TEST OF ORIGINATING SENDER TEST FRAME

CONTENTS

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1. GENERAL INFORMATION

1.1 Refer to Section 161 for general information concerning the operation of the originating sender test circuit.

1.2 Test Sequence: These tests should be made before routine tests of the originating and auxiliary senders are started.

2. TEST EQUIPMENT

Amt	ITE	Description
1	4029	Pulse Checking Test Set
	KS-3008	Stop Watch
	J24753A or 4325	Timing Test Set

3. DIAL PULSING, KEY PULSING AND REVERTIVE PULSING CIRCUIT PER CENT BREAK TEST

3.1 PLS and CTG Relays - Code Key and Dial Pulse (-0106)

3.11 Remove the INT, INT1, PLS and CTG relays from the test frame and check adjustments using the 209FF relay test panel, located on relay rack. Replace relays on test frame.

3.12 Connect 48V battery and ground to the A jack of ITE-4029 (Pulse Checking Set) using an ITE-9598 cord. Connect the P jack of set to the PLS jack of test frame with an ITE-0601 cord.

3.13 Operate the 26 P.P.S. MIN BREAK key of frame and block the ST and SY relays of the dial pulse circuit operated.

3.14 Make calibration, adjustment, per cent break and pulse speed tests, outlined in Handbook 50, Section 5, Paragraph 4.

3.15 Check that the pulse output of the PLS relay meets the requirements specified on the PLS and CTG 26 P.P.S. Min Break Key Operated graph, shown on the circuit requirement table as follows:

(a) Plot the readings of ITE-4029 on the scales of the graph. Extend a horizontal line from the "Per Cent Break" and a vertical line from the "Pulses per Second" values, until the lines intersect on the graph.

(b) If the point of intersection falls within the small diamond (PLS solid line bounded) area, the pulse output of the PLS relay is satisfactory.

(c) If the lines intersect outside of the PLS area, increase or decrease the values of the K and L (36 type) resistances as indicated in the (dashed line bounded) area in which the point of intersection falls. Repeat tests and if necessary change resistance values until the pulse output of the PLS relay is satisfactory.

3.16 Release the 26 P.P.S. MIN BREAK key and operate the 26 P.P.S. MAX BREAK key. Do not interchange INT, INT1, PLS and CTG relays as all the following adjustments are to be made at the resistances. Make test and increase or decrease the values of the M, N or P resistances to meet requirement of the PLS relay output when the 26 P.P.S. MAX BREAK key is used.

3.17 Connect the P jack of ITE-4029 to the CTG jack and perform tests. Check that the CTG relay pulse output is satisfactory for both 26 P.P.S. MIN and MAX BREAK keys. The point of intersection should fall within the six sided (CTG solid line bounded) area.

3.18 Make tests using the 7 and 15 P.P.S. keys, and change the values of the resistances indicated on respective graphs so that the pulse outputs of the PLS and CTG relays are satisfactory. Repeat all above tests and recheck that all requirements have been met.

3.19 To check the between digits interval, operate the 26 P.P.S. MAX BREAK key, insulate the 1B of PP relay (dial pulse control) and block operated the PP, ST and SY relays.

3.191 Connect P jack of set to PLS jack and perform tests as outlined in Paragraph 3.14.

3.192 Check that the PLS relay meets requirements specified in the pulse output (PLS relay under control of INT, INT1, BD1 and BD2 relays) graph.

3.2 FND and CHK Relays - Route Keys and Revertive Pulse (-0108)

3.21 Check the RVP, RVP1, FND and CHK relays using the 209FF relay test panel.

3.22 Connect 48V battery and ground to the ITE-4029 set. Connect the P jack of set to the FND jack of test frame.

3.23 Insulate 2T of BT relay (REV PLS) and perform tests outlined in Paragraph 3.14.

3.24 Check that the FND relay meets the requirements specified on the pulse output FND and CHK relays graph (SP key normal) shown in the circuit requirement table as follows:

(a) Plot the readings of ITE-4029 on the scales of the graph. Extend a horizontal line from the Per Cent Break and a vertical line from the Pulses per Second values, until the lines intersect on the graph.

(b) If the point of intersection falls within the small diamond (FND solid line bounded) area, the pulse output of the FND relay is satisfactory.

(c) If the lines intersect outside of the FND area, increase or decrease the values of the A and B (36 type) resistances as indicated in the (dashed line bounded) area in which the point of intersection falls. Repeat tests and if necessary change resistance values until the pulse output of the FND relays is satisfactory.

3.25 Operate the SP key and repeat test as outlined in Paragraphs 3.23 and 3.24 and check that the FND relay pulse output is satisfactory for the SP key operated.

3.26 Connect P jack to ITE-4029 to the CHK jack and perform tests. Check that the CHK relay pulse output is satisfactory for both the SP key normal and SP key operated, the point of intersection falling within the six or four sided (CHK solid line bounded) area, respectively.

3.27 Repeat test of FND and CHK relays and recheck that all requirements have been met.

3.3 KP2, KP3 and KP4 Relays - Key Pulsing (-0123)

3.31 Connect 48V battery and ground to the ITE-4029 set. Connect the P jack of set to the KP2 jack of test frame.

3.32 Perform tests outlined in Paragraph 3.14. If pulsing fails to start, momentarily connect ground to 1T of C relay.

3.33 Check that the pulse output of the KP2 relay meets requirements specified on the Pulse Output of KP2, KP3 and KP4 relays graph, (SKP key normal) shown in the circuit requirement table as follows:

(a) Plot the readings of ITE-4029 on the scales of the graph. Extend a horizontal line from the Per Cent Break and a vertical line from the Pulses per Second value until lines intersect on graph.

(b) If the point of intersection falls within the area on the graph the pulse output of the KP2 relay is satisfactory.

3.34 Operate the SKP key and repeat test. Check that the KP2 relay meets requirements shown on the SKP key operated graph.

3.35 Connect the set to the KP3 jack and repeat test as outlined in Paragraphs 3.32 to 3.34 to check the KP3 relay.

3.36 Connect the set to the KP4 jack and check the KP4 relay.

4. CAPACITOR TIMED RELAYS

4.1 Speed Test of Sender OF Relay - Overflow Control for Sub. Sender (-0119)

4.11 This test measures the operating time of the RV2 relay using the pulse checking set ITE-4029. A continuous pulsing condition is set up by pulsing the RV1 relay using the slow revertive pulse interrupter.

4.12 Insulate 4, 5, 8 and 9T of FR relay of the OFL-CONT circuit for subscriber senders. Connect ground to terminal 14 (armature) of the CHK relay of the revertive pulsing circuit, and connect terminal 15 of the CHK relay to the 2T winding of the RV1 relay.

4.13 Connect battery and ground to ITE-4029 and connect the P terminal to the No. 4 terminal (back contact) of RV2 relay, using an ITE-9528 cord equipped with a 419A test connector.

4.14 Calibrate the ITE-4029 as described in Section 5 of Handbook 50, Paragraph 4.

4.15 Insulate 1 and 2T of BT relay in the REV-PLS circuit. Operate the SP and ST keys.

4.16 Block operated the FR relay and check the pulses per second and per cent break. From this data compute the time in thousandths of a second that ground is connected to the back contact of the RV2 relay as follows:

$$\frac{100 - \text{Per Cent Break Reading}}{100 \times \text{Pulses Per Second}} = \text{Time in Seconds}$$

The result should be .075 ± .007 seconds.

4.17 Operate the MTG key and again check the per cent break and pulses per second. Compute the result as in Paragraph 4.16. The result should be .040 ± .005 seconds.

4.2 Timing of Trunk Closure - Operator Class Control for K.P. Sender (-0129)

4.21 This test checks the slow operating features of the capacitor timed circuit consisting of the TC1 relay and associated network.

4.22 Insulate 2 and 3T (Z) relay, Connect 6T winding (RB) to 3 (TC1) relay. Connect ground at 1T (SB) relay. Block the G and RB1 relays normal.

4.23 Connect 48V battery and ground to the ITE-4029 set and connect the P terminal of the set to 4 (TC1) relay.

4.24 Calibrate the ITE-4029 set as specified in Handbook 50, Section 5.

4.25 Block operated C relay to start TC and TC1 relays pulsing. Take per cent break and pulses per second readings.

4.26 Compute the operating time of TC1 as follows:

$$\frac{100 - \text{Percent Break Reading}}{100 \times \text{Pulses Per Second}} = \text{Time in Seconds}$$

The result should be .035 ± .005.

4.3 Timing of Trunk Closure - Overflow Control Circuit for Subscriber Sender (-0119)

4.31 This test checks the slow operating features of the capacitor timed TC3 relay and network. This relay should operate in approximately .235 seconds. By means of the IP interrupter in circuit 0117 the relay is checked to operate in .295 seconds and nonoperate in .195 seconds.

4.32 Insulate 5 and 6T (C) relay. Block the C and G relays operated.

4.33 Connect 1B (TC) to 5T (AS) relay (B contact of the IP interrupter). The TC2 relay pulses which in turn causes TC3 to pulse. Using a test receiver check for interrupted ground at make contact (No. 3) of TC3 relay.

4.34 Move the connection from 5T (AS) to 5B (F1) relay (F contact of IP interrupter). The TC2 relay continues to pulse. TC3 should not follow the pulses. Check for absence of interrupted ground at the make contact (No. 3) of TC3 relay.

4.4 TO and WO1 Relays

4.41 Test Preparation

4.411 Connect 48V battery and ground to J24753A or ITE-4325 test set 48V jack using P3K or ITE-9598 cord.

4.412 Connections for tip (white), ring (black) and sleeve (red) leads of W3M or ITE-9607 cord are shown on the circuit requirement tables on page 3 of SD-25221-0142. Connect the cord to TST-1 jack.

4.413 Set the SEND key and REC switch as shown in test set preparation column on page 3 of SD-25221-0142.

4.414 Set the MCF to normal.

4.415 Set the MIL-SEC switch for the range which will just cover the maximum time requirement as given in the circuit requirement.

4.42 Calibration

4.421 With the BAT key to OFF position, the meter should read zero. If not, set pointer to zero with the adjusting screw on the meter.

4.422 Set the BAT key to ON. Allow test set to warm up for 30 seconds. BAT lamp lights.

4.423 Adjust the meter to read zero by means of the ADJ-0 knob.

4.424 Full scale calibration. Operate key TST to CAL and adjust meter to full scale deflection with CAL knob.

4.425 Restore TST key to normal. The meter reads zero and test set is ready for measurement.

4.426 Recalibrate the test set per Paragraphs 4.423 and 4.424 immediately before making each test or if MIL-SEC switch setting is changed.

4.43 Test Operation

4.431 Operate and hold TST key to OPR position until meter pointer comes to rest.

4.432 Immediately release and reoperate TST key to OPR position to recycle timer.

4.433 Observe meter reading when pointer comes to rest. Release TST key.

4.434 To obtain measured time in MIL-SECONDS, refer to table below:

MIL-SEC SETTING	
0-20	Divide reading by 5
0-100	Direct reading
0-500	Multiply reading by 5
0-5000	Multiply reading by 50

4.435 Compare the test time obtained with the time requirements of the circuit under test. The test time must lie within the limits given.

4.436 When no timing tests are being made, release the BAT key to conserve battery life.

4.44 Check that relays TO and WO1 meet the timing requirements shown on page 3 of SD-25221-0142.

5. TEST OF INTERRUPTERS

5.1 CA and RP (Conn. Ckt. -0103)

(a) Manually operate CA2 relay. Check that T1 relay operates (Max. 2.75 Sec.) and that the T2 relay operates about 2 seconds later. If the B & F contacts are reversed the T2 relay will operate almost immediately (0.17 sec.).

(b) Release CA2 and operate RP relay. Check T1 relay operates (Max. 1.3 sec.) and that the T2 relay operates about 1 second later. If the B & F contacts are reversed the T2 relay will operate almost immediately (0.17 sec.).

(c) Release RP relay. Insulate 3T and 4T of T1 relay. Connect ground to the B lead to the RP interrupter. (Punching 81 on MISC. T.S.). T1 relay operates. Check that T2 relay does not operate after 3 seconds. Remove insulator and ground connection.

5.2 IOF Interrupter (OFL Control Circuit -0119)

(a) Connect battery through a receiver to 1B of I01 relay. Connect ground to the A lead to the IOF interrupter (punching No. 17 on MISC. T.S.). Observe that a click is heard in the receiver about one second after I01 relay operates. If the B and F leads to the interrupter are reversed and click will be heard almost immediately (0.17 second) after the I01 relay operates.

(b) Insulate 1T of I01 relay and move the ground from the A to the B lead (punching No. 27 on the MISC. T.S.). The I01 relay operates. Note that no clicks are heard in the receiver. Remove insulator and ground connection.

5.3 T Interrupter (Sender Group Test Circuit -0131)

(a) Connect ground to the A lead to the T interrupter (punching No. 92 on the MISC. T.S.). The T relay operates (maximum 6.07 seconds) and the T1 relay operates about 6 seconds (5.93 seconds) after T. If the B and F leads to the interrupter are reversed the T1 relay will operate about 1 second (1.07 second) after T.

(b) In the CONN (connector) circuit block nonoperated relay (W1) and block operated (BK) relay. Verify that (TA) lamp lights.

(c) Insulate 4T and 5T of T relay. Transfer the ground from the A to the B lead (punching No. 82 on the MISC.T.S.) and observe that (TA) lamp is extinguished and the T relay operates. Note that the T1 relay does not operate. Leave the ground at the B lead at least 7 seconds to make certain the interrupter has had time to make a complete cycle. Remove insulator and ground connection.

→ 6. AUXILIARY SENDER TEST FEATURES

6.1 Check MF receiver as outlined in Handbook 50, Section 31.

6.2 Check of Receiver Leads

6.21 Block operated KP1 relay in MF receiver and LMP relay in test circuit.

6.22 Operate in turn, relays 0, 1, 2, 4, 7 and 10 in the MF receiver and check that the corresponding N- relays operate and associated P- lamps light.

6.3 Check of Operating Paths

6.31 Registration

6.311 Using a solid MB plug connected to ground, plug into ACA 2 to 9 jacks in turn, checking for operation of associated A0-7 relays (2 out of 5) and SAS relay.

6.312 Repeat Paragraph 6.311 to ACB 0-1 jacks checking operation of B 0-1 relays.

6.313 Repeat Paragraph 6.311 to ACC 0-9 jacks, checking operation of associated C 0-7 relays (2 out of 5).

6.314 Repeat Paragraph 6.311 to 7DG-PL and 7DG-DL jacks, checking operation of 7P and 7D relays respectively.

6.315 Repeat Paragraph 6.311 to WO, WO1 and WO2 jacks, checking operation of WO, WT and WOL relays respectively.

6.316 Repeat Paragraph 6.311 to TO and TO1 jacks, checking operation of TO relay.

→ Arrowed lines indicate new or changed information.

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Reason for Reissue:
To include test of auxiliary sender test features.

Replaces Section 161.2 of 8-17-44.