

**DIGITAL DATA SYSTEM**  
**950A TESTBOARD (J70176A AND B)**  
**INSPECTION AND MAINTENANCE**  
**TESTS**

**1. GENERAL**

**PAGE**

**1.01** This section contains information concerning the testing of components in a 950A testboard for maintenance purposes. A description of the tests, apparatus used to perform the tests, and test procedures are included in this section.

**C. KS-20908 DTS Receiver Test Using Control and Test Code Generator:**

This test checks the indicators on the front panel of the receiver using the control and test code generator in the testboard. . . . .

**7**

**1.02** This section is reissued to:

- Add information concerning the alarm indicator panel.
- Replace the HL49 circuit pack (CP), which is rated manufacture discontinued (MD), with the HL49B CP.
- Make revisions due to equipment changes.

**D. Test Code Generator Test:**

This test checks the test code generator (part of HL66 and HL67 CPs) and the wiring between the CPs and the cord reel units. . . . .

**7**

Since this reissue constitutes a general revision, arrows ordinarily used to indicate changes have been omitted.

**E. Control Code Generator Test:**

This test checks the CONT CODE switch, part of HL66 and HL67 circuit packs (CPs), the wiring between the CPs and the switch, and the wiring between the CPs and cord reel units. . . . .

**8**

**1.03** The tests included are as follows:

**PAGE**

**A. Routine Test of Clock Line:**

This test checks the spare clock line for presence of both 8- and 64-kHz clocks, the clock alarm circuitry, and clock failure lamp associated with the CLOCK switch. . . . .

**3**

**F. Cord Reel Test:** This test checks the continuity of the cord reels and wiring in a cord reel unit. . . . .

**9**

**B. KS-20908 Data Test Set (DTS) Receiver and KS-20909 DTS Transmitter Test:**

This test checks the proper operation of the circuitry, controls, and indicators associated with the transmitter and receiver. . . . .

**3**

**G. 19C2 Key Telephone Unit Power Unit Test:**

This test checks the 19C2 power unit for proper input and output voltages. . . . .

**9**

**H. 74A and 78A Power Unit Test:**

This test checks the output voltages of the 74A or 78A power unit for proper voltage level. . . . .

**10**

**I. Clock Terminator Card and Driver Card Test:**

This test checks the output of the clock drivers

**NOTICE**

Not for use or disclosure outside the  
Bell System except under written agreement

	PAGE
and clock terminator for presence of the 8-kHz and 64-kHz clocks. . . . .	10
<b>J. Test of Telephone Pickup</b> <b>Keys:</b> This test checks each pickup key associated with the telephone circuitry for proper operation. . . . .	11
<b>K. Buzzer Test:</b> This test checks the AUD OFF key for proper operation. . . . .	11
<b>L. TEL ALM Key Test:</b> This test checks the ability of the TEL ALM key to connect the CO telephone alarm to and remove it from the telephone circuitry. . . . .	11
<b>M. HOLD Key Test:</b> This test checks the ability of the HOLD key to place a telephone call on hold and to remove it from hold. . . . .	11
<b>N. Headset Jacks and Telephone Handset Test:</b> This test checks the headset jacks and the telephone handset for proper operation. . . . .	11
<b>O. Multipoint Signaling Unit (MSU) Display Readout Test:</b> This test checks each segment of all the display readouts to verify that all segments light. . . . .	12
<b>P. MSU TST and SIG Key and HL81 CP Relay Test:</b> This test checks the TST key, SIG key, and the relay on HL81 CP for proper operation. . . . .	12
<b>Q. MSU BRANCH and CLR Keys and Part of HL81 and HL82 CPs Test:</b> This test checks the BRANCH and CLR keys and part of the circuitry on HL81 and HL82 CPs for proper operation. . . . .	12
<b>R. MSU Alarm Function Test:</b> This test checks the visual alarm indication that flashes when the TRMT cord reel plug is removed from a testboard or jack bay jack after a BRANCH key	

	PAGE						
has been depressed, but before the CLR key is depressed. . . . .	13						
<b>S. MSU Reception and Display of Test Alert Code Test:</b> This test checks the ability of the MSU to receive and display the test alert (TA) code (01101100). . . . .	13						
<b>T. MSU Idle Code Transmit Test:</b> This test checks the ability of the MSU to transmit the idle code (11111110) for one-half second. . . . .	13						
<b>U. Testboard Alarm Circuit Test:</b> This test checks the operation of the alarm circuit and the associated cutoff key and indicators. . . . .	14						
Test A is the only test in this section which is used for routine maintenance and should be performed daily. Tests B through U are maintenance tests used only for checking proper operation of the 950A testboard. These tests should be performed when the components in the testboard are suspected of operating improperly.							
<b>1.04</b> When one or more of the six jacks in one of the jack modules is suspected of operating improperly, the jack module should be replaced. When any of the components in the testboard become defective and must be replaced, refer to the section entitled Digital Data System—950A Testboard (J70176A and B)—Maintenance Procedures (666-600-300) for information concerning the removal and replacement of the components.							
<b>2. APPARATUS</b>							
<b>2.01</b> This part contains lists of test equipment required to test the components in the 950A testboard.							
<b>2.02</b> The test equipment used in each of the tests is listed below:							
<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">TEST</th> <th style="text-align: left;">EQUIPMENT</th> </tr> </thead> <tbody> <tr> <td>Test A</td> <td>None</td> </tr> <tr> <td>Test B</td> <td>KS-20909 DTS (located in testboard)</td> </tr> </tbody> </table>	TEST	EQUIPMENT	Test A	None	Test B	KS-20909 DTS (located in testboard)	
TEST	EQUIPMENT						
Test A	None						
Test B	KS-20909 DTS (located in testboard)						

TEST	EQUIPMENT
Test C	Control and test code generators (located in testboard)
Test D	KS-20908 DTS (located in testboard)
Test E	KS-20908 DTS (located in testboard)
Test F	KS-20908 DTS (located in testboard)
Test G	KS-16979-L1 volt-ohm-milliammeter (VOM) or equivalent
Test H	KS-16979-L1 VOM or equivalent
Test I	KS-20908 and KS-20909 DTSs (located in testboard)
Tests J-O	None
Test P	KS-20908 and KS-20909 DTSs (located in testboard)
Test Q	None
Test R	None
Test S	KS-20909 DTS (located in testboard)
Test T	KS-20908 DTS (located in testboard)
Test U	None

**Note:** Information concerning operation of the KS-20908 and KS-20909 DTS is located in Sections 107-600-100 and 107-601-100.

### 3. TEST PROCEDURES

**3.01** This part contains procedures for using the test equipment to test the components in a 950A testboard (Fig. 1).

#### A. Routine Test of Clock Line

**Note:** The testboard should not be used for testing channel lines while this test is being performed.

**3.02** Operate the CLOCK switch to the middle position.

**Requirement:** The clock failure lamp lights.

**3.03** Operate the switch to position B.

**Requirement:** The clock failure lamp extinguishes.

**3.04** Operate the switch to position A.

**Requirement:** The clock failure lamp remains extinguished.

#### B. KS-20908 Data Test Set (DTS) Receiver and KS-20909 DTS Transmitter Test

**3.05** Condition the transmitter as follows:

- (1) OUTPUT switch to BIPOLAR.
- (2) DATA RATE switch to 2.4.
- (3) MODE switch to REPEAT.
- (4) Insert the TRMT cord reel plug into the RCV jack (Fig. 2) in the cord reel unit.

**3.06** Condition the receiver as follows:

- (1) INPUT switch to BIPOLAR.
- (2) DATA RATE switch to 2.4.
- (3) COUNTER switch to BIT ERRORS.
- (4) TEST WORD switch to 511.
- (5) SUBRATE CHANNEL switch to SINGLE.

**3.07** Operate the transmitter and receiver POWER switches to ON.

**Requirement:** Switch tops and CLOCK indicators light. If the receiver DTS is not equipped with a TERMINATE key, the TERMINATED indicator will light.

**3.08** Depress the receiver TERMINATE key if the receiver is equipped with this key.

**Requirement:** The TERMINATED indicator lights.

**3.09** Depress the transmitter RESET key.

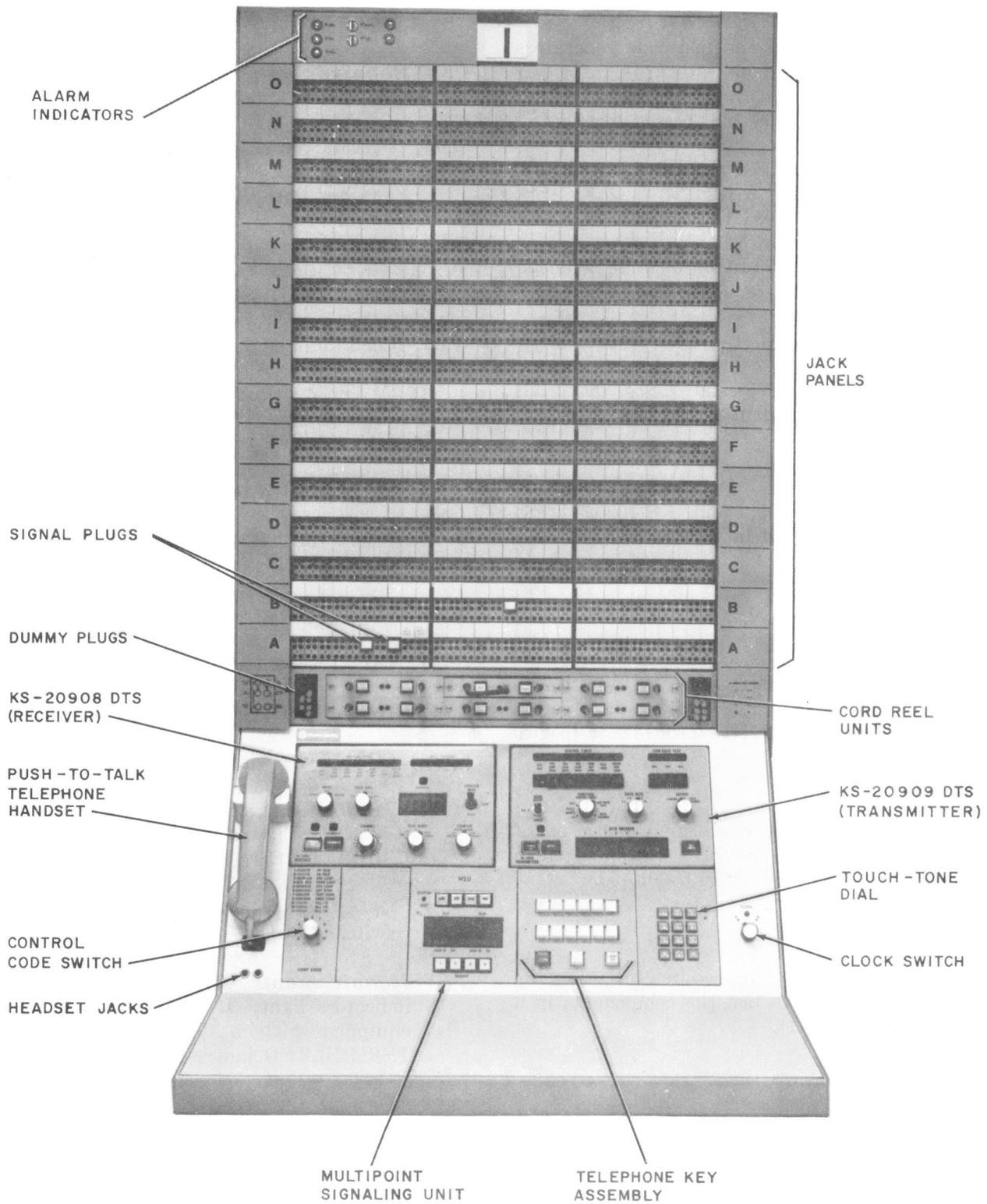


Fig. 1—Front View of 950A Testboard

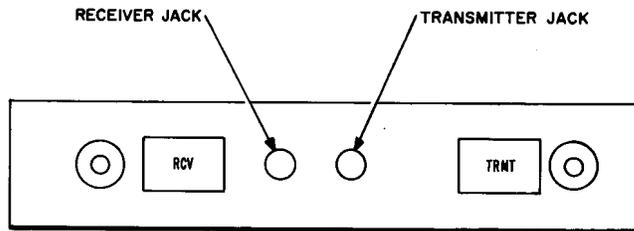


Fig. 2—Test Set Jack Locations on Cord Reel Unit

3.10 Check the transmitter test word output, the receiver counter display, COUNTER MODE switch, and TEST WORD switch as follows:

- (1) Place the transmitter FUNCTION switch to 511 TEST WORD.
- (2) Momentarily operate the receiver COUNTER MODE switch to RESET and leave in the COUNT position.

**Requirement:** The OVERFLOW indicator is extinguished and the counter display registers zero.

- (3) Move the receiver TEST WORD switch to 2047.

**Requirement:** The counter display runs freely and the OVERFLOW indicator lights when the counter exceeds 999.

- (4) Move the receiver COUNTER MODE switch to HOLD.

**Requirement:** The counter display stops counting.

- (5) Move the receiver TEST WORD switch to 511.

- (6) Momentarily operate the receiver COUNTER MODE switch to RESET and leave in the COUNT position.

**Requirement:** The OVERFLOW indicator extinguishes and the counter display registers zero.

- (7) Repeat Steps (2) through (6) above with the transmitter and receiver DATA RATE switches to 4.8, then to 9.6, and finally to 56.

- (8) Move the receiver COUNTER MODE switch to HOLD.

- (9) Move the receiver TEST WORD switch to LOOPED.

- (10) Move the transmitter FUNCTION switch to LOOPBACK TEST.

- (11) Depress the transmitter RESET key.

- (12) Depress the transmitter DSU LOOPBACK TEST key.

- (13) Move the receiver COUNTER MODE switch to COUNT.

**Requirement:** The counter display registers errors.

- (14) Move the receiver COUNTER MODE switch to HOLD and depress the transmitter RESET key.

- (15) Depress the transmitter OCU LOOPBACK TEST key.

- (16) Momentarily operate the receiver COUNTER MODE switch to RESET and leave in the COUNT position.

**Requirement:** The counter display registers errors.

- (17) Move the receiver COUNTER MODE switch to HOLD and depress the transmitter RESET key.

- (18) Depress the transmitter CHAN LOOPBACK TEST key.

- (19) Momentarily operate the receiver COUNTER MODE switch to RESET and leave in the COUNT position.

**Requirement:** The counter display registers zero errors.

## SECTION 666-600-500

**3.11** Check the transmitter BYTE ENCODER switches, the ALL 1's key and the receiver BYTE PATTERN indicators as follows:

- (1) Move the transmitter FUNCTION switch to BYTE ENCODER.
- (2) Arrange the transmitter BYTE ENCODER switches to obtain all zeros and then rotate each switch, one at a time, in the same direction at least nine times.

**Requirement:** The receiver BYTE PATTERN indicator, associated with the switch being operated, lights each time a "1" appears beside the switch.

- (3) Depress the transmitter ALL 1's key.

**Requirement:** All the receiver BYTE PATTERN indicators are lighted.

**3.12** Check the transmitter and receiver CONTROL CODES as follows:

- (1) Move the transmitter FUNCTION switch to CONTROL CODES.
- (2) Depress the transmitter IDLE CODE key.

**Requirement:** The transmitter and receiver IDLE CODE indicators are lighted.

- (3) Repeat Step (2) above with each remaining transmitter CONTROL CODE key.

**Requirement:** The corresponding transmitter and receiver CONTROL CODE indicators light.

**3.13** Check the transmitter LOOPBACK TEST codes as follows:

- (1) Place the transmitter and receiver DATA RATE switches to 2.4 and place the transmitter MODE switch to REPEAT.
- (2) Place the transmitter FUNCTION switch to LOOPBACK TEST and depress and hold the DSU key.

**Requirement:** The transmitter DSU LED and receiver BYTE PATTERN indicators 3, 5, and 6 are lighted and the DSU LOOPBACK indicator is lighted.

- (3) Release the DSU key.

**Requirement:** BYTE PATTERN indicators 2 through 8 light dimly and indicator 1 is extinguished at the substrate speeds (2.4, 4.8, and 9.6 kb/s). At 56 kb/s, indicators 1 through 8 light dimly.

- (4) Depress the transmitter RESET key and depress and hold the CHAN key.

**Requirement:** The transmitter CHAN indicator and receiver BYTE PATTERN indicators 3 and 5 are lighted, and the CHAN LOOPBACK indicator is lighted.

- (5) Release the CHAN key.

**Requirement:** Results are the same as in Step (3) above.

- (6) Depress the transmitter RESET key and depress and hold the OCU key.

**Requirement:** The transmitter OCU indicator and receiver BYTE PATTERN indicators 3, 5, and 7 are lighted and the OCU LOOPBACK indicator is lighted.

- (7) Release the OCU key.

**Requirement:** Results are the same as in Step (3) above.

- (8) Depress the transmitter RESET key.

- (9) Perform Steps (2) through (8) above with the transmitter and receiver DATA RATE switches to 4.8, then to 9.6, and finally to 56.

**3.14** Check the transmitter MODE switch as follows:

- (1) Place the transmitter and receiver DATA RATE switches to 2.4.
- (2) Place the transmitter MODE switch to the ALL 0s position.

**Requirement:** All receiver BYTE PATTERN indicators are extinguished.

- (3) Place the transmitter FUNCTION switch to CONTROL CODES position and depress the IDLE CODE key.
- (4) Operate and release the transmitter MODE switch to the SINGLE position, while watching the receive BYTE PATTERN display.

**Requirement:** Receiver BYTE PATTERN indicators 2 through 7 light momentarily.

3.15 After performing the tests, operate both transmitter and receiver POWER switches to OFF and remove the TRMT cord reel plug from the RCV cord reel jack.

#### C. KS-20908 DTS Receiver Test Using Control and Test Code Generator

3.16 Check the receiver as follows:

- (1) Insert one of the CONT CODE cord reel plugs into the RCV cord reel jack (Fig. 2).
- (2) Condition the receiver as follows:
  - (a) INPUT switch to BIPOLAR.
  - (b) SUBRATE CHANNEL switch to SINGLE.
  - (c) Operate POWER switch to ON.
  - (d) Depress TERMINATE key if the receiver is equipped with this key.

**Requirement:** The switch top, CLOCK indicator, and TERMINATED indicator light.

3.17 Condition the control code generator as follows:

- (1) Set the CONT CODE switch to position 1.

**Requirement:** The receiver IDLE CODE indicator and BYTE PATTERN indicators 2 through 7 light.

- (2) Set the CONT CODE switch to position 2.

**Requirement:** The receiver IDLE CODE indicator and BYTE PATTERN indicators 1 through 7 light.

- (3) Set the CONT CODE switch to each of the positions 3 through 8.

**Requirement:** The CONTROL CODES indicator, associated with the CONT CODE switch position, lights. The BYTE PATTERN indicators display the control code selected by the CONT CODE switch.

- (4) Set the CONT CODE switch to the ALL 1's position.

**Requirement:** All BYTE PATTERN indicators are lighted.

- (5) After performing the test, operate the receiver POWER switch to OFF and remove the CONT CODE cord reel plug from the RCV cord reel jack.

#### D. Test Code Generator Test (Part of HL66 and HL67 CPs)

##### HL67 CP Test Code Output

3.18 Check the output of HL67 CP as follows:

- (1) Insert a TEST CODE cord reel plug into the RCV cord reel jack.
- (2) Condition the receiver as follows:
  - (a) INPUT switch to BIPOLAR.
  - (b) SUBRATE CHANNEL switch to SINGLE.
  - (c) Operate POWER switch to ON.
  - (d) Depress TERMINATE key if the receiver is equipped with this key.

**Requirement:** Receiver TEST CODE indicator, TERMINATED indicator, and BYTE PATTERN indicators 4, 5, and 6 light.

- (3) Perform the test on the remaining TEST CODE cord reel plugs.

## SECTION 666-600-500

### HL66 CP Test Code Output and HL67 CP Test Code Input

**3.19** Check the output of HL66 CP and the input of HL67 CP for presence of the test code as follows:

- (1) Condition the receiver test set as follows:
  - (a) INPUT switch to LOGIC FAR.
  - (b) SUBRATE CHANNEL switch to SINGLE.
  - (c) COUNTER MODE switch to HOLD.
  - (d) Operate POWER switch to ON.
- (2) Insert the receiver signal plug into the test point adapter, and insert the receiver test point adapter into TP6 and TP7 on the HL66 CP.

**Requirement:** Receiver BYTE PATTERN indicators 1, 2, 3, 7, and 8 are lighted.

- (3) Insert the receiver test point adapter into TP4 and TP5 of HL67 CP with the ground wire connected to TP1.

**Requirement:** Receiver BYTE PATTERN indicators 1, 2, 3, 7, and 8 are lighted.

- (4) After testing, restore equipment to normal.

**Note:** Pull straight out or test point adapter to avoid damaging adapter terminals.

### E. Control Code Generator Test (Part of HL66 and HL67 CPs)

#### HL67 CP Control Code Output

**3.20** Check the control code generator output as follows:

- (1) Insert a CONT CODE cord reel plug into the RCV cord reel jack.
- (2) Condition the receiver as follows:
  - (a) INPUT switch to BIPOLAR.
  - (b) SUBRATE CHANNEL switch to SINGLE.

- (c) Operate POWER switch to ON.
  - (d) Depress TERMINATE key if the receiver is equipped with this key.
- (3) Place the CONT CODE switch to each position 1 through the ALL 1's.

**Requirement:** The receiver BYTE PATTERN indicators display the control code selected.

- (4) Perform the test on the remaining CONT CODE cord reel plugs.

#### HL66 CP Control Code Output and HL67 CP Control Code Input

**3.21** Check the output of HL66 CP and the input of HL67 CP for presence of control codes as follows:

- (1) Condition the receiver test set as follows:
  - (a) INPUT switch to LOGIC NEAR.
  - (b) SUBRATE CHANNEL switch to SINGLE.
  - (c) COUNTER MODE switch to HOLD.
  - (d) Operate POWER switch to ON.
- (2) Insert the receiver signal plug into the test point adapter and insert the receiver test point adapter into TP6 and TP7 on the HL66 CP.
- (3) Operate the CONT CODE switch to each of the 12 positions and note which indicators light.

**Requirement:** Refer to Table A for the receiver BYTE PATTERN indicators that light for each CONT CODE switch position.

- (4) Repeat Step (3) with the receiver test point adapter inserted into TP4 and TP5 of HL67 CP.
- (5) After testing, restore equipment to normal.

**Note:** Pull straight out on test point adapter to avoid damaging adapter terminals.

TABLE A

CONT CODE SWITCH POSITION	ILLUMINATED BYTE PATTERN INDICATOR(S)*
1	1, 8
2	8
3	1, 2, 4, 7, 8
4	1, 2, 4, 6, 7, 8
5	1, 2, 4, 6, 8
6	1, 2, 3, 6, 8
7	1, 2, 3, 7, 8
8	1, 2, 3, 6, 7, 8
9	1, 6, 8
10, 11	NONE
ALL 1's	NONE

\* Illuminated indicators correspond to the positions of zeros in the byte selected by the CONT CODE switch.

#### F. Cord Reel Test

3.22 To verify proper operation of a cord reel unit, perform the following test:

- (1) Exchange the connector on the rear of the cord reel unit being tested with a connector of an adjacent cord reel unit; the equipment or circuitry associated with the adjacent cord reel unit connector should be operating properly.
- (2) If the connector from the adjacent cord reel unit is associated with the control or test code generator, verify that a control code or test code is available at the respective cord reel plugs. If the connector is associated with the transmitter and receiver, verify that the transmitter and receiver can transmit and receive test signals, respectively, through the cord reel plugs.
- (3) After performing the test, restore the connectors to their original positions.

#### G. 19C2 Key Telephone Unit Power Unit Test

3.23 Test the 19C2 key telephone unit (KTU) power unit as follows:

- (1) Condition the KS-16979-L1 VOM as follows:
  - (a) Insert the black and red test leads into the - (negative) jack and + (positive) VOM jack, respectively.
  - (b) Set the VOM range selector switch to ACV-150.
- (2) Use the test lead probes to check the power unit input voltage at the 117-volt ac outlet or at the power unit.

**Requirement:** The meter indicates between 105 and 129 volts ac.

- (3) Set the VOM range selector switch to ACV-15.
- (4) Connect the meter between one of the two pairs of power unit output points labeled 10V AC and 10V GRD.

**Requirement:** The meter indicates between 8.75 and 11 volts ac.

- (5) Connect the meter between the second pair of output points labeled 10V AC and 10V GRD.

**Requirement:** The meter indicates between 8.75 and 11 volts ac.

- (6) Set the VOM range selector switch to DCV-30 and the polarity-reversing switch to negative.
- (7) Connect the black and red probes to the output points labeled SIG GRD and B SIG, respectively.

**Requirement:** The meter indicates between -20 and -26 volts dc.

## SECTION 666-600-500

(8) Connect the black and red probes to the output points labeled TLK GRD and A TLK, respectively.

**Requirement:** The meter indicates between -20 and -26 volts dc.

(9) Remove the meter test lead probes from the output points.

### H. 74A and 78A Power Unit Test

**3.24** Test the 74A or 78A power unit as follows:

(1) Condition the KS-16979-L1 VOM as follows:

(a) Set the range selector switch as follows:

- DCV-30 when testing a 78A power unit
- DCV-150 when testing a 74A power unit.

(b) Insert the black and red test leads into the - (negative) and + (positive) VOM jacks, respectively.

(c) Set the polarity-reversing switch to - (negative).

(2) Connect the black test lead probe to the BAT RTN test point on the faceplate of the power unit and connect the red test lead probe to the -48V test point for a 74A power unit or to the -24V test point for a 78A power unit.

**Requirement:** The meter indicates approximately -48 volts dc for a 74A power unit or approximately -24 volts dc for a 78A power unit.

(3) Connect the red test lead probe to the -12V test point on the faceplate of the power unit.

**Requirement:** The meter indicates between -10.8 and -13.2 volts dc.

(4) Set the meter polarity-reversing switch to + (positive).

(5) Connect the red test lead probe to the +5V test point on the faceplate of the power unit.

**Requirement:** The meter indicates between 4.5 and 5.5 volts dc.

(6) Remove the meter test lead probes from the test points.

### I. Clock Terminator Card and Driver Card Test

**3.25** Test the clock terminator card (HL49B CP) as follows:

**Note:** Verify that the clock failure lamp lights when the clock select switch is in the middle position before performing this test.

(1) Operate the CLOCK select switch to position A.

**Requirement:** Clock failure lamp does not light.

(2) Operate the CLOCK select switch to position B.

**Requirement:** Clock failure lamp does not light.

**3.26** Test the clock driver card (HL52 CP) as follows:

(1) Operate the transmitter and receiver DTS POWER switches to ON.

**Requirement:** The CLOCK indicators light.

(2) Remove the transmitter DTS clock cord connector from the TRMT CLK connector (P18) and insert it into the AUX TRMT CLK connector (P20) located under the writing shelf.

(3) Remove the receiver DTS clock cord connector from the RCV CLK connector (P17) and insert it into the AUX RCV CLK connector (P19) located under the writing shelf.

**Requirement:** Both DTS CLOCK indicators remain lighted.

(4) Use the receiver to check each TEST CODE and CONT CODE cord reel plug for presence of the test code and a control code, respectively.

**Requirement:** The codes are present at all cord reel plugs.

- (5) Operate the transmitter and receiver DTS POWER switches to OFF.

#### J. Test of Telephone Pickup Keys

3.27 Test the pickup keys as follows:

- (1) Depress a central office (CO) line pickup key.

**Requirement:** Dial tone is present and the pickup lamp lights.

- (2) Release the pickup key and perform Step (1) above on all remaining CO line pickup keys.

- (3) Request a station to place a call to the serving test center (STC).

**Requirement:** The pickup key associated with the incoming call blinks while the call is being received.

- (4) Perform Step (3) above on all remaining pickup keys.

#### K. Buzzer Test

3.28 Test the buzzer (AUD OFF) key as follows:

- (1) With the AUD OFF key in the activated (released) position, request a local station to place a call to the STC.

**Requirement:** The buzzer sounds while the call is being received.

- (2) Operate the AUD OFF key.

**Requirement:** The lamp flashes at the buzzer rate and the buzzer no longer sounds.

#### L. TEL ALM Key Test

3.29 If the CO service alarm is used in conjunction with the telephone circuits to notify the operator of an incoming call, test the CO telephone alarm key and alarm as follows:

- (1) Operate the TEL ALM key.

**Requirement:** The lamp under the keytop lights.

- (2) Request a remote location to place a call to the STC.

**Requirement:** The pickup key associated with the incoming call flashes and the CO alarm sounds while the call is being received.

- (3) Release the TEL ALM key.

**Requirement:** The alarm stops and the TEL ALM key lamp extinguishes.

#### M. HOLD Key Test

3.30 Check the HOLD key as follows:

- (1) Place a call to another location.
- (2) After the call is answered, operate the HOLD key.

**Requirement:** The HOLD keytop lights, the pickup key associated with the line winks, and communication with the called party is not possible.

- (3) Release the HOLD key.

**Requirement:** The lamp under the keytop is extinguished and communication with the called party is now possible.

#### N. Headset Jacks and Telephone Handset Test

3.31 Check the headset jacks and handset as follows:

- (1) Insert a pair of headset plugs into the telephone headset jacks.

- (2) Place a call to another location.

- (3) Using the telephone headset, verify that communication with the called party is possible.

- (4) Remove the headset plugs from the jacks.

- (5) Using the telephone handset, verify that communication with the called party is possible.

**SECTION 666-600-500**

**O. MSU Display Readout Test**

**3.32** Test the display indicator readouts as follows:

- (1) Depress the DISPLAY TEST key.

**Requirement:** All seven segments of each digit in the display light.

**P. MSU TST and SIG Key and HL81 CP Relay Test**

**3.33** Test the TST and SIG keys and the relay on HL81 CP as follows:

- (1) Condition the receiver controls as follows:

- (a) INPUT—BIPOLAR
- (b) DATA RATE—2.4
- (c) SUBRATE CHANNEL—SINGLE
- (d) TEST WORD—511
- (e) COUNTER—BLOCK ERRORS
- (f) COUNTER MODE—COUNT.

- (2) Condition the transmitter controls as follows:

- (a) OUTPUT—BIPOLAR
- (b) DATA RATE—2.4
- (c) FUNCTION—511 TEST WORD
- (d) MODE—REPEAT.

- (3) Operate the transmitter and receiver POWER switches to ON.

**Requirement:** Switch top and CLOCK indicator light.

- (4) Insert the TRMT cord reel plug into the RCV cord reel jack. Depress the TERMINATE key if the receiver is equipped with the key.

**Requirement:** The TERMINATED indicator lights, BYTE PATTERN indicator 1 remains extinguished, 2 through 7 light dimly, and 8 lights; no errors are counted.

- (5) Depress SIG key.

**Requirement:** The SIG lamp lights, receiver BYTE PATTERN indicators are extinguished, and the counter counts errors.

- (6) Depress TST key.

**Requirement:** TST, SIG, and CLR lamps are extinguished. Receiver BYTE PATTERN indicator 1 remains extinguished, 2 through 7 light dimly, and 8 lights; no errors are counted.

- (7) Remove the TRMT cord reel plug from the RCV cord reel jack.

**Q. MSU BRANCH and CLR Keys and Part of HL81 and HL82 CPs Test**

**3.34** Test the BRANCH and CLR keys and part of HL81 and HL82 CPs as follows:

**Note:** The receiver and transmitter test set signal plugs must be located in their proper jacks (J9 and J10, respectively) on the rear of the control panel and writing shelf prior to the start of this test.

- (1) Insert the TRMT cord reel plug into the RCV cord reel jack.

- (2) Depress the SIG key.

**Requirement:** The SIG lamp lights.

- (3) Depress BRANCH key 1.

**Requirement:** The NEW display registers 70.1.

- (4) Depress BRANCH key 2.

**Requirement:** The OLD display registers 70.1 and the NEW display registers 70.2.

- (5) Depress BRANCH key 3.

**Requirement:** The OLD display registers 70.2 and the NEW display registers 70.3.

- (6) Depress BRANCH key 4.

**Requirement:** The OLD display registers 70.3 and the NEW display registers 70.4.

- (7) Depress the CLR key.

**Requirement:** The display and all lamps except CLR are extinguished. The CLR lamp lights for approximately one-half second; then, extinguishes.

- (8) Remove the TRMT cord reel plug from the RCV cord reel jack.

#### R. MSU Alarm Function Test

**3.35** Test the MSU alarm function as follows:

- (1) Condition the MSU as given in 3.34, Steps (1) through (3).
- (2) Remove the TRMT cord reel plug from the RCV cord reel jack.

**Requirement:** The SIG lamp extinguishes and the CLR lamp flashes.

- (3) Replace the TRMT cord reel plug into the RCV cord reel jack.

**Requirement:** The CLR lamp extinguishes and the SIG lamp lights.

- (4) Depress the CLR key.

**Requirement:** The display and all lamps except CLR are extinguished. The CLR lamp lights for approximately one-half second; then, extinguishes.

#### S. MSU Reception and Display of Test Alert Code Test

**3.36** Test the ability of the MSU to receive the test alert (TA) code (01101100) and respond with the proper display as follows:

- (1) Remove the transmitter test set signal plug from the jack (J10) on the rear of the control panel and writing shelf.
- (2) Insert the transmitter signal plug into the RCV cord reel jack.
- (3) Set the transmitter controls as follows:
  - (a) OUTPUT—BIPOLAR
  - (b) DATA RATE—2.4

(c) FUNCTION—BYTE ENCODER

(d) MODE—REPEAT

(e) BYTE ENCODER SWITCHES—01101100.

- (4) Depress the SIG key.

**Requirement:** The SIG lamp lights.

- (5) Depress any BRANCH key.

**Requirement:** The NEW HUB ID registers 66 and the NEW BR remains extinguished.

- (6) Operate the transmitter MODE switch to ALL 0s and then back to REPEAT.

**Requirement:** The OLD HUB ID registers 66 and the NEW HUB ID registers 66. The OLD BR and NEW BR remain extinguished.

- (7) Depress the CLR key.

**Requirement:** The display and all lamps except CLR are extinguished. The CLR lamp lights for approximately one-half second; then, extinguishes.

- (8) Remove the transmitter signal plug from the RCV cord reel jack and replace in jack (J10) on the rear of the control panel and writing shelf.

#### T. MSU Idle Code Transmit Test

**3.37** Test the ability of the MSU to transmit the idle code (11111110) for one-half second as follows:

**Note:** Operate the transmitter power switch to OFF before performing this test.

- (1) Remove the receiver test set signal plug from the jack (J9) on the rear of the control panel and writing shelf.
- (2) Insert the receiver signal plug into the TRMT cord reel jack.
- (3) Connect the TRMT and RCV cord reel plug sleeves together with a clip lead.

**SECTION 666-600-500**

(4) Set the receiver controls as follows:

- (a) INPUT—BIPOLAR
- (b) DATA RATE—2.4
- (c) SUBRATE CHANNEL—SINGLE
- (d) TEST WORD—511
- (e) COUNTER—BLOCK ERRORS
- (f) COUNTER MODE—HOLD.

(5) Depress the TERMINATE key if the receiver is equipped with this key.

**Requirement:** The TERMINATED indicator lights.

(6) Depress the SIG key.

**Requirement:** The SIG lamp lights.

(7) Depress any BRANCH key.

**Requirement:** The display remains extinguished.

(8) Depress the CLR key.

**Requirement:** The CLR lamp lights, the receiver BYTE PATTERN indicators 1 through 7 light, 8 extinguishes for approximately one-half second, and the SIG lamp is extinguished.

**U. Testboard Alarm Circuit Test**

**3.38** Test the testboard fuse/power unit failure alarm cutoff (TST BD F/PWR UN FAIL ACO) key and alarm indicators as follows:

(1) Operate the TST BD F/PWR UN FAIL ACO key.

**Requirement:** The TST BD F/PWR UN FAIL ACO indicator lights.

(2) Insert a blown fuse in one of the testboard fuse locations.

**Requirement:** The testboard fuse alarm (TST BD FA) indicator lights.

(3) Release the TST BD F/PWR UN FAIL ACO key.

**Requirement:** The CO service alarm sounds.

(4) Remove the blown fuse and restore the circuit by installing the proper fuse.

**Requirement:** The alarm stops and the TST BD FA indicator extinguishes.

(5) Repeat Steps (1) through (4) above for the other testboard fuse locations.

(6) Operate the TST BD F/PWR UN FAIL ACO key.

**Requirement:** The TST BD F/PWR UN FAIL ACO indicator lights.

(7) Remove and reinstall the 74A or 78A power unit. Do not depress the ALM RESET button on power unit.

**Requirement:** The alarm (ALM) indicator on the power unit lights.

(8) Release the TST BD F/PWR UN FAIL ACO key.

**Requirement:** The CO service alarm sounds.

(9) Depress the ALM RESET button on the power unit.

**Requirement:** The ALM indicator on the power unit extinguishes. The PWR UN FAIL ALM indicator extinguishes and the alarm stops.