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Columbus Works

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TERMINATING MARKER CONNECTOR TEST

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1. GENERAL INFORMATION

1.1 Description of Test

1.11 This section describes a method of testing Terminating Marker Connector Circuit, SD-25036-01.

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

1.2 Test Procedure

1.21 These tests should be made before the routine tests on the associated senders are started.

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

CAUTION 1: In the tests per this section a DS or TM relay should be operated for only a few seconds at a time to prevent overheating the CB resistance. If these relays are operated for more than 10 or 15 seconds at a time, block the TR relay in the operated position. Also, S relays should be operated for only a few seconds at a time to prevent overheating the G resistance of the sender due to ground on the HLD lead. If these relays are operated for more than 10 or 15 seconds, open the HLD leads in terminating senders by blocking open contacts 1 and 2 bottom of relays RV5.

CAUTION 2: When using Test Receiver R-9572 as described in this section do not place the receiver directly over the ear.

1.3 Testing Additions

1.31 New Connector

1.311 Do not close down the sender and marker cables at the sender and marker frame until after the tests per Paragraphs 4 to 8 have been made.

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

1.313 The tests per Paragraphs 10 to 14 may be made after the cables are closed down.

1.32 New Sender or Marker Added to a Working Connector

1.321 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.

1.322 Make the tests per Sections 222, 223 and Section 227, Paragraph 12 covering the test of leads to marker. These tests are made from new senders and to new markers as equipped.

2. RECORDS AND REQUIREMENTS

2.1 Forms SD-4-1313 and SD-4-1315 are required for recording the results of these tests. For further information see Section 3 of Handbook 50.

3. TESTING EQUIPMENT

3.1 Accessories Required

Amt	Code	Description	With ITE
1	R-1824	Pencil Lamp	⁄4023
1	ITE-8507	Alligator Clip	⁄4023
1	R-9572	Test Receiver	⁄4023
As Req.	322A	Make Busy Plugs	⁄4023

⁄ Crossbar Test Accessory Set

9.20

4. FUSE VERIFICATION

4.1 Test Procedure - General

CAUTION: To eliminate a fire hazard, verify that direct ground is not present on the alarm bar or stud on a fuse panel before installing its feeder fuse.

NOTE: Use ITE-4442 Volt-ohmmeter. To avoid damaging the meter, first verify that battery is not present on the alarm bar by using the voltmeter portion of ITE-4442. If clear, switch to the ohmmeter portion for the resistance reading which should be either infinity or approximately 600 ohms.

4.11 Fuse verification is, ordinarily, only required on fuse panels wired by the installer.

4.12 On shop wired and fused fuse panels, inspect the panel for missing or operated fuses. If a fuse is missing or operated, test the fuse terminal for the absence of low resistance ground. Clear any grounded condition and install the proper fuse. At the completion of this test all fuse panels should be fully equipped with proper fuses. These may be either the proper specified type or a dummy.

4.13 The operation of relays in circuits when fuses or potentials are applied is normal in some circuits. Oscillation, chatter, and signs of overheating should be analyzed and cleared immediately.

4.14 ITE-4442 Volt-ohmmeter should be used to verify all potentials at fused terminals to insure that polarity and voltages are correct. Many errors are caused by the use of the R-9572 Test Receiver on potentials other than -48 Volts. Handbook 100, TMO-4442, provides full instructions for the use of the volt-ohmmeter. When the R-9572 Test Receiver is used, avoid placing it directly on the ear.

4.2 Fusing Tests

4.21 Using fuses of the correct type, as indicated by the circuit drawing and fuse panel designations, install the fuses listed in Table A one at a time. Verify that each fuse is associated with the correct circuit and is free from cross with other unfused posts on the panel.

5. CONTACT PROTECTION

5.1 For those contact protection networks installed on the job, test in accordance with Handbook 61, Section 0.2.

5.2 Where a network is directly across a relay winding, the resistance of the relay winding used in the standard should be the same as that in the circuit under test.

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.

7.121 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.

7.122 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.

7.211 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 ground 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 ground 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.

7.321 When all leads have been checked the ground strap will still be connected to the crossed leads and the leads

TABLE A

FUSE DESIGNATION	POTENTIAL	AMPERAGE	TEST LOCATION
A	-48V	1 1/3	Winding Relay CA2
B			Winding Relay TR
TM (0-9)			Winding Relay TM (0-9)
TBS	-48V	1 1/3	48V Terminals

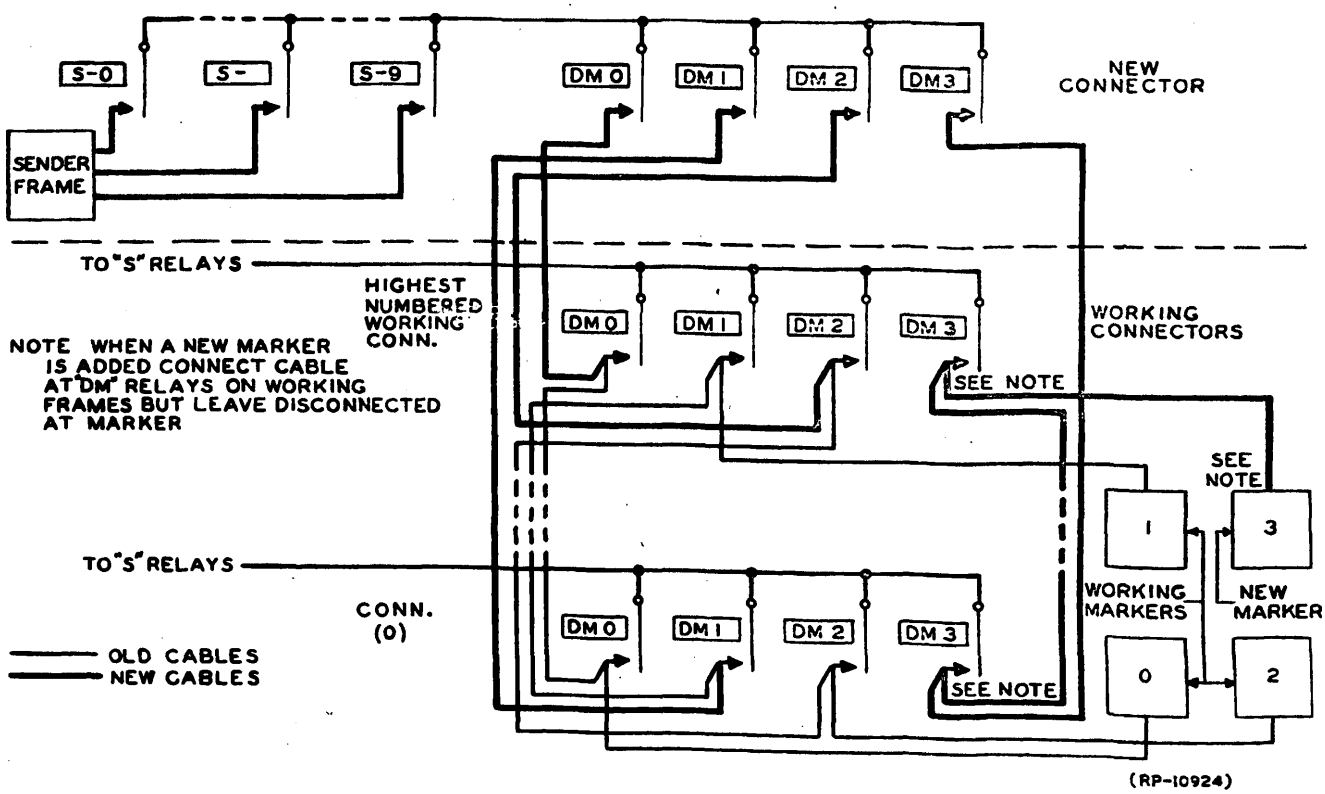

FIG. 1 SCHEMATIC OF CONNECTOR MULTIPLE

grounded at the relay contacts. Refer to the drawings for the legitimately grounded leads.

8. SENDER CONTROL AND CHAIN CIRCUITS

NOTE: In 8.2 and 8.3 the connector time alarm, unless blocked, will operate if relay CA1 is held in the operated position 5 to 12 seconds.

8.1 Check for direct ground at contact 2T 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 relay SS is operated. A test receiver or a pencil lamp may be used for this test.

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

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

8.4 SPL and ST Leads

8.41 Using a Test Receiver R-9572 check that ground is not present on contacts 4B and 5B of each SS relay in the connector circuit under test.

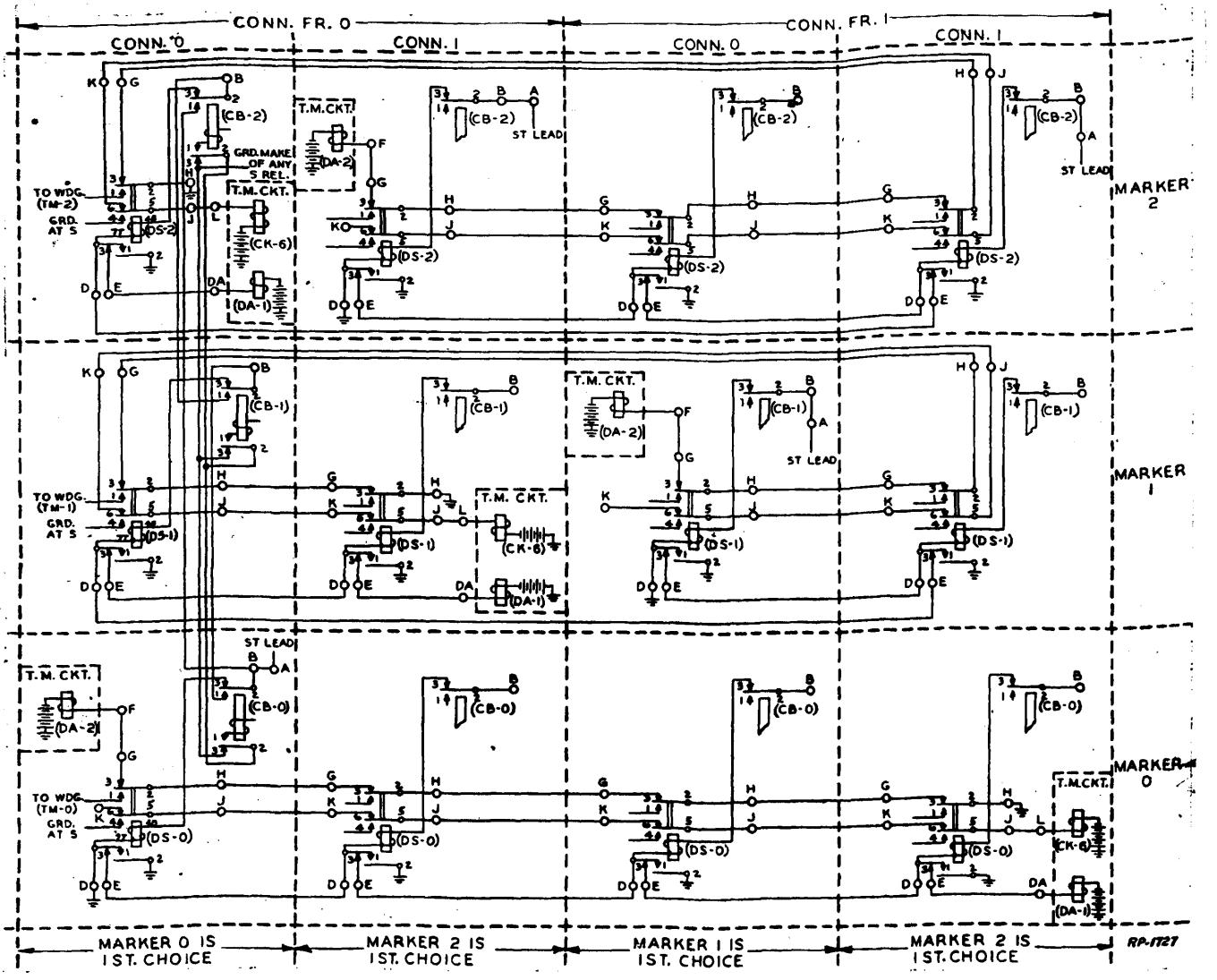

FIG. 2 MARKER CONTROL AND CHAIN CIRCUITS

8.42 Using Test Receiver R-9572 check that neither ground nor battery is present on the No. 9 armature of any one of the TM relays of the connector circuit under test.

8.43 Connect battery to contact 6T of relay SS-0, momentarily operate relay SS-0 and using Test Receiver R-9572 check that battery is removed from contact 5T.

8.431 Release relay SS-0 and manually operate SS-1. Check that battery is present on contact 6T and is not present on 5T of SS-1. Release relay SS-1.

8.432 Continue in this manner through the remaining SS relays, checking that the leads to 5T and 6T of the SS relays in the connector circuit are not reversed.

8.44 Block relay SS-0 normal and connect ground to contact 6B of relay SS-0. Relay SPL operates.

8.441 Momentarily operate all higher numbered SS relays (relays SS-1, SS-2, etc.) one at a time and check that as each one is operated relay SPL is released.

8.442 Remove the battery and ground connections and remove the block from relay SS-0.

8.45 Block operated relay TR and momentarily connect battery to ST leads as indicated below to check ST leads through contacts of relay TR.

Connect Battery		Observe Relays
4T of relay	TR	SS-0 operates S-0 does not operate
2T "	" " SS-1	" S-1 does not operate

8.45 (Cont'd)

Connect Battery			Observe Relays	
1B of relay	TR	SS-2	operates	S-2 does not operate
3B "	"	SS-3	"	S-3 does not operate
5B "	"	SS-4	"	S-4 does not operate

8.46 Repeat test 8.45 and as each SS relay is operated manually operate the corresponding S relay. Check that the S relay locks to the battery applied at the associated contact of the TR relay. Remove block from TR relay on completion of test.

9. MARKER CONTROL AND CHAIN CIRCUITS

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

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

9.2 Check that the operation of each DS relay releases relays DA1 and DA2 and operates relays CBR and CBS, as provided in the associated marker. (Refer to Figure 2.)

9.3 D-E Chain Circuit

9.31 Connect battery through a test receiver or 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, terminating marker 0).

9.32 Momentarily operate each DS relay in the D-E chain and observe that ground is not removed from the test receiver of lamp.

9.33 Move the test connection to the next D punching in the order of progress toward relay DA.

9.34 Momentarily operate each DS relay between this D punching and relay DA1 and observe that ground is not removed. This includes operating relay DS whose winding terminal is connected to the D punching used for test.

9.35 Continue in this manner to the end of the chain moving to the next D punching after each test.

NOTE: Refer to Cautions 1 and 2 under Paragraph 1.22.

9.4 G-H Chain Circuit

9.41 Connect battery through a test receiver or pencil lamp to the H punching associated with relay DS that has ground connected to its H punching. (For example, on Figure 2, this would be relay DS-0 of connector 1, frame 1, terminating marker 0).

9.42 Momentarily operate each DS relay in the G-H chain and observe that ground is not removed from the test receiver or lamp.

9.43 Move the test connection to the next H punching in the order of progress toward relay DA2.

9.44 Momentarily operate each DS relay between this H punching and relay DA2 and observe that ground is not removed. This includes operating relay DS whose armature is connected to the H punching used for test.

9.45 Continue in this manner to the end of the chain moving to the next H punching after each test.

9.5 J-K Chain Circuit

9.51 Check that the L punching is connected to the proper J punching. Connect ground through a test receiver or pencil lamp to the last K punching in the chain (as an example, on Figure 2, this would be the K punching associated with relay DS-0, of connector 0, frame 0, marker 0).

9.511 Momentarily operate each DS relay in the J-K chain. Check that battery is removed from the K punching or the lamp is extinguished each time relay DS is operated.

9.512 Move the test connection to the next K punching toward relay CK6 and momentarily operate each DS relay in the chain toward relay CK6 and observe that the chain is opened.

9.513 Continue in this manner moving to the next K punching after each test.

NOTE: Refer to Cautions 1 and 2 under Paragraph 1.22.

9.52 With any S relay of a connector circuit operated, momentarily operate each DS relay of the connector circuit and observe that relay CK6 of the associated marker operates while relay DS is operated.

9.521 Then with any DS relay of a connector operated momentarily operate each S relay of the connector circuit and observe that relay CK6 of the associated marker operates while relay S is operated.

9.6 Check that direct ground is present on contact 2B of each DS relay.

9.7 Connector Start Chain Circuit

9.71 Check that the operation of the CB relay associated with the first choice marker transfers the start lead to the winding of relay DS associated with the second choice marker.

9.72 Check this chain circuit through to the winding of relay DS 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).

9.8 CB Relay Locking Circuit

NOTE: Refer to Cautions 1 and 2 under Paragraph 1.22.

9.81 Operate any S relay of the connector circuit to provide locking ground for relay CB. Operate all CB relays of the connector circuit except the first CB relay. Check that the operated CB relays lock.

9.811 Operate the first CB relay and observe that the other CB relays release and the first CB relay locks.

9.82 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.

9.83 Continue as in 9.81 and 9.82 until each CB relay is used.

9.84 On one of the above tests prove relay CB locking ground at each S relay of the connector circuit by operating a second S relay and releasing the first S relay. Continue this procedure until each S relay of the connector circuit has been used.

9.85 Block GT relay operated, then at the CHOICE terminal strip connect battery to all A or B punchings, one at a time, and observe that the associated DS or TM relay operates.

9.851 Connect to the A punching if the connector is first choice to the marker associated with the A punching, otherwise, connect to the B punching. Remove block from GT relay.

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 marker circuit at the trouble indicator frame. Observe that relays CBR and CBS (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 TM relays operated, operate relays CBR and CBS of the marker which in turn operate the associated CB relays of the connector circuits. This feature was verified on the test per 9.2 which checks that the TM relays operate the CBR and CBS relays and the test per 10.2 which checks that the CBR and CBS relays operate the associated CB relays.

10.3 Operate the SPL relay and check that all CB relays of the connector circuit operate except the CB relays (CB-0 and CB-1) associated with terminating markers 0 and 1.

10.4 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 key BAT at the trouble indicator frame operated, operate each S 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 (Fig. 2)

12.1 Time Alarm

NOTE: These tests apply on circuits equipped per issues prior to issue 13B of SD-25036-01.

12.11 Block relay CA1 operated. Relay CA2 operates when contacts B of the interrupter make and 5 to 6 seconds later relay CA4 operates. If contacts B and F of the interrupter are reversed, relay CA4 will operate about 1 second after CA2.

12.12 Lamp CT lights at the trouble indicator frame. A major alarm is given (marker connector time alarm).

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

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

12.15 Operate relay TM and observe that TMS2 relay of the associated marker operates.

12.151 Block relay TMS2 normal. Relay CA5 operates immediately and lights lamp C. Relay CA3 operates when contacts B of CA2 interrupter make and 5 to 6 seconds later relay CA4 operates.

12.152 If the B and F contacts of the interrupter are reversed relay CA4 will operate about 1 second after CA3. The alarm again functions as before.

12.16 Release relay TM and remove block from TMS2 relay in the terminating marker.

12.17 Repeat the tests outlined in Paragraphs 12.15 and 12.16 on each TM relay.

12.2 False Ground on Leads RL and TRL (Fig. 10)

12.21 Momentarily ground lead RL at punching 14, terminal strip SDR or MKR. This operates relay GR which locks and lights lamps GR on the trouble indicator frame. Lamp CT at the trouble indicator frame lights and a major alarm is given.

12.211 Operate key BAT on the trouble indicator frame and observe that lamp C (connector) associated with the connector circuit under test lights. Momentarily operate key RLA to restore the circuits to normal.

12.22 Momentarily ground lead TRL at punching 4, terminal strip SDR. The same results are obtained as for the test described in Paragraph 12.21.

12.23 Operate relay GRA and then momentarily ground lead RL at punching 14 and lead TRL at punching 4, terminal strip SDR. Observe that the lamps and alarm described in 12.21 are not received.

12.24 Check that each TM relay when operated operates relay GRA.

13. ALARM FEATURES (Fig. 12)

13.1 Block relay CA1 operated. Observe that relay CA2 operates when contact B of the CA1 interrupter makes, and 5 to 6 seconds later CA4 operates and locks.

13.11 If the B and F contacts of the interrupter are reversed relay CA4 will operate about 1 second after CA2. Lamp CT at the Terminating Trouble Indicator Frame lights and the major alarm functions.

13.12 At the same time the minor alarm functions and lamp TFA at the trouble indicator frame lights.

13.13 Operate key BAT at the trouble indicator frame. Lamp C associated with the connector under test lights.

13.2 Release relay CA1. The major alarm restores to normal. Operate key LORL momentarily at the Terminating Trouble Indicator Frame. The minor alarm restores to normal and lamp TFA is extinguished. The proper C lamp at the Terminating Trouble Indicator Frame is also extinguished.

13.3 Block operated an S relay on the frame. Verify the same results as in Paragraph 13.1. Release the relay and operate key LORL momentarily. The alarms and TFA lamp restore to normal. The proper C lamp is extinguished.

NOTE: When a dial pulse terminating sender is associated with the operated S relay, block relay RL in the sender circuit normal.

13.4 Repeat the test outlined in Paragraph 13.3 on each S relay of the connector circuit under test.

13.5 Block operated one of the TM relays in the connector circuit under test and check that ground is connected to the TM lead of the terminating marker by observing that relay TMS2 of the terminating marker operates.

13.51 Block relay TMS2 nonoperated. The same C lamp as in Paragraph 13.1 lights. Observe that relay CA3 operates when contacts B of the CA2 interrupter make and CA4 relay operates 5 to 6 seconds later.

13.52 If the B and F contacts of the interrupter are reversed relay CA4 will operate about 1 second after CA3. Lamp CT lights and the major audible alarm functions. Verify that the proper GT and GT1 relays associated with the connector under test operate.

13.6 Restore relay TM to normal. The major audible alarm restores to normal. Relays GT and GT1 release. Remove block from relay TMS2 in the terminating marker.

13.7 Repeat the tests outlined in Paragraphs 13.5 and 13.6 on each TM relay of the connector circuit under test.

14. SEQUENCE CIRCUIT (Fig. 12)

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

NOTE 2: When testing additions the tests per Paragraphs 14.01 to 14.13 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 relay TFA at Terminating Trouble Indicator Frame. Insulate No. 45 contact and block operated the TM relay associated with the first terminating marker in the connector circuit under test. The associated GT and GT1 relays operate.

14.02 Block TR relay normal and then connect 48 volt battery through Test Receiver R-9572 to the No. 27 armature of one of the S relays associated with the connector under test. Verify that all DS relays remain normal.

14.021 Remove insulation from No. 45 contact and verify that the associated DS relay operates.

14.022 Remove block from TR relay and then remove block from TM relay. Remove battery from the No. 27 armature of the S relay. The TM and DS relays release.

14.03 Again connect battery through Test Receiver R-9572 momentarily to the No. 27 armature of the S relay verifying that relay DS associated with the first choice marker of the connector circuit under test operates momentarily.

14.04 Repeat test 14.03 two times, once with bottom 3 contact of relay GT insulated and again with bottom 6 contact of relay GT1 insulated and observe the same results. Remove insulator on completion of each test.

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

14.06 Block normal relay CA6 of all connector circuits in the group under test. Block operated one of the S relays associated with the second connector circuit in the marker group under test. Manually operate relay GT associated with all other connectors in the same marker group and verify that relays GT and GT1 lock operated.

14.061 Manually operate relay GT associated with the second connector. All GT relays in the group release.

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

14.071 Manually operate relay GT associated with the first connector. All GT and GT1 relays in the group release.

14.08 Release relay S associated with the first connector. In like manner continue the tests by blocking operated one S relay in each remaining connector in turn and then verifying that GT and GT1 relays, associated with those connectors in the group other than the one associated with the operated S relay, lock operated.

14.081 Verify also that these GT and GT1 relays release when the GT relay, associated with the operated S relay of the connector, is operated manually. Release the operated S relay on completion of each test.

14.09 When Figure 10C and ZB wiring are furnished repeat the tests in Paragraphs 14.06 to 14.08 with the following change: manually operate relay SPL (instead of relay GT) associated with the connector in which relay S is blocked operated and observe that all GT and GT1 relays in the group release.

14.10 At the miscellaneous terminal strip at any connector frame in the marker group, temporarily ground terminal 46 (CP lead). Manually operate relay GT in each connector circuit of the group. Relay GT and GT1 of all connector circuits lock operated.

14.101 Operate and release key TLO at the Terminating Trouble Indicator Frame. Check that relays GT and GT1 of each connector circuit release. Remove temporary ground from terminal 46 on completion of test.

14.11 Repeat tests 14.06 to 14.10 inclusive on each group of connectors. Remove the block from the TFA relay at the Terminating Trouble Indicator Frame at the conclusion of the test.

14.12 Block normal CA2 relay, then block operated one of relays S in the first connector circuit in the marker group under test.

14.121 Operate manually relay GT associated with the second connector circuit in the marker group. Relay GT should lock operated and 2 to 5 seconds later, release. Lamp TFA at the Terminating Trouble Indicator Frame lights and the minor alarm sounds.

14.122 Operate key TLO momentarily to restore the alarm and TFA lamp to normal.

14.123 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.

14.124 At the conclusion of this test, restore the S relay to normal and remove block from CA2 relay.

14.13 Repeat the tests outlined in Paragraph 14.12 blocking one of the S relays associated with the second connector in the marker group operated and manually operating relay GT of the first connector. Verify the same results. Restore relay S to normal at the conclusion of this test. Remove block from relay CA6 of all connector circuits.

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

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

15. INDICATIONS AT TROUBLE INDICATOR FRAME

15.1 Block operated relay LP of the Terminating Trouble Indicator to supply battery for lighting the CF, CN and SN lamps. Block operated relay TIA of the terminating marker to supply ground for operating the CF, CN and SN relays of the trouble indicator.

15.2 Operate relays TM, one at a time, associated with the marker whose TIA relay is operated. There is one TM relay in each connector associated with the marker. As each TM relay is operated observe that the number of lamp CF which lights agrees with the number of the connector frame and the number of lamp CN which lights agrees with the number of the connector circuit on the frame. Make this test using each marker.

15.3 Operate relay TM of a connector circuit associated with the marker whose TIA relay is operated. Then operate all S relays of this connector, one at a

time, and observe that the number of the SN lamp which lights agrees with the number of the operated S relay.

15.31 Make this test using each connector circuit. It is necessary to make this test using only one TM relay of a connector circuit but other TM relays of each connector circuit should be used to light one SN lamp as a matter of checking the ground connection through all TM relays.

15.4 These tests can be facilitated by operating relay TIA in each terminating marker, if this is feasible, and making all tests at one time. Release all relays at completion of the test.

16. LEADS TO TERMINATING MARKER APPLIQUE CIRCUIT (TMA)

16.1 At first preferred connector of Marker to be tested, block operated relay TM. Verify associated TMA relay operates.

No arrows are shown due to extinsive changes.

16.2 While ground is applied at last preferred connector "S" relay, verify proper relay operates in TMA as follows:

GRD "S" Terminal	TMA	Operated Relay
41	6	TST 1
45	1	NS 0
46	2	NS 1
47	3	NS 2
48	4	NS 4

16.21 Remove blocking tool in relay TM.

16.3 Using a sketch of the overall marker control and chain circuits, example shown in Figure 2, verify all leads and multiple as stated in Paragraphs 16.1 and 16.2 of each equipped TMA.

Manager, Crossbar Product Engineering
Control Center

Reason for Reissue:
(1) Include changes required for DID-LLP.
(2) Make a general revision to update to current engineering standards.