CA1	Figs. 2 & 12	2	B wdg. of CA1	CA1 Norm.	ZE
Rel CA3	Figs. 2 & 12	2	3T of CA3	CA3 Norm. Ins.B Cont. of CA2 Int.	ZE
Rel CA5	Figs. 2 & 12	2	5T of CA5	Ins. B Cont. of CA2 Int.	ZE
Rel (CB)0-7	Figs. 6,7,8	2	6TF of CB	(CB)0-7 Norm.	ZF
Rel (DS)0-7	Figs. 6,7,8	2	4B of (DS)0-7	(DS)0-7 Norm.	ZE
Rel GRA	Fig. 11 & 12	2	5T of GRA	-	ZE
Rel GT1	Fig. 12	2	4T of GT1	-	ZD
Rel (SS)0-9	Fig. 3,4,5	2	4B of (SS)0-9	CA1 Norm. (SS)0-9 Norm.	ZE
Rel GR-Sec.	Fig. 11 & 12	2	7TR of GR	GR Norm.	ZH
Rel GT-Pri.	Fig. 12	2	6TF of GT	GT Norm.	ZH
Rel (B)	On Orig. Tbl. Indicator Frame	1	Arm. 2B any GT relay		

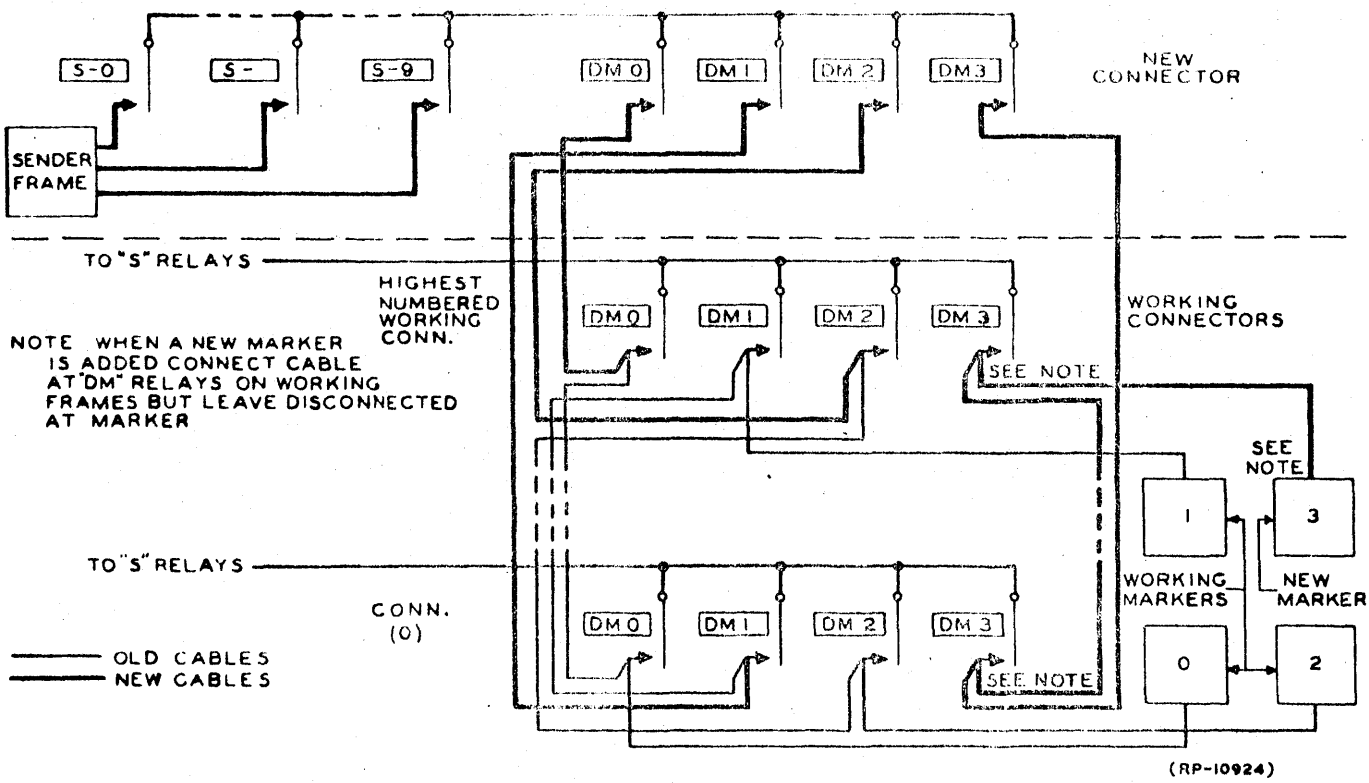

FIG. 1 SCHEMATIC OF CONNECTOR MULTIPLE

8. SENDER CONTROL AND CHAIN CIRCUITS

8.1 Check for direct ground at the 2T spring of the first SS relay (relay SS-0) in the connector circuit. Manually operate and release the remaining SS relays of the connector circuit, one at a time, and check that ground is removed each time an SS relay is operated. A test receiver or a portable pencil lamp may be used for this test.

8.2 Block CA2 and CA3 relays normal. Check for ground (through the CA1 relay) at the 1B spring of the last SS relay in the connector circuit. Manually operate and release the remaining SS relays of the connector circuit, one at a time, and check that ground is removed each time an SS relay is operated. A test receiver or a portable pencil lamp may be used for this test.

8.3 Check that the 2B spring of all SS relays except the first SS relay of the connector circuit, is wired to winding of the CA1 relay.

9. MARKER CONTROL AND CHAIN CIRCUITS

NOTE: On the following tests the originating marker time alarm will operate and the trouble indicator will be called in to take a record unless the time measure circuit of the originating marker is blocked.

CAUTION: In the following tests operate the DS or DMA relay, only for a few seconds at a time, to prevent overheating the CR resistance. If these relays are operated for more than 10 or 15 seconds at a time, insulate the 7 springs of relay DMA.

9.1 Figure 2 shows a sketch of the general plan of connecting the marker control and chain circuits of the connector circuits.

9.2 Check that the operation of each DS relay releases the DA1 and DA2 relays and operates the CBR, CBS and CBT relays, as provided, in the originating marker.

9.3 D-E Chain Circuit: Connect battery thru a test receiver or portable pencil lamp to the D punching associated with the DS relay that has direct ground connected to its winding (for example, on Figure 2, this would be relay DS-0 of connector 0, frame 0, originating marker 0). Momentarily operate each DS relay in the D-E chain and observe that ground is not removed from the test receiver or lamp. Move the test connection to the next D punching in the order of progress toward the DA1 relay. Momentarily operate each DS relay between this D punching and the DA1 relay and observe that ground is not removed. This includes operating the DS relay whose winding terminal is connected to the D punching used for test. Continue in this manner to the end of the chain moving to the next D punching after each test.

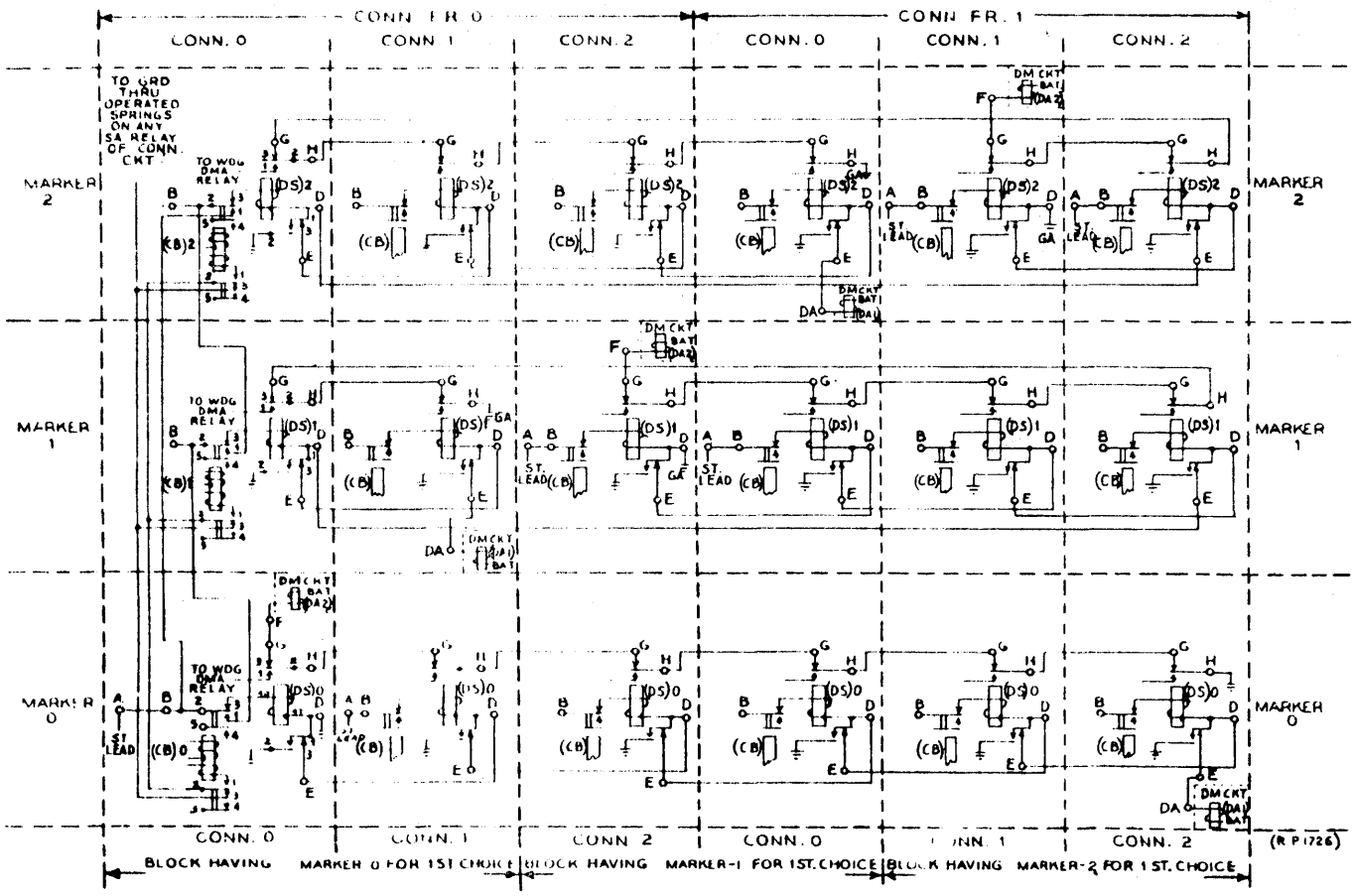

FIG. 2 MARKER CONTROL AND CHAIN CIRCUITS

9.4 G-H Chain Circuit: Connect battery thru a test receiver or portable pencil lamp to the H punching associated with the DS relay that has ground connected to its H punching. (For example, on Figure 2, this would be relay DS-0 of connector 2, frame 1, originating marker 0). Momentarily operate each DS relay in the G-H chain and observe that ground is not removed from the test receiver or lamp. Move the test connection to the next H punching in the order of progress toward the DA2 relay. Momentarily operate each DS relay between this H punching and the DA2 relay and observe that ground is not removed. This includes operating the DS relay whose armature is connected to the H punching used for test. Continue in this manner to the end of the chain moving to the next H punching after each test.

9.5 Check that ground is present on the CB spring of each DS relay.

9.6 Connector Start Chain Circuit: Check that the operation of the CB relay associated with the first choice originating marker transfers the start lead from the winding of the DS relay of the first choice marker to the winding of the DS relay associated with the second choice originating marker. Check this chain circuit through to the winding of the DS relay associated with the last choice marker. (As an example, on Figure 2 the order of the start chain circuit for connector 0, frame 0, is DS-0, DS-1, DS-2)

9.7 CB Relay Locking Circuit

9.71 Operate an SA relay of a connector circuit to provide locking ground for the CB relays. Operate all CB relays of the connector circuit except the first CB relay. Check that the operated CB relays lock. Operate the first CB relay and observe that the other CB relays release and the first CB relay locks.

9.72 Operate all CB relays except the second CB relay. Check that the operated CB relays lock. Operate the second CB relay and observe that the other CB relays release and the second CB relay locks.

9.73 Continue as in 9.71 and 9.72 until each CB relay is used.

9.74 On one of the above tests prove the CB relay lockout ground at each SA relay of the connector circuit by operating a second SA relay and releasing the first SA relay; continuing this procedure until each SA relay of the connector circuit has been used.

9.8 When Figure 12 is equipped, block GT relay normal and insulate 2 and 3T contacts. At the CHOICE terminal strip connect battery to all A or B punchings, one at a time, and observe that the associated DS relay or DMA and DMB relays operate. Connect to the A punching if the connector has as its first choice the originating marker associated with the A punching; otherwise, connect to B punching.

10. MAKE BUSY FEATURES

10.1 Insert a make busy plug into jack CB at the trouble indicator frame. Observe that the associated CB relay of the connector circuit operates. Remove the make busy plug.

10.2 Insert a make busy plug into jack DB of the originating marker circuit at the trouble indicator frame. Observe that relays CBR, CBS and CBT (as provided) of the marker and the associated CB relays of the connector circuits operate. One CB relay per connector circuit is associated with each marker. Remove the make busy plug.

NOTE: The DMA relays operated, operate relays CBR, CBS and CBT of the marker which in turn operate the associated CB relays in the connector circuits. This feature was verified on the test per 9.2 which checks that the DMA relays operate relays CBR, CBS and CBT and the test per 10.2 which checks that relays CBR, CBS and CBT operate the associated CB relays.

10.3 Insert a make busy plug into the sender group make busy jack GB at the trouble indicator frame. Observe that the MB relay of the connector circuit and the MB relay of each sender in the associated group of senders operate. Remove the make busy plug.

11. SENDER POSITION LAMPS

11.1 With the BAT key at the trouble indicator frame operated, operate each SA relay of the connector circuit, one at a time, and check that the associated S lamp at the trouble indicator frame lights.

12. ALARM FEATURES (Figs. 2 and 11)

NOTE: These tests apply on circuits equipped per issues prior to issue 14-B of SD-25035-01.

12.01 Remove the blocks from the CA2 and CA3 relays. Block the CA1 relay operated. CA2 relay operates when the B contacts of the interrupter make and 5 to 6 seconds later the CA4 relay operates. If the B and F contacts of the interrupter are reversed the CA4 relay will operate about 1 second after CA2.

12.02 The CT lamp lights at the trouble indicator frame. A major alarm is given (marker connector time alarm). The MB relay operates ("M" wiring).

12.03 Operate the BAT key at the trouble indicator frame and check that the C lamp associated with the connector under test lights.

12.04 Operate a SB relay and release the CA1 relay. The results are unchanged. Operate a second SB relay and release the first SB relay. The results are unchanged. Continue in this manner until all SB relays are used. Release the alarm.

12.05 Operate a DMA relay and observe that the TMS1 relay of the associated marker operates. Block the TMS1 relay non-operated. The CA5 relay operates immediately after the DMA relay is operated and lights the C lamp. The CA3 relay operates when the B contact of CA2 interrupter makes and 5 to 6 seconds later the CA4 relay operates. If the B and F contacts of the interrupter are reversed, CA4 relay will operate about 1 second after CA3. The alarm again functions as before.

12.06 Release the DMA relay and remove the block from the TMS1 relay in the originating marker.

12.07 Repeat the tests outlined in Paragraphs 12.05 to 12.06 on each DMA relay.

12.08 Block CA4 relay operated. MB relay operates. Block operated all CB relays. Relay AMB operates and releases MB relay. Release the CA4 and CB relays.

12.09 Operate and release each DMB relay in turn and observe that the GRA relay operates each time a DMB is operated.

12.10 Momentarily ground the RL lead (#6 armature) of any DMB or SB relay. GR, CT and C lamps light at the trouble indicator. The major alarm sounds. Operate the RLA key to retire the alarm.

12.11 Repeat the tests per Paragraph 12.10 grounding TRL lead (#1 armature W wiring) for the first test and grounding the RO lead (#0 armature W wiring) for the second test.

13. ALARM FEATURES (Fig. 12)

13.01 Remove the blocks from the CA2 and CA3 relays. Block the CA1 relay operated. Observe that when the B contact of the CA1 interrupter makes, relay CA2 operates, and 5 to 6 seconds later CA4 operates and locks. If the B and F contacts of the interrupter are reversed relay CA4 will operate about 1 second after CA2. The CT lamp at the originating trouble indicator frame lights and the major alarm functions. At the same time the minor alarm functions, and the TFA lamp at the trouble indicator frame lights. Operate the BAT key at the trouble indicator frame. The C lamp associated with the connector under test lights.

13.02 Release the CA1 relay. The major alarm restores to normal. Operate the LORL key momentarily at the originating trouble indicator frame. The minor alarm restores to normal and the TFA lamp is extinguished. The proper C lamp at the originating trouble indicator frame is also extinguished.

13.03 Block operated an SB relay on the frame. Verify the same results as in Paragraph 13.01. Release the SB relay and operate the LORL key momentarily. The alarms and TFA lamp restore to normal. The proper C lamp is extinguished.

13.04 Repeat the test outlined in Paragraph 13.03 on each SB relay of the connector circuit under test.

13.05 Block operated one of the DMA relays in the connector circuit under test and observe that the TMS1 relay of the associated originating marker operates. Block TMS1 relay normal. The same C lamp as in Paragraph 13.01 lights. Observe that the CA3 relay operates when the B contacts of the CA2 interrupter make and CA4 relay operates 5 to 6 seconds later. If the B and F contacts of the interrupter are reversed the CA4 relay will operate about 1 second after CA3. The CT lamp lights and the major audible alarm functions. Verify that the proper GT and GT1 relays associated with the connector under test operate.

13.06 Restore the DMA relay to normal and remove block from TMS1 relay. The major audible alarm restores to normal. Relays GT and GT1 release.

13.07 Repeat the tests outlined in Paragraphs 13.05 and 13.06 on each DMA relay of the connector circuit under test.

13.08 Manually operate one of the SA relays of a connector circuit and verify that the proper corresponding GRA relay operates. In like manner operate one of the DMB relays of the same connector and verify the same results. Repeat this test on each SA and DMB relay of the connector circuit under test.

13.09 Connect ground momentarily to the 0 armature of one of the DMB relays in the connector under test. The proper connector C lamp and the GR lamp light at the originating trouble indicator frame. The major alarm functions. Momentarily operate the RLA key to restore the alarm. The C and GR lamps are extinguished.

13.10 Repeat the test in Paragraph 13.09, grounding the 1 and 6 armatures of the DMB relay each in turn, verifying the same results.

13.11 Verify that when one of the SA relays of the connector under test is operated, grounding of the 0, 1 or 6 armatures of one of the DMB relays does not cause the GR relay of the connector under test to operate and bring in the major audible alarm.

14. SEQUENCE CIRCUIT (Fig. 12)

NOTE 1: Disregard the alarms during this test unless otherwise specified.

NOTE 2: When testing additions the tests per Paragraphs 14.01 to 14.12 should be made with only one working connector and at a low traffic period when the connector may be removed from service.

14.01 Block normal the TFA relay at the originating trouble indicator frame. Block operated the DMB relay associated with the first originating marker in the connector circuit under test. The associated GT and GT1 relays operate.

14.02 Connect 48 volt battery through a test receiver to the No. 6 armature of one of the SA relays associated with the connector under test. Verify that all DS relays remain normal.

14.03 Manually operate the corresponding DMA relay of this connector circuit and verify that the associated DS relay operates. Remove battery from the No. 6 armature of the SA relay. The DMA and DS relays release.

14.04 Remove the block from the DMB relay allowing it to release. Again connect battery through a test receiver momentarily to the No. 6 armature of the SA relay verifying that the DS relay, associated with the first choice marker of the connector circuit under test operates momentarily.

14.05 Repeat the tests outlined in Paragraphs 14.01 to 14.04 inclusive on each connector circuit.

14.06 Block non-operated the CA6 relay of each connector circuit in the marker group. Block operated one of the SB relays associated with the second connector circuit in the marker group under test. Manually operate the GT relays associated with all other connectors in the same marker group and verify that the GT and GT1 relays lock operated. Manually operate the GT relay associated with the second connector. All GT and GT1 relays in the group release.

14.07 Release the SB relay associated with the second connector circuit in the marker group under test and block operated the SB relay associated with the first connector circuit. Manually operate the GT relays associated with all other connectors in the same marker group and verify that the GT and GT1 relays lock operated. Manually operate the GT relay associated with the first connector. All GT and GT1 relays in the group release.

14.08 Release the SB relay associated with the first connector. In like manner continue the tests by blocking operated one SB relay in each remaining connector in turn and then verifying that the GT and GT1 relays, associated with those connectors in the group other than the one associated with the operated SB relay, lock operated. Verify also that these GT and GT1 relays release when the GT relay, associated with the operated SB relay of the connector, is operated manually. Release the operated SB relay to normal at completion of each test.

14.09 At the miscellaneous terminal strip on any marker connector frame in the marker group, temporarily ground terminal 86 (CP lead). Manually operate the GT relay in each connector circuit in the group. The GT and GT1 relays of all connector circuits lock operated. Operate and release the TLO key at the originating trouble indicator frame. Check that the GT and GT1 relays of each connector circuit release. Remove the temporary ground from terminal 86 on completion of test.

14.10 Repeat tests 14.06 to 14.09 inclusive on each group of connectors. Remove the blocks from the CA6 relays of each connector circuit at the conclusion of the test.

14.11 Block normal the CA6 relay and block operated one of the SB relays in the first connector circuit in the marker group under test. Operate manually the GT relay associated with the second connector circuit in the marker group. The GT and GT1 relays should lock operated. Operate manually the CA1 relay of the second connector. Three to eight seconds later the GT and GT1 relays release. The TFA lamp at the originating trouble indicator frame lights and the minor alarm sounds. Operate the TLO key momentarily to restore the alarm and TFA lamp to normal. In the same manner, operate the GT relay of the third connector in the marker group, verifying the same results and so on until all GT relays except the first in the group under test, have been operated in this manner. At the conclusion of this test, restore the SB relay to normal and remove block from relay CA6.

14.12 Repeat the test outlined in Paragraph 14.11 blocking one of the SB relays associated with the second connector in the marker group operated and CA6 normal and manually operating the GT and CA1 relays of the first connector. Verify the same results. Restore the SB relay to normal at the conclusion of this test and remove blocks from CA6 relay and the TFA relay at the originating trouble indicator frame.

14.13 Using a test receiver check for the presence of battery at the 1T contact of the CA6 relay and that operation of this relay removes the battery.

14.14 Check for ground at the 2B contact of the CA5 relay and verify that operation of this relay removes the ground.

R. E. RAHMES

Engineer of Installation

Reason for Reissue:
Removal of Paragraph 15. Also minor changes.

Replaces Section 171 dated 6-19-47.