

**SUBRATE DATA MULTIPLEXER
INITIAL TESTS
DIGITAL DATA SYSTEM**

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 1. GENERAL		314-970-101	Digital Data System, Central Office, 5-Volt Power Supply Shelf, Description, Maintenance, and Testing
1.01 This section provides the initial tests for subrate data multiplexer (SRDM) shelves after installation and before SRDM circuit pack (CP) placement. The purpose of the tests is to ensure proper SRDM operation when the correct CPs are placed in the shelves at any subsequent time. Placement of the CPs is covered in Section 314-911-502.		314-983-110	Digital Data System, Subrate Data Multiplexer Performance Monitor, Description.
1.02 This section is reissued for the following reasons:			
(1) To add information on the looping adapter for the SRDM			
(2) To change the designation of HL36 CP (Mfr Disc) to HL36B CP.			
Revision arrows are used to emphasize the more significant changes.			
1.03 Use of this section requires general familiarity with the equipment and test sets described in the following sections:			
			1.04 Tests are included in this section to ensure subrate data multiplexer performance monitor (SPM) monitoring and switching and to ensure correct HL37 CP displays for each possible SRDM arrangement in the shelf. Test procedures require the temporary modification of one HL37 CP according to Fig. 1.
			1.05 Preliminary tests are made to ensure that the necessary fuses are in place in the bay clock, power, and alarms (BCPA) shelf and in the 5-volt power supply shelf (5V PSS) and that the correct voltages are present at the SRDM shelves. The location of fuses is shown in Fig. 2.
			1.06 Transmission tests including the multiplexing and demultiplexing directions are made for each subrate port available in each shelf group, with the SRDM in the normal and switched conditions. To permit this, the transmission tests are made to the
 SECTION			TITLE
107-600-100			Digital Data System, KS-20909 Data Test Set (Transmitter), Description and Operation

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cable connectors at the back of the SRDM shelf, shown in Fig. 3. A looping adapter, as shown in Fig. 4, is used to connect the transmitting multiplexed line to the receiving multiplexed line. Access to the substrate channels is provided by the use of a 66E-type connecting block, as shown in Fig. 5, temporarily cabled from the front of the bay to the appropriate cable connector. Pin positions corresponding to each substrate port input and output are given in Table A.

1.07 To test the SRDM shelves, the following equipment must be installed in the bay and must be operational:

- J70177AJ BCPA shelf
- J70177AK 5V PSS
- J70177AL SPM and spare SRDM.

2. CHART PROCEDURES

2.01 This part includes the test procedures for initial testing on the SRDM shelves of each new J70177AM 2-shelf SRDM assembly or J70177AL 3-shelf SRDM and SPM assembly.

A. Chart 1—Preliminary Test

2.02 The apparatus listing is as follows:

- 1—KS-14510 volt-ohm-milliammeter (VOM)
- 1—HL35 port switch (PS) CP
- 1—HL39 common switch (CMS) CP.

STEP	PROCEDURE
1	Using the VOM set for 12 Vdc, at the back of shelf B, measure the voltage to ground (SG bus) at terminal strip 4, terminal TS4-1. Requirement: +4.6 to +5.5 Vdc. Note: If no voltage was present in Step 1, refer to Fig. 2 for fuse locations.
2	At the 5V PSS, install a 12-amp fuse in the F fuse holder serving this shelf assembly and then install a 1-1/3 amp indicating-type fuse in the associated FA fuse holder.
3	At SRDM shelf B, install 1-1/3 amp indicating-type fuses in fuse holders A1, A2, A3, A4, A5, B1, B2, B3, B4, and B5. Repeat Step 1.
4	If voltage was present in Step 1 but the requirement was not met, check the 5V PSS according to Section 314-970-101.
5	Using the VOM set for 60 Vdc, measure the voltage to ground (BR bus) at terminal TS4-3. Requirement: For -24 volt office battery: -20.0 to -28.0 volts For -48 volt office battery: -42.0 to -52.8 volts.
6	If no voltage was present in Step 5, at the BCPA shelf install a 1-1/3 amp fuse in fuse holder FA21.
7	If voltage was present in Step 5 but the requirement was not met, check the BCPA shelf (see Section 314-916-500) and the central office battery voltage.
8	Visually check the HL35 and HL39 CPs to be used in the tests.

STEP

PROCEDURE

- 9 Verify the correct position of screw switches S1A and S1B according to the office battery voltage.

Requirement: For -24 volt operation: Screw switches S1A and S1B must both be in the closed (fully clockwise) position, sufficiently tight for the screwheads to make firm contact with both rails (leads) without stripping threads in the nylon switch base. For -48 volt operation: Screw switches S1A and S1B must both be in the open (counterclockwise) position, three turns away from the closed position.

B. Chart 2—SRDM Shelf Test

2.03 The apparatus listing is as follows:

- 1—KS-20908 data test set (DTS) receiver with test point adapter
- 1—KS-20909 DTS transmitter with test point adapter
- 1—W1BF cord (8 inches long with a P-11H966 terminal assembly at each end), or equivalent
- 1—Alligator clip (Herman H. Smith No. 300 or equivalent) shortened by 1/2 inch according to Fig. 1
- 1—Looping adapter (KS-16689, List 12) for SRDM connector J7 (See Fig. 4)
- 1—66E3-25 connecting block with A25D double-ended connector cable
- 4—Test leads (4 feet long, each made locally with an insulated alligator clip at one end and a phone tip plug at the other end to fit T and R tip jacks on the DTS transmitter or DTS receiver)
- 2—Test adapters (each made locally from two 4-foot insulated wires with one end of each wire soldered to one terminal of an Amphenol 284-1 TAC test apparatus connector, or equivalent, obtained locally, and the other end of each terminated in a phone tip plug to fit T and R tip jacks on the DTS transmitter or DTS receiver)
- 1—HL37 common logic (C) CP, temporarily modified according to Fig. 1
- 2—HL35 PS CP
- 1—HL36B subrate port (SP) CP
- 1—HL37 common logic CP (without modification)
- 1—HL38 test access (TA) CP
- 1—HL39 CMS CP.

STEP	PROCEDURE
1	Test shelf B using Steps 2 through 55.
2	Install the HL38 TA and the HL39 CMS CPs in shelf positions TA and CMS, respectively. Refer to Fig. 3 for CP locations.
3	Test half-shelf 10 using Steps 4 through 51.
4	Install the two HL35 CPs in shelf positions PS (1) and PS (2). Note: When shelf position designations are shown in both parentheses and brackets, use the designations in parentheses when testing half-shelf 10 and the designations in brackets when testing half-shelf 20.
5	Install the HL37 CP in shelf position C (11) [21].
6	On the SPM, operate the DISPLAY TEST (⏏) key to TEST (⏏) and observe the newly installed HL37 CP display. Requirement: The HL37 CP displays a ⏏.
7	Restore the DISPLAY TEST (⏏) key to NORMAL. Requirement: The HL37 CP display changes to a ⏏.
8	Using the portable DTS transmitter and the KS-20909 test point adapter, send the test code at test point (TP) 4 and TP 5 on HL37 CP (INPUT test points). Note: Refer to Section 107-600-100 for DTS transmitter operation. The DTS transmitter switches should be set as follows: MODE: REPEAT FUNCTION: CONTROL CODES DATA RATE: 9.6 OUTPUT: BIPOLAR LOOPBACK TEST: all off CONTROL CODES: TEST CODE BYTE ENCODER: all zeros.
9	Verify that the HL37 CP displays a ⏏.
10	Disconnect the DTS transmitter from the HL37 CP test points.
11	Move the HL37 to shelf position C (12) [22] and repeat Steps 6 through 10.
12	Move the HL37 CP to shelf position C (10) [20].

STEP	PROCEDURE
13	<p>At the back of the SRDM shelf under test, insert the looping adapter into connector J7.</p> <p>Requirement: The HL37 CP display is blank.</p>
14	<p>On the HL37 CP, operate the MODE switch to NO ALM.</p> <p>Requirement: The HL37 CP displays an H .</p>
15	<p>On the spare SRDM (SPM shelf), operate the HL37 CP MODE switch to NO ALM.</p>
16	<p>On the SPM, using the W1BF cord, or equivalent, connect TP 3 to TP 12 on the HL42 CP.</p>
17	<p>On the SRDM under test, restore the MODE switch on the HL37 CP to NORM.</p> <p>Requirement 1: On the SRDM under test, the HL37 CP displays a flashing [.</p> <p>Requirement 2: On the SPM, HL48 CP green lamps 9.6 and 4.8 are both illuminated.</p> <p>Requirement 3: On the BCPA shelf, the MN lamp is illuminated.</p>
18	<p>On the SPM, remove the W1BF cord, or equivalent, from TP 3 and TP 12 on the HL42 CP.</p> <p>Requirement: On the SRDM under test, the HL37 CP displays a flashing H .</p>
19	<p>Remove the HL37 CP from shelf position C (10) [20] and replace it with the HL37 CP modified according to Fig. 1.</p> <p>Requirement: The HL37 CP displays a flashing [.</p>
20	<p>Replace the modified HL37 CP with the good HL37 CP in shelf position C (10) [20].</p>
21	<p>Verify that the MODE switch is in the NO ALM position and that the HL37 CP displays a flashing H .</p>
22	<p>On the SPM, set the BAY DEFEAT key to BAY DEFEAT; and push the SPARE RELEASE key, hold it for 1 second, and then release it.</p> <p>Requirement 1: On the SRDM under test, the HL37 CP displays a steady H .</p> <p>Requirement 2: On the spare SRDM, the HL37 CP displays a steady H .</p> <p>Requirement 3: On the SPM, HL48 CP lamps 9.6 and 4.8 both are extinguished.</p> <p>Requirement 4: On the BCPA shelf, all lamps are extinguished.</p>
23	<p>On the SRDM shelf, install the ♦HL36B♦ CP in shelf position SP (1).</p>
24	<p>Referring to Fig. 3, at the back of the SRDM shelf, connect one end of the A25D cable to the connector associated with shelf position PS (1) in the half-shelf under test.</p>

STEP	PROCEDURE
25	Bring the other end of the A25D cable to the front of the bay and connect it to a 66E-type connecting block.
26	On the DTS transmitter, change the FUNCTION switch to TEST WORD 511 and the DATA RATE switch to 2.4.
27	Verify that other switch positions are set as follows: MODE: REPEAT OUTPUT: BIPOLAR LOOPBACK TEST: all off CONTROL CODES: TEST CODE BYTE ENCODER: all zeros.
28	Using a test adapter, connect the T and R tip jacks of the DTS transmitter (transmitter output) to the 66E connecting block terminals for port 1 input (see Fig. 5 and Table A).
29	Using a test adapter, connect the T and R tip jacks of the DTS receiver to the 66E connecting block terminals for port 1 output. Note: Refer to Section 107-601-100 for DTS receiver operation. The DTS receiver switches should be set as follows: INPUT: BIPOLAR DATA RATE: 2.4 CHANNEL: SINGLE TEST WORD: 511 COUNTER: BIT ERRORS.
30	Using the phone set, terminate the DTS receiver by plugging the retractable phone cord plug into the phone jack located in the cord storage compartment of the DTS receiver.
31	Depress the TERMINATE key and verify that the TERMINATED lamp illuminates and remains on when the switch is released. Note: On later model receivers, the TERMINATE key is inoperative (and has no designation) and impedance matching is accomplished automatically when the plug is inserted.
32	Move the COUNTER MODE switch momentarily to RESET, allow it to return to COUNT, and observe the counter for 2 seconds.

STEP

PROCEDURE

- Requirement 1:** The counter shows no bit errors.
- Requirement 2:** The HL37 CP displays a steady H.
- 33 Repeat Steps 26 through 30 for ports 2, 3, 4, and 5 at the 66E connecting block terminals indicated in Table A.
- 34 On the SRDM shelf, move the ◆HL36B◆ CP from shelf position SP (1) to SP (3).
- 35 Repeat Steps 29 through 32 for ports 11 through 15 at the 66E connecting block terminals determined from Table A.
- 36 At the back of the SRDM shelf, disconnect the A25D cable and connect it to the connector associated with shelf position PS (2) in the half-shelf under test (see Fig. 3).
- 37 On the SRDM shelf, move the ◆HL36B◆ CP from shelf position SP (3) to SP (2).
- 38 Repeat Steps 28 through 32 for ports 6 through 10 at the 66E connecting block terminals determined from Table A.
- 39 Move the ◆HL36B◆ CP from shelf position SP (2) to SP (4).
- 40 Repeat Steps 28 through 32 for ports 16 through 20 at the 66E connecting block terminals determined from Table A.
- 41 On the spare SRDM, verify that the MODE switch on the HL37 CP is in the NO ALM position.
- 42 On the SPM, using a W1BF cord, connect TP 3 to TP 12 on the HL42 CP.
- 43 On the SRDM under test, restore the HL37 CP MODE switch to NORM.
- Requirement 1:** On the SRDM under test, the HL37 CP displays a flashing □.
- Requirement 2:** On the SPM, green lamps 9.6 and 4.8 on the HL48 CP are both illuminated.
- Requirement 3:** On the BCPA shelf, the MN lamp is illuminated.
- 44 On the SPM, remove the W1BF cord, or equivalent, from TP 3 and TP 12 on the HL42 CP.
- Requirement:** On the SRDM under test, the HL37 CP displays a flashing H.
- 45 On the SRDM shelf, remove the ◆HL36B◆ CP from shelf position SP (4).
- 46 With no ◆HL36B◆ CP in place in the SRDM under test, verify transmission through all 20 ports according to Steps 28 through 31, using 66E connecting block terminals according to Table A and the A25D cable connection at the back of the SRDM shelf according to Fig. 3.
- 47 On the SRDM under test, verify that the HL37 CP displays a flashing H.

STEP	PROCEDURE
48	On the SPM, set the BAY DEFEAT key to BAY DEFEAT and depress the SPARE RELEASE key, hold it for 1 second, and then release it.
	Requirement 1: On the SRDM under test, the HL37 CP displays a steady H.
	Requirement 2: On the spare SRDM, the HL37 CP displays a steady H.
	Requirement 3: On the SPM, the HL48 CP lamps 9.6 and 4.8 both are extinguished.
	Requirement 4: On the BCPA shelf, all lamps are extinguished.
49	Disconnect the A25D cable and looping adapter at the back of the SRDM shelf.
50	Remove the HL35 CP from the SRDM shelf.
51	On the SPM shelf, restore the BAY DEFEAT key to NORMAL and the spare SRDM HL37 CP MODE switch to NORM.
52	Test half-shelf 20, using Steps 4 through 48.
53	Disconnect the A25D cable and looping adapter from the back of the SRDM shelf.
54	Remove all CPs from the front of the shelf.
55	On the SPM shelf, restore the BAY DEFEAT key to NORMAL and the spare SRDM HL37 CP MODE switch to NORM.
56	Test shelf A, using Steps 3 through 55.

C. Chart 3—Fuse Alarm Test

STEP	PROCEDURE
1	On the front of the shelf assembly under test, insert a blown fuse (70D or mechanical equivalent) into fuse position A1 (see Fig. 2 for fuse location).
	Requirement: On the BCPA shelf, fuse alarm lamp FA is illuminated.
2	Replace the blown fuse with a good fuse of the correct value.
	Requirement: On the BCPA shelf, lamp FA is extinguished.

♦ TABLE A ♦

SRDM PORT CONNECTOR PIN ASSIGNMENTS

HL36B SHELF POSITION			SUBRATE PORT NUMBER (NOTE 2)	PORT CONNECTOR			
				HS 1 — J9A OR J9B HS 2 — J6A OR J6B		HS 1 — J8A OR J8B HS 2 — J5A OR J5B	
SP()	HS (NOTE 1)	EQPT LOG		CONNECTOR TERMINAL PAIRS (NOTE 3)			
				INPUT	OUTPUT	INPUT	OUTPUT
1	10	10	1	1-26	2-27		
			2	3-28	4-29		
			3	5-30	6-31		
	20	48	4	7-32	8-33		
			5	9-34	10-35		
2	10	13	6			1-26	2-27
			7			3-28	4-29
			8			5-30	6-31
	20	51	9			7-32	8-33
			10			9-34	10-35
3	10	16	11	11-36	12-37		
			12	13-38	14-39		
			13	15-40	16-41		
	20	53	14	17-42	18-43		
			15	19-44	20-45		
4	10	18	16			11-36	12-37
			17			13-38	14-39
			18			15-40	16-41
	20	56	19			17-42	18-43
			20			19-44	20-45

Note 1: HS = half shelf.

Note 2: Port number refers to 2.4-kb/s configuration.

Note 3: For each terminal pair, lower number is ring and higher number is tip.

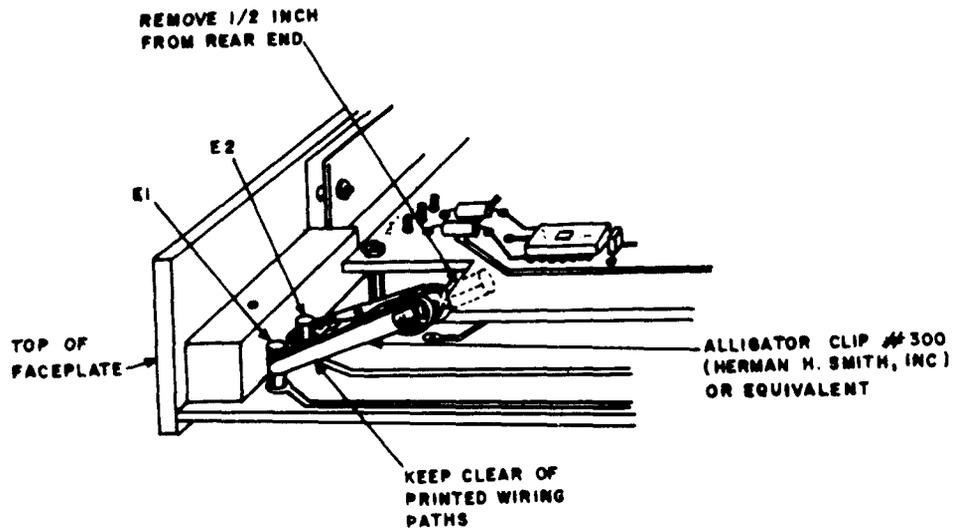


Fig. 1—Temporary Modification of HL37 Common Logic Circuit Pack Using Alligator Clip to Disable Line Driver

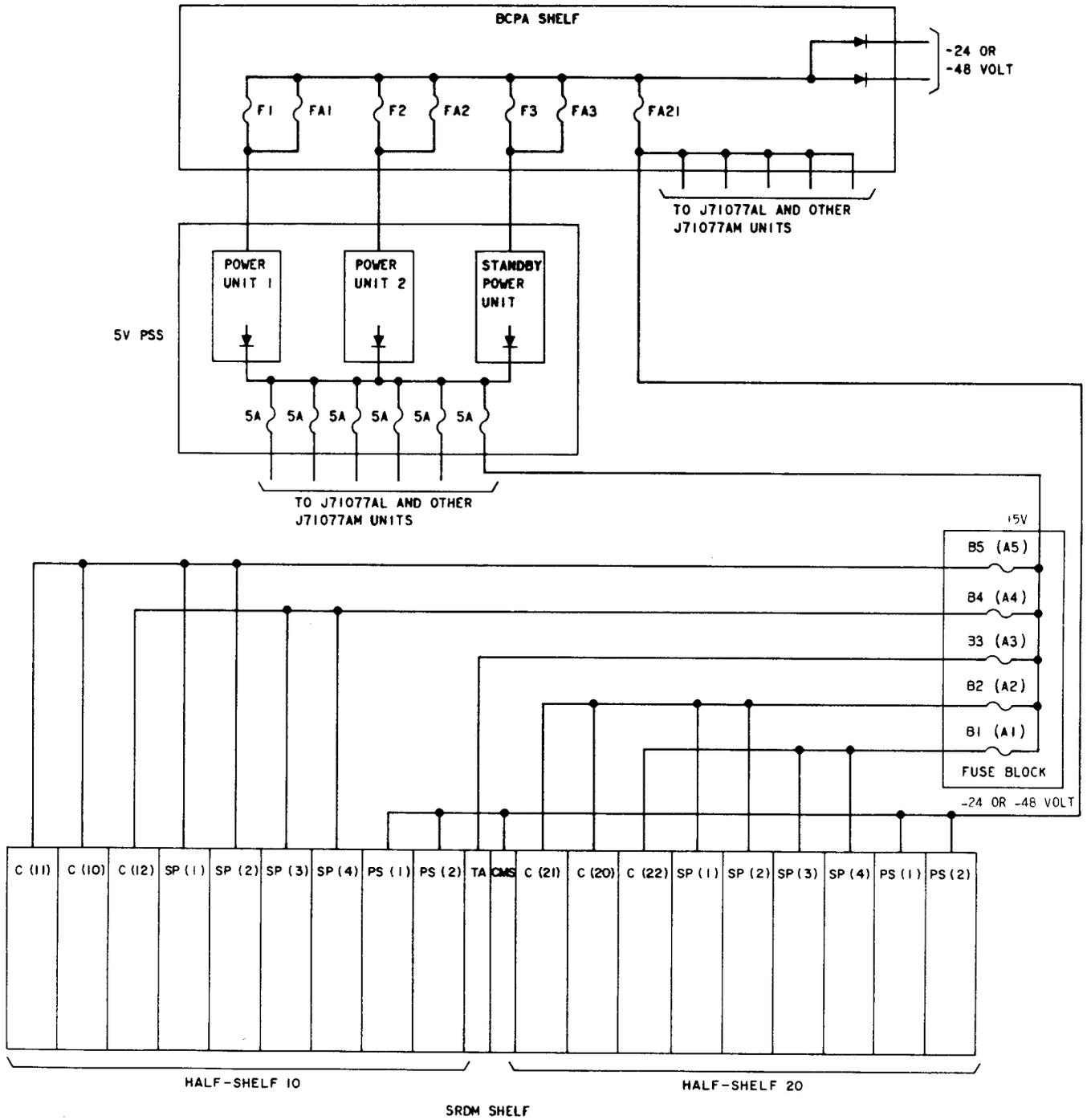


Fig. 2—Location of Fuses Serving SRDM and 5-Volt Power Supply Shelves

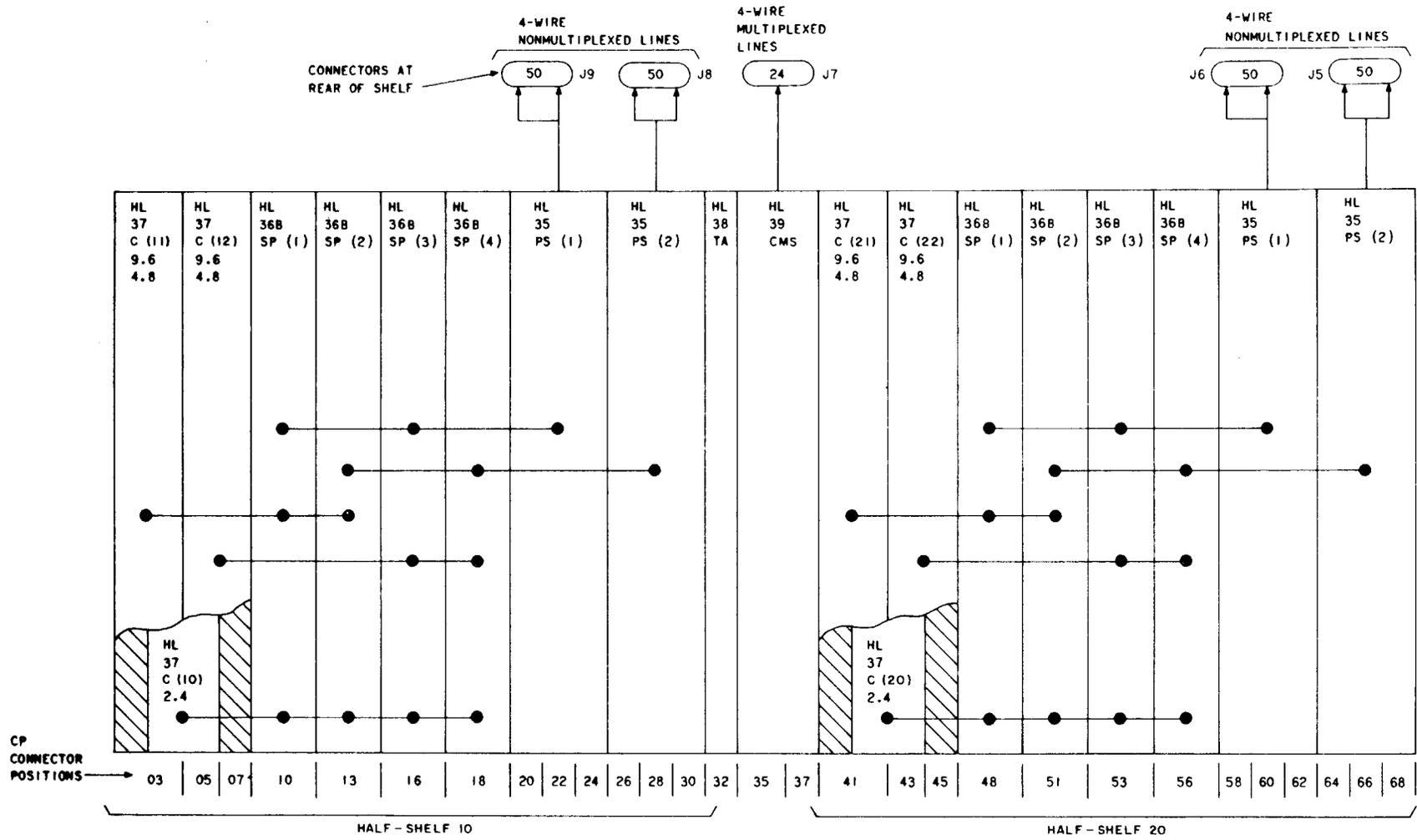


Fig. 3—Cable Connectors and Circuit Pack Interconnection

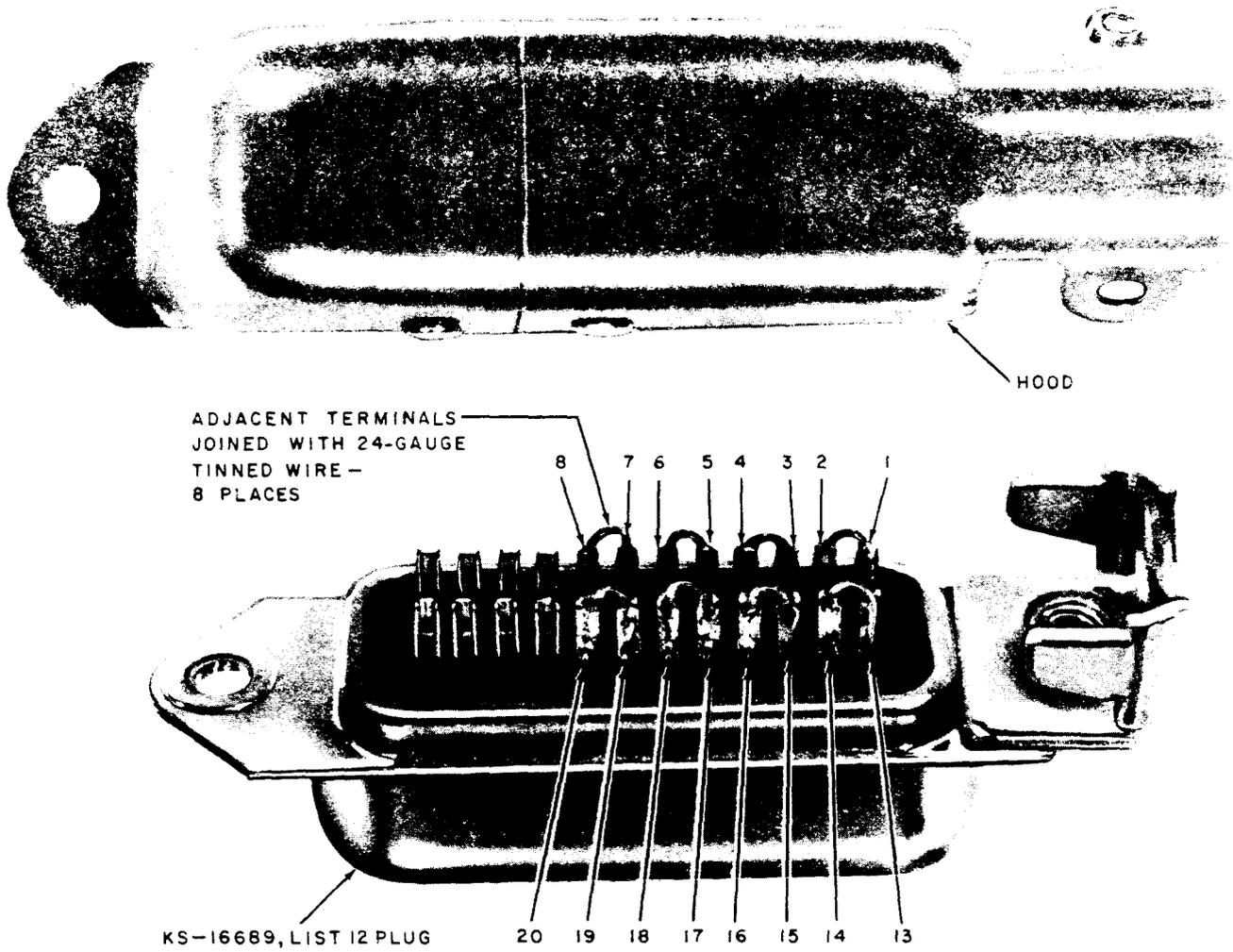


Fig. 4—Looping Adapter for SRDM Connector J7—Modified Connector Plug

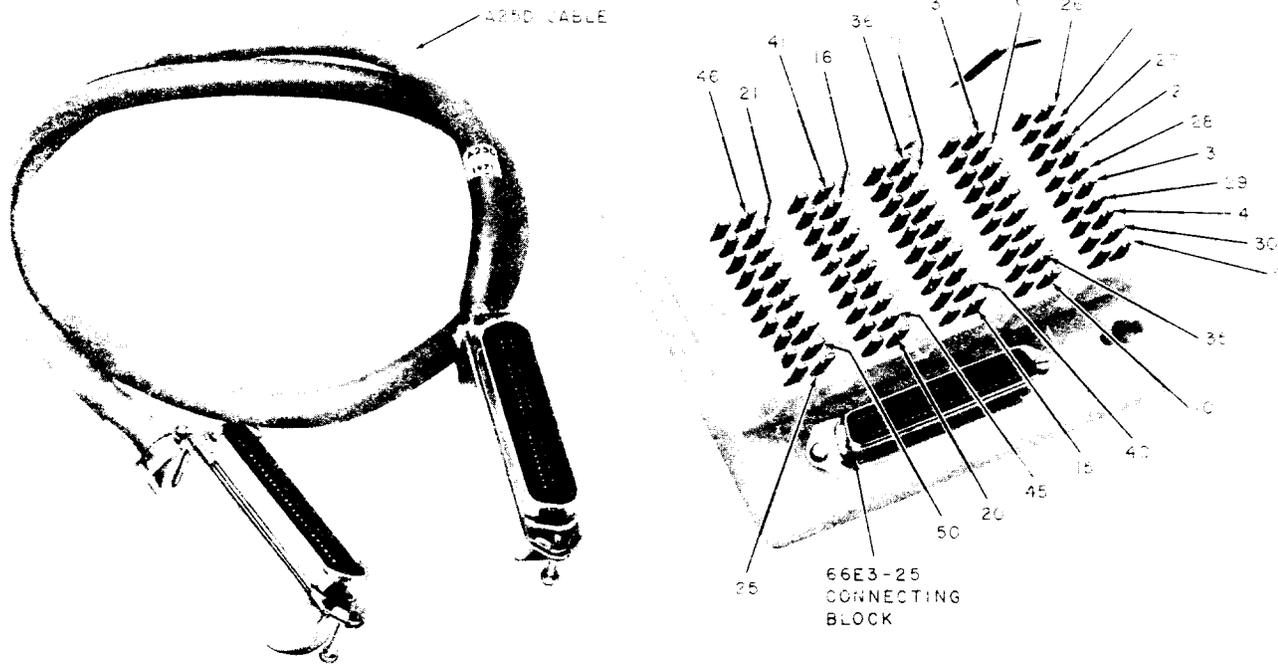


Fig. 5—A25D Double-Ended Connector Cable and 66E3-25 Connector Block With Terminal Locations