

**DIGITAL CLOCK DISTRIBUTOR  
DCD-400, DCD-ST2 AND DCD-CIM  
TEST AND ACCEPTANCE**

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4. CI Card Switch .....	27	1.01 This practice provides test and acceptance pro- cedures for the Digital Clock Distributor (DCD Sys- tem). When acceptance testing has been completed, file the Sign-off sheet locally, as per local company practice.	
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1.02 This practice is reissued due to editorial changes. No change bars are used.

1.03 The following abbreviations are used in this document:

ACI	Analog Clock Input card
AI	Alarm Interface card
CI	Clock Input card
DCD	Digital Clock Distributor
FA	Fuse and Alarm card
HS TOxA	Hot spare card
LOS	Loss of signal
MCA	Matrix Controller Automatic card
MCA-2	Matrix Controller Automatic-2 card
OOF	Out of frame
SCIU	Synchronous Clock Insertion Unit card
ST2	Stratum-2 Clock card
ST2E	Enhanced Stratum-2 Clock card
ST3	Stratum-3 Clock card
ST3E	Enhanced Stratum-3 Clock card
TOAA	Timing Output Analog Automatic card
TOCA	Timing Output Composite Clock Automatic card
TOLA	Timing Output Logic Level Automatic card

TOTA	Timing Output T1 Automatic card
TOxA	Timing Output card

**Note:** Throughout this practice, information common to the CI and ACI cards is referenced as “clock input” or “input cards.” Information unique to the CI is referred to as “CI,” the ACI is referred to as “ACI.”

**Note:** Information common to the ST2, ST2E, and ST3E clock cards is referenced as “clock card” or “ST card.” Information unique to the ST2 is referred to as “ST2;” the ST2E is referred to as “ST2E;” the ST3E is referred to as “ST3E;” the ST3 is referred to as “ST3.”

**Note:** A lowercase “x” is used in card nomenclature as a variable to indicate all cards of that type (e.g., “TOxA” represents TOAA, TOCA, TOLA, and TOTA cards).

1.04 The DCD system consists of one master shelf and up to three expansion shelves. The DCD-ST2 shelf only operates as a master shelf. The DCD-400/CIM may be used as either a master or an expansion shelf. A DCD-400/CIM may be an expansion shelf from a DCD-400/CIM or DCD-ST2 master shelf.

2. ACCEPTANCE TEST PROCEDURES

2.01 When performing any of the acceptance test procedures, if problems are encountered, or if requirements listed in a step are not met, refer to 097-4000-59 Maintenance to assist in troubleshooting. If the problem cannot be resolved, contact Telecom Solutions' Customer Technical Assistance Center (CTAC) at (408)433-0910 for help.

2.02 The acceptance testing should be performed after installing and connecting the master to expansion shelf(s), applying power to each shelf, and connecting reference inputs to the master shelf. The cabling from the office alarm system, remote telemetry equipment and timing outputs must not be terminated on the shelves prior to acceptance testing. After acceptance testing has been completed, return to TMSL 097-40000-57, DCD Installation, to make these connections.

2.03 To perform the acceptance test procedure, refer to Table A and Table B for test flow.

Table A. Master Shelf Test Flow

STEP*	CHART TITLE
1	Power Test
2	Amplitude Verification Test
3	AI Card Test
4	FA Card Test
5	CI/ACI Card Test
6	ST2 Card Test
7	ST2E Card Test
8	ST3E Card Test
9	ST3 Card Test

Table A. Master Shelf Test Flow (Contd)

STEP*	CHART TITLE
10	MCA/MCA-2 Card Test
11	Timing Output Card Test
12	SCIU Card Test
* If not equipped with a particular card, proceed to the next step.	

Table B. Expansion Shelf Test Flow

STEP*	CHART TITLE
1	Power Test
2	FA Card Test
3	MCA/MCA-2 Card Test
4	Timing Output Card Test
5	SCIU Card Test
* If not equipped with a particular card, proceed to the next step.	

A. Power Test

2.04 This test assumes the DCD shelf has been physically and electrically installed per TMSL 097-40000-57, DCD Installation.

**Caution: This test cannot be performed on a DCD shelf supplying timing to network elements. This test must be performed prior to using the DCD shelf to time network elements (NE). Failure to observe this caution will result in service interruption.**

Chart 1. Power Test

STEP	PROCEDURE
	<p>Use this procedure for verifying the power connections to the shelf. The DCD shelf does not load share the A and B battery feeds. The alternate source becomes active only if the active source fails. This procedure assumes power to the shelf under test has been connected per TMSL 097-40000-57, DCD Installation practice.</p> <p>Test Equipment: Digital Multimeter, Fluke 77 or equivalent</p>
	<p><b>Caution: Do not perform this procedure on DCD shelves which are supplying timing to network elements (in service). Failure to observe this caution will result in a service interruption.</b></p>
1	Ensure all plug-in cards are removed from the shelf under test.
2	Ensure all fuses are removed from the fuse panel which powers the shelf under test.
3	Disconnect the -48V A and -48V B power leads from the shelf power terminal blocks TB1 on the rear of the shelf (leave the battery [RTN] leads connected to the shelf).
4	<p>At the shelf end of the battery leads, use the multimeter to measure the voltage between the following:</p> <ul style="list-style-type: none"> <li>a. Battery A lead and battery B lead</li> <li>b. Battery A lead and battery return (RTN) terminal on the power terminal block</li> <li>c. Battery A lead and frame (FRM) ground terminal on the power terminal block</li> <li>d. Battery B lead and battery return (RTN) terminal on the power terminal block</li> <li>e. Battery B lead and frame (FRM) ground terminal on the power terminal block</li> </ul> <p><b>Requirement:</b> The multimeter indicates no voltage between any of the points listed above.</p>
5	<p>Set the multimeter for maximum resistance measurement and measure the resistance between the following:</p> <ul style="list-style-type: none"> <li>a. Battery A lead and battery B lead</li> <li>b. Battery A lead and battery return (RTN) terminal on the power terminal block</li> <li>c. Battery A lead and frame (FRM) ground terminal on the power terminal block</li> <li>d. Battery B lead and battery return (RTN) terminal on the power terminal block</li> <li>e. Battery B lead and frame (FRM) ground terminal on the power terminal block</li> </ul> <p><b>Requirement:</b> The multimeter indicates infinite resistance (completely open circuit).</p>

Chart 1. Power Test (Contd)

STEP	PROCEDURE
6	Reconnect the A and B battery leads to the power terminal block (TB1) -48V A and -48V B terminal sets on the shelf under test.
7	<p>Verify that the shelf will cause an alarm if all power is lost to the shelf by connecting the multimeter, set to ohms, across the following terminal sets on the shelf backplane (Figure 3).</p> <p><u>Office Alarm:</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)  MAJOR AUD NO and C (TB3, pins 5 &amp; 6)  MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>  MINSI and MINSR (TB2, pins 7 &amp; 8)  MAJSI and MAJSR (TB3, pins 7 &amp; 8)  BATT ALM and RTN (TB15, pins 1 &amp; 2 - DCD-ST2 shelf only)</p> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms on all terminal sets.</p>
8	In the power source fuse panel, install the A and B battery fuses for the shelf under test. Use 7.5 A to 10 A size fuses for the DCD-ST2 Shelf or 3A size fuses for DCD-400/CIM Shelf.
9	<p>Use the multimeter to measure the voltage between the -48V A and RTN terminal sets on the power terminal block (TB1) on the shelf under test.</p> <p><b>Requirement:</b> The multimeter indicates -42 to -56 volts dc.</p>
10	<p>Use the multimeter to measure the voltage between the -48V B and RTN terminal sets on the power terminal block (TB1) on the shelf under test.</p> <p><b>Requirement:</b> The multimeter indicates -42 to -56 volts dc.</p>

Chart 1. Power Test (Contd)

STEP	PROCEDURE
11	<p>Verify that the shelf will not cause a battery alarm if there is power to the shelf from both sources by connecting the multimeter, set to maximum ohms, across the following terminal sets on the shelf backplane (Figure 3).</p> <p><u>Office Alarm:</u>            MINOR AUD NO and C (TB2, pins 5 &amp; 6)            MINOR VIS NO and C (TB2, pins 2 &amp; 3)            MAJOR AUD NO and C (TB3, pins 5 &amp; 6)            MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>            MINSI and MINSR (TB2, pins 7 &amp; 8)            MAJSI and MAJSR (TB3, pins 7 &amp; 8)            BATT ALM and RTN (TB15, pins 1 &amp; 2) - DCD-ST2 shelf only</p> <p><b>Requirement:</b> The multimeter indicates infinite resistance (completely open circuit) on all terminal sets.</p>
12	Repeat Steps 1 through 11 for each of the remaining shelves (if any) in the DCD System.
13	This procedure is completed. Indicate completion of the Power Test on the Test Sign-off form, then proceed to next section.

**B. Amplitude Verification**

2.05 Use this procedure for verifying that clock input signal(s) are within the specified input voltage range. This procedure assumes input to the shelf under test has been connected per TMSL 097-40000-57, DCD Installation.

**Chart 2. Amplitude Verification Test**

STEP	PROCEDURE
Test Equipment: Dual-channel oscilloscope with 100 MHz minimum bandwidth	
1	Obtain a dual-channel oscilloscope and preset the controls as listed in Table C.
2	Connect X10 probes to channel 1 and channel 2 oscilloscope inputs and install a terminating resistor across the probes. Connect channel 1 and 2 probe ground leads together. Connect channel 1 and 2 probes (with resistor) to T and R of each DCD shelf input terminals.
3	<p>Verify that the clock input signal(s) are within the specified input voltage range and meets the prescribed template. Consult local company Installation Job Specifications for the type of input signals installed and on which DCD input connectors.</p> <p><b>Requirement:</b> Input signal ranges are as follows:</p> <ul style="list-style-type: none"> <li>a. DS1 Terminated: 1.0 to 3.5 V base-to-peak, 100 ohms terminated (TB7 and TB10, pins 1 &amp; 2)</li> <li>b. DS1 Bridged: 0.10 to 0.35 V base-to-peak, 100 ohms terminated (TB6 and TB9, pins 1 &amp; 2)</li> <li>c. CC: 1.5 to 4.0 V base-to-peak, 135 ohms terminated (TB5 and TB8, pins 1 &amp; 2)</li> </ul> <p><b>Note:</b> Although the voltage may appear within range, the pulses may have a large overshoot. If this is the case, once installed, the clock input card will be overdriven, thereby causing its FAIL lamp to light or not go off after card insertion. If the clock input card fails, but the voltage is within range, check the transmitting terminal equipment cable equalization settings. If the voltage level is too high and cannot be adjusted, a solution may be to install a 100 ohm, 1/4 watt resistor across the Tip and Ring input terminal sets on the DCD backplane. This provides a double termination and will usually lower the voltage to within the input card's bridging repeater range.</p>
4	This procedure is completed. Indicate completion of the Amplitude Verification Test on the Test Sign-off form, then proceed to next section.

Table C. Typical Oscilloscope Settings\*

<b>CONTROL</b>	<b>SETTING</b>
Mode Trigger Switch	ADD
Invert Switch	INVERT
Ch1 and Ch2: Volts/Div Input Coupling Vert Position Control	5 AC mid-range
"A" Sweep Mode	AUTO-TRIGGER
Horizontal Display Switch	"A"
Time/Div Switch: for CC (TOCA) for 1.544 Mb/s (TOTA) for Analog (TOAA) for Logic Level (TOLA)	20 $\mu$ s 500 ns 60 kHz: 10 $\mu$ s 4 kb/s: 0.5 ms 8 kb/s: 0.1 ms 64 kb/s: 10 $\mu$ s 564 kb/s: 2 $\mu$ s 384 kb/s: 2 $\mu$ s 512 kb/s: 2 $\mu$ s 768 kb/s: 2 $\mu$ s 1.536 Mb/s: 0.5 $\mu$ s 1.5446 Mb/s: 0.5 $\mu$ s 2.048 Mb/s: 0.1 $\mu$ s
"A" Sweep	FULL
Horizontal Position Control	mid-range
"A" Triggering: Slope Coupling Source	+ or - AC INT
* Consult the oscilloscope manufacturer's manual for details and operating instructions.	



C. Card Test

**Warning: When handling cards, use local office procedures regarding electrostatic discharge (ESD), including the following:**

- Use grounded wrist straps connected to equipment frame ground when handling cards.
- Store cards only in antistatic packaging provided by the factory.

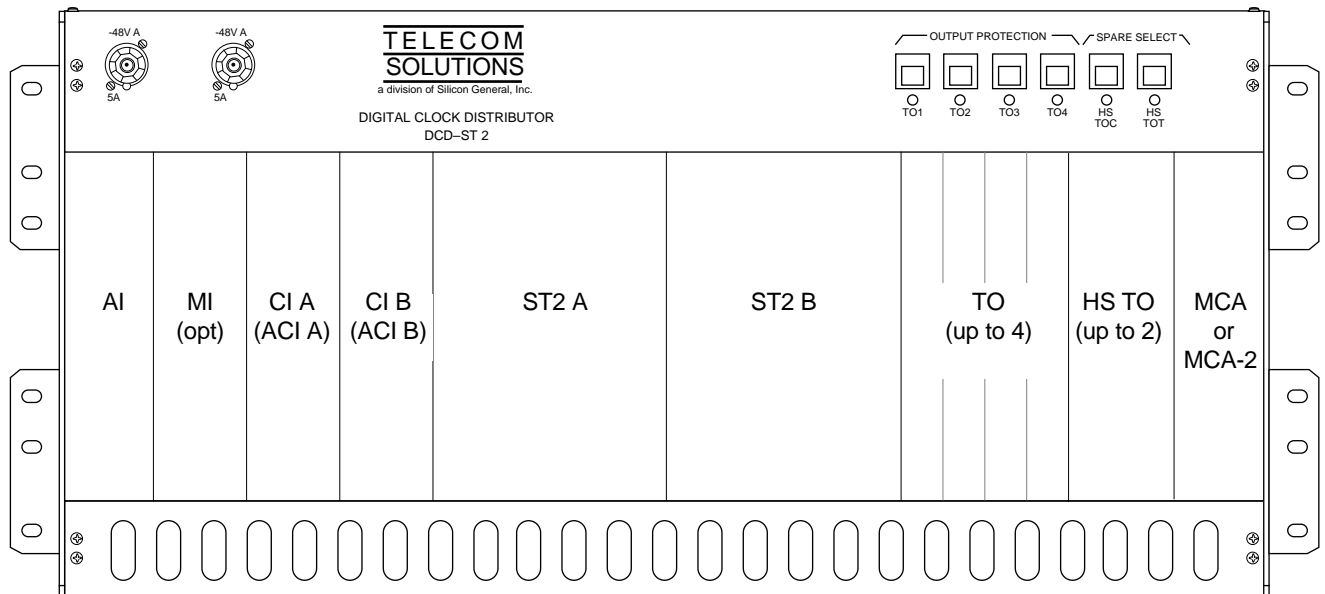
2.06 System circuit cards are keyed, making it virtually impossible to fully insert a card into the wrong slot. If a card does not seat fully, make sure the card is sliding into the proper slot. Labels printed along the top lip of the shelves identify each slot. Use the following instructions whenever installing a card into a slot:

1. Hold the card by the locking lever on the faceplate with one hand, and carefully hold and align card with the shelf card edge guides with the other hand. Gently seat the card in the connector on the shelf backplane.

**Note:** Always use two hands to install cards, especially ST2 and ST2E clock cards.

2. Secure the card into place by lowering the locking lever.

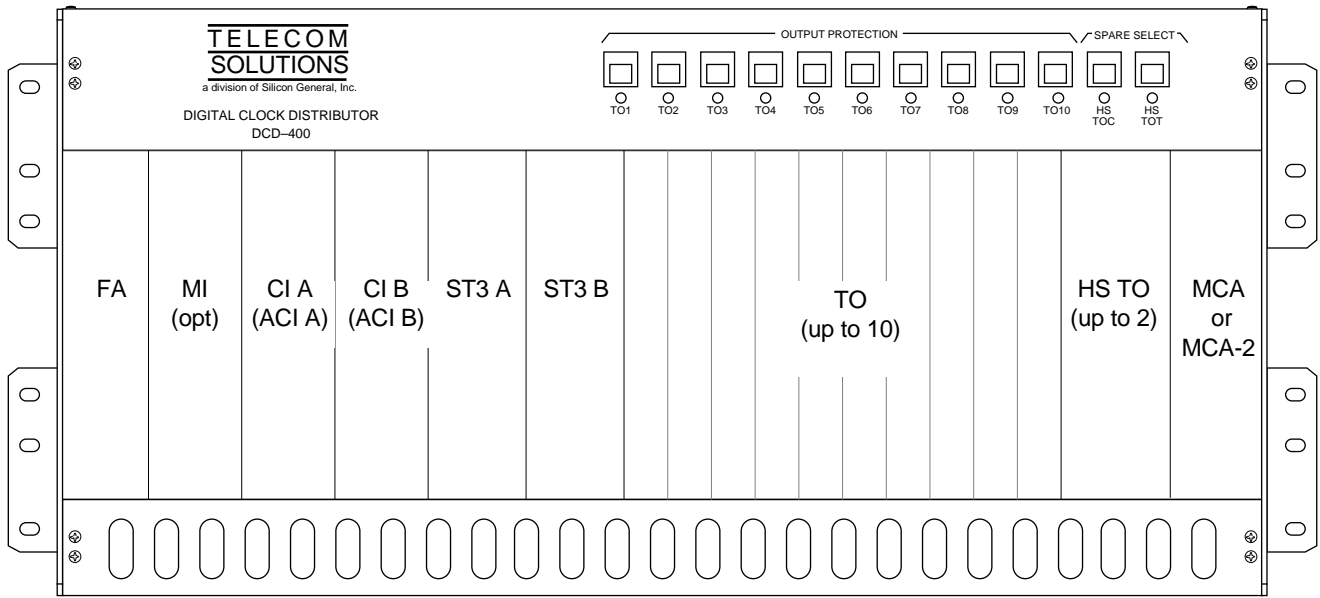
2.07 Each shelf has card slots for TOxA, SCIU, ACI, MCA/MCA-2, CI, FA, AI, ST3, ST3E, ST2, and ST2E cards. Refer to Figure 1 and Figures 2a and 2b for shelf card slot positions.



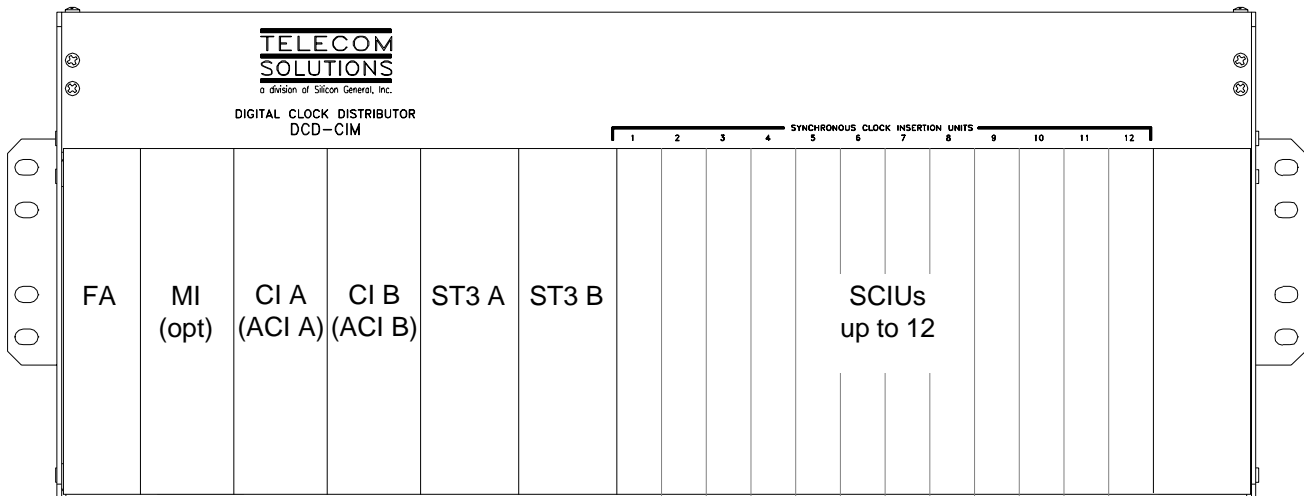
Notes:

1. TOxA and SCIU cards may be intermixed in the output slots on the shelf; the SCIU cards are unprotected cards and do not require Hot Spare (HS) cards.
2. If configured for all unprotected output, an MCA/MCA-2 card is not required; the slot cannot be used as an unprotected output slot.

Figure 1. DCD-ST2 Shelf Card Slot Positions (Front View)



a. DCD-400 Shelf Card



**Note:** Although the CIM can be used as a master shelf (in a standalone configuration), it is not recommended. The CIM does not provide protection switching.

b. DCD-CIM Shelf Card

Figure 2. Shelf Card Slot Positions (Front View)

Chart 3. FA Card Test (DCD-400/CIM, Master and Expansion Shelves Only)

STEP	PROCEDURE
	<p>Use this procedure to install the FA card and verify operation. If the FA card is not used, skip this chart and proceed to the next chart. This procedure assumes power has been applied to the shelf and alarm connections have been made per TMSL 097-40000-57, DCD Installation practice.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. There are no switch or jumper settings for the FA card.</li> <li>2. When checking relay contact status, refer to Figure 3b for connector locations, and Figure 3c for pin locations.</li> <li>3. This test assumes that the alarm system requires normally open (NO) for a no alarm condition; if local company practice dictates that the alarm system requires normally closed (NC) for no alarm, refer to Figure 3c and test normally closed pins.</li> <li>4. If the Office Alarm and Shelf Status terminal sets have been connected to the office alarm system and remote telemetry equipment, the ohmmeter tests cannot be performed because these systems apply -48V on the alarm leads and ground on the return leads. To adequately test the FA card, perform one of the following: <ol style="list-style-type: none"> <li>a. Disconnect the office alarm system and remote telemetry equipment from the DCD-400/CIM shelf, and perform the ohmmeter tests, then reconnect the leads.</li> <li>b. Leave the office alarm system and remote telemetry equipment connections intact, and substitute the ohmmeter tests with audible and visual tests for appropriate condition responses from the office alarm system and verification of appropriate condition responses at the alarm and surveillance center.</li> </ol> </li> </ol>
1	<p>Insert the FA card into the slot labeled "FA" in the DCD-400 or DCD-CIM shelf.</p> <p><b>Requirement:</b> The MAJOR and MINOR lamps on the FA card are off.</p>
2	<p>Remove fuse "-48V A" on the front panel of the FA card with a small, flat-blade screwdriver.</p> <p><b>Requirement:</b> The red lamp beside the -48V A fuse holder on the FA card lights, and the MINOR lamp lights.</p>
3	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3b):</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> </ul> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>

Chart 3. FA Card Test (DCD-400/CIM, Master and Expansion Shelves Only) (Contd)

STEP	PROCEDURE
4	<p>Press the ACO pushbutton on the FA card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the FA card lights green, and the MINOR and -48V A lamps remain lit.</p>
5	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3b);</p> <p><u>Office Alarm:</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>  MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p><b>Requirement:</b> The MINOR AUD NO and C contacts are open (infinite ohms); the MINOR VIS NO and C, and MINSI and MINSR contacts remain closed (&lt;15 ohms).</p>
6	<p>Replace the -48V A fuse using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> -48V A fuse lamp and FA MINOR and ACO lamps go off (after approximately 6 to 10 seconds).</p>
7	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3b);</p> <p><u>Office Alarm:</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>  MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
8	<p>Remove fuse “-48V B” on the front panel of the FA card with a small, flat-blade screwdriver.</p> <p><b>Requirement:</b> The red lamp beside the -48V B fuse holder on the FA card lights, and the MINOR lamp lights.</p>

Chart 3. FA Card Test (DCD-400/CIM, Master and Expansion Shelves Only) (Contd)

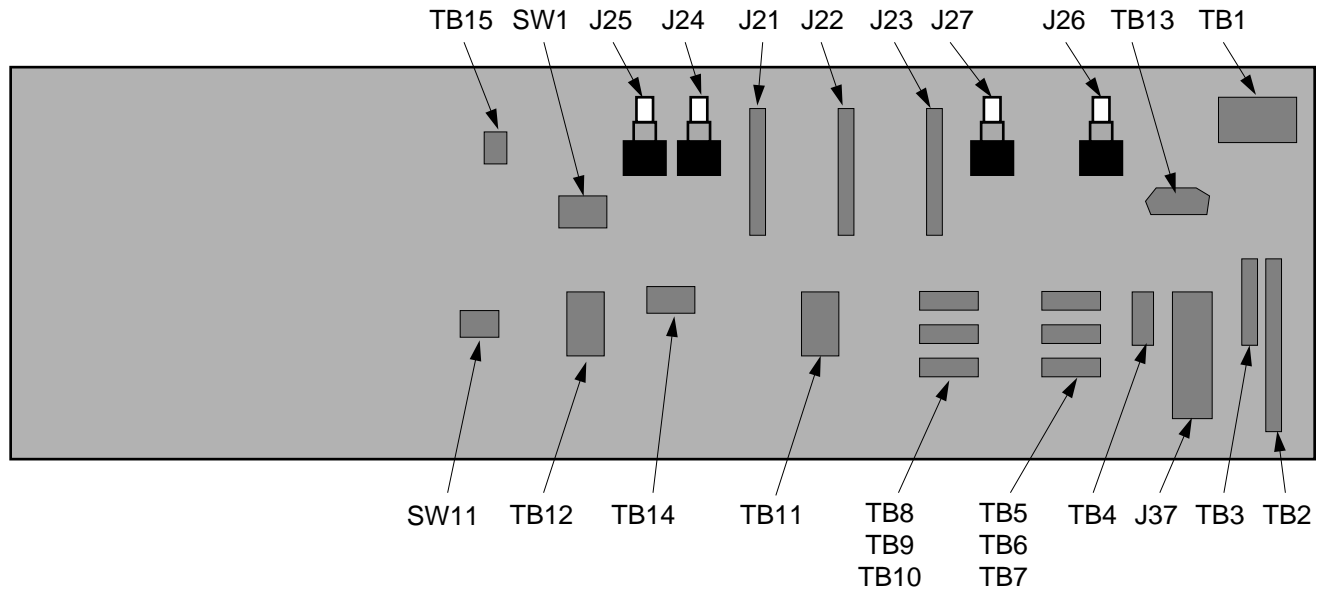
STEP	PROCEDURE
9	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3b);</p> <p><u>Office Alarm:</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>  MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>
10	<p>Press the ACO pushbutton on the FA card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the FA card lights green; and the MINOR and -48V B lamps remain lit.</p>
11	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c);</p> <p><u>Office Alarm:</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>  MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p><b>Requirement:</b> The MINOR AUD NO and C contacts are open (infinite ohms); and MINOR VIS NO and C, and MINSI and MINSR contacts remain closed (&lt;15 ohms).</p>
12	<p>Replace the -48V B fuse using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> -48V B fuse lamp, FA MINOR and ACO lamps go off (after approximately 6 to 10 seconds).</p>
13	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c):</p> <p><u>Office Alarm:</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u>  MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
14	<p>Remove both fuses from the front of the FA card using a small, flat-blade screwdriver.</p> <p><b>Requirement:</b> All lamps on the shelf will go out.</p>

Chart 3. FA Card Test (DCD-400/CIM, Master and Expansion Shelves Only) (Contd)

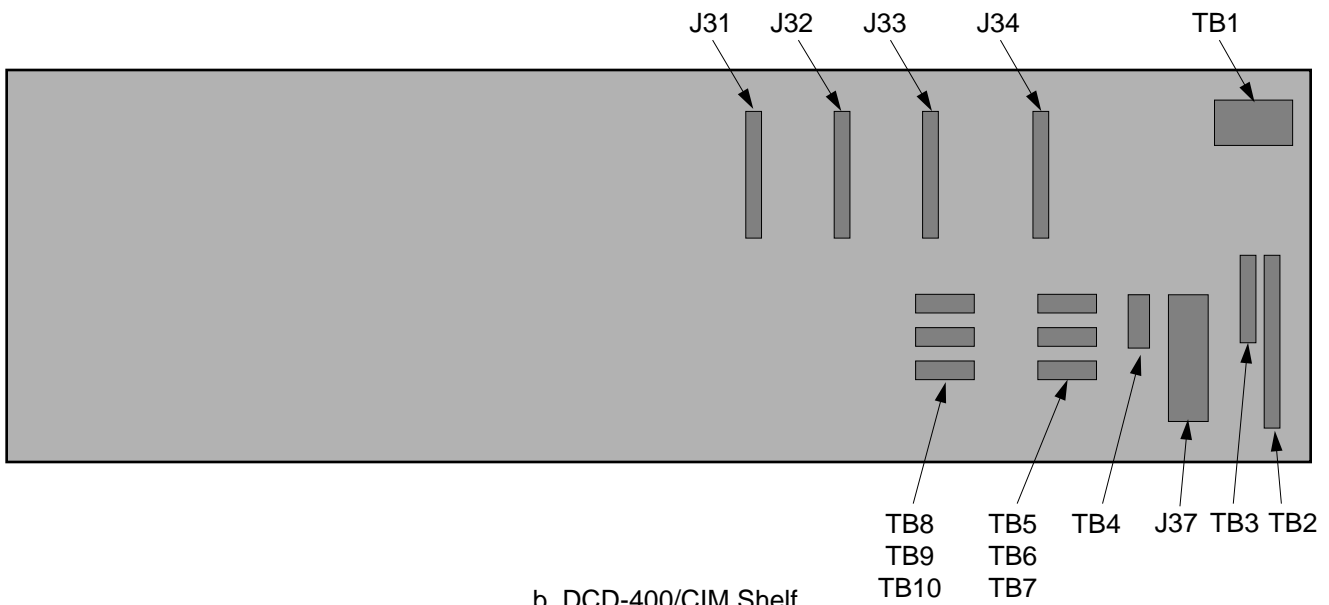
STEP	PROCEDURE
15	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c):</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> </ul> <p><b>Requirement:</b> All alarm contacts are closed (&lt;15 ohms).</p>
16	<p>Replace both fuses using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> The MAJOR, MINOR, and ACO lamps are off on the FA card, and the -48V A and -48V B lamps are off on the Output Protection/Spare Select panel.</p>
17	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c):</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> </ul> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
18	<p>Insert a TOxA card in any TOx output slot in the shelf.</p> <p><b>Requirement:</b> FAIL lamp lit on TOxA card, MAJOR lamp lit on FA card.</p>
19	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> </ul> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>

Chart 3. FA Card Test (DCD-400/CIM, Master and Expansion Shelves Only) (Contd)

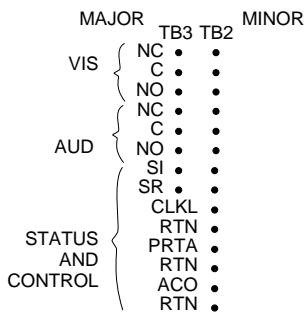
STEP	PROCEDURE
20	<p>Press the ACO pushbutton on the FA card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the FA card lights green, and the MAJOR and -48V A lamps remain lit.</p>
21	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</p> <p>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</p> <p><b>Requirement:</b> The MAJOR AUD NO and C are open (infinite ohms); and the MAJSI and MAJSR, MAJOR VIS NO and C remain closed (&lt;15 ohms).</p>
22	<p>Remove the TOxA card inserted in Step 18.</p> <p><b>Requirement:</b> MAJOR lamp on FA card goes off in 6 to 10 seconds.</p>
23	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</p> <p>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</p> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
24	<p>This completes the tests for FA card MINOR and MAJOR alarms. Indicate completion of the FA Card Test on the Test Sign-off form, then proceed to the next chart.</p>



a. DCD-ST2 Shelf



b. DCD-400/CIM Shelf



c. Pins of TB2 and TB3

Figure 3. Shelf Backplane Connector Positions (Rear View)



Chart 4. AI Card Test (DCD-ST2 Master Shelf Only)

STEP	PROCEDURE
<p>Use this procedure to install the AI card and verify operation. If the AI card is not used, skip this chart and proceed to the next chart. This procedure assumes power has been applied to the shelf and alarm connections have been made per TMSL 097-40000-57, DCD Installation practice.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. There are no switch or jumper settings for the AI card.</li> <li>2. When checking relay contact status, refer to Figure 3a for connector locations, and Figure 3c for pin locations.</li> <li>3. This test assumes that the alarm system requires normally open (NO) for a no alarm condition; if local company practice dictates that the alarm system requires NC (Normally Closed) for no alarm, refer to Figure 3c and test normally closed pins.</li> <li>4. If the Office Alarm and Shelf Status terminal sets have been connected to the office alarm system and remote telemetry equipment, the ohmmeter tests cannot be performed because these systems apply -48V on the alarm leads and ground on the return leads. To adequately test the AI card, perform one of the following:               <ol style="list-style-type: none"> <li>a. Disconnect the office alarm system and remote telemetry equipment from the DCD-ST2 shelf, and perform the ohmmeter tests, then reconnect the leads.</li> <li>b. Leave the office alarm system and remote telemetry equipment connections intact, and substitute the ohmmeter tests with audible and visual tests for appropriate condition responses from the office alarm system and verification of appropriate condition responses at the alarm and surveillance center.</li> </ol> </li> </ol>	
1	<p>Insert the AI card into the slot labeled “AI” in the DCD-ST2 master shelf.</p> <p><b>Requirement:</b> The MAJOR and MINOR lamps on the AI card are off.</p>
2	<p>Set the POWER ALARM switch (SW11) on the DCD-ST2 shelf backplane to MIN (see Figure 3a).</p>
3	<p>Remove fuse “-48V A” from the Output Protection/Spare Select Panel on the DCD-ST2 shelf with a small flat-blade screwdriver.</p> <p><b>Requirement:</b> The red lamp under the -48V A fuse on the Output Protection/Spare Select Panel front panel lights, and the MINOR lamp on the AI card lights.</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
4	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a):</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)  BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</p> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>
5	<p>Press the ACO pushbutton on the AI card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the AI card lights green, and the MINOR and -48V A lamps remain lit.</p>
6	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)  BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</p> <p><b>Requirement:</b> The MINOR AUD NO and C contacts are open (infinite ohms); the MINOR VIS NO and C, MINSI and MINSR, and BATTALM and BATTRTN remain closed (&lt;15 ohms).</p>
7	<p>Replace the -48V A fuse using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> -48V A fuse lamp and AI MINOR and ACO lamps go off (after approximately 6 to 10 seconds).</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
8	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</p> <p>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</p> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
9	<p>Remove fuse “-48V B” from the Output Protection/Spare Select Panel on the DCD-ST2 shelf using a small flat-blade screwdriver.</p> <p><b>Requirement:</b> The red lamp under the -48V B fuse on the Output Protection/Spare Select Panel front panel lights, and the MINOR lamp on the AI card lights.</p>
10	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</p> <p>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</p> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>
11	<p>Press the ACO pushbutton on the AI card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the AI card lights green, and the MINOR and -48V B lamps remain lit.</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
12	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</p> <p>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</p> <p><b>Requirement:</b> The MINOR AUD NO and C contacts are open (infinite ohms), and MINOR VIS NO and C, MINSI and MINSR, and BATTALM and BATTRTN remain closed (&lt;15 ohms).</p>
13	<p>Replace the -48V B fuse using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> -48V B fuse lamp, AI MINOR and ACO lamps go off (after approximately 6 to 10 seconds).</p>
14	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</p> <p>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)</p> <p>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</p> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
15	<p>Set the POWER ALARM switch (SW11) on the shelf backplane to MAJ (see Figure 3a).</p>
16	<p>Remove fuse “-48V A” from the Output Protection/Spare Select Panel on the DCD-ST2 shelf with a small flat-blade screwdriver.</p> <p><b>Requirement:</b> The red lamp under the -48V A fuse on the Output Protection/Spare Select Panel front panel lights, the MAJOR and MINOR lamps light on the AI card.</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
17	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>
18	<p>Press the ACO pushbutton on the AI card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the AI card lights green, and the MAJOR, MINOR, and -48V A lamps remain lit.</p>
19	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> The MAJOR and MINOR AUD NO and C are open (infinite ohms); and the MAJSI and MAJSR, MAJOR and MINOR VIS NO and C, MINSI and MINSR, and BATTALM and BATTRTN remain closed (&lt;15 ohms).</p>
20	<p>Replace the -48V A fuse using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> -48V A fuse lamp and AI MAJOR, MINOR, and ACO lamps go off (after approximately 6 to 10 seconds).</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
21	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
22	<p>Remove fuse “-48V B” from the Output Protection/Spare Select Panel on the DCD-ST2 shelf using a small flat-blade screwdriver.</p> <p><b>Requirement:</b> The red lamp under the -48V B fuse on the Output Protection/Spare Select Panel front panel lights, and the MAJOR and MINOR lamps light on the AI card.</p>
23	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> The multimeter indicates &lt;15 ohms across each set of terminals, indicating that the contacts have closed.</p>
24	<p>Press the ACO pushbutton on the AI card to silence the audible office alarm (if connected).</p> <p><b>Requirement:</b> The ACO lamp on the AI card lights green, and the MAJOR, MINOR, and -48V B lamps remain lit.</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
25	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> The MAJOR and MINOR AUD NO and C are open (infinite ohms); and the MAJSI and MAJSR, MAJOR and MINOR VIS NO and C, MINSI and MINSR, and BATTALM and BATTRTN remain closed (&lt;15 ohms).</p>
26	<p>Replace the -48V B fuse using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> -48V B fuse lamp, AI MAJOR, MINOR, and ACO lamps go off (after approximately 6 to 10 seconds).</p>
27	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c);</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>

Chart 4. AI Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
28	<p>Remove both fuses from the Output Protection/Spare Select Panel on the DCD-ST2 shelf using a small flat-blade screwdriver.</p> <p><b>Requirement:</b> All lamps on the shelf are off, except the -48V A and -48V B lamps on the Output Protection/Spare Select panel, and the MAJOR, MINOR, and ACO lamps on the AI card, which are lit.</p>
29	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c):</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> All alarm contacts are closed (&lt;15 ohms).</p>
30	<p>Replace both fuses using a small flat-blade screwdriver to lock in place.</p> <p><b>Requirement:</b> The MAJOR, MINOR, and ACO lamps are off on the AI card, and the -48V A and -48V B lamps are off on the Output Protection/Spare Select panel.</p>
31	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3a and Figure 3c):</p> <p><u>Office Alarm:</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status:</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> <li>BATTALM and BATTRTN (TB15, pins 1 &amp; 2)</li> </ul> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p>
32	<p>This completes the tests for AI card MINOR and MAJOR alarms. Indicate completion of the AI Card Test on the Test Sign-off form, then proceed to the next chart.</p>



Chart 5. CI/ACI Card Test

STEP	PROCEDURE
	Use this procedure to verify the operation of the CI/ACI cards. If the CI/ACI cards are not used, skip this chart and proceed to the next chart. This procedure assumes the clock input signals have been connected per TMSL 097-40000-57, DCD Installation practice. Consult the local company Installation Job Specifications to determine the type of input card, either CI or ACI, to be installed in the CI-A and CI-B slots in the shelf.
1	If the DCD-400/CIM shelf is the master shelf, skip this step. On the rear of the DCD-ST2 master shelf, set the ST3/ST2 switch (SW1) to the ST3 position (Figure 3a).
2	If not equipped with CI cards, skip to Step 6. If equipped with a CI card, set sections 1 through 4 of switch SW1 (Figure 4) on the CI card as required for the type of clock input signal (refer to local company Installation Job Specifications for the type of clock input signals).
3	If not equipped with a second CI card, skip to the next step. If equipped with a second CI card, repeat the previous step for the second CI card.
4	If the CI-A slot in the master shelf is to be equipped with a CI card, insert a CI card into this slot. If not equipped with a CI card, skip to the next step.  <b>Requirement:</b> On the CI card just installed, the DS1 lamp is lit green, and the FAIL lamp goes off after approximately 8 to 40 seconds. After the card has warmed up, the SRC ACTIVE lamp lights green.
5	If the CI-B slot in the master shelf is to be equipped with a CI card, insert a CI card into this slot. If not equipped with a CI card, skip to the next step.  <b>Requirement:</b> On the CI card just installed, the DS1 lamp is lit green, and the FAIL lamp goes off after approximately 8 to 40 seconds. If this is the first input card installed, after the card has warmed up, the SRC ACTIVE lamp lights green. If this is the second input card, the SRC ACTIVE lamp will remain off.
6	If not equipped with ACI cards, skip to Step 10. If equipped with an ACI card, set sections 1 and 2 of switch SW4 (Figure 5) to match the frequency of the clock input signal (refer to local company Installation Job Specifications for the frequency of the clock input signals).
7	If not equipped with a second ACI card, skip to the next step. If equipped with a second ACI card, repeat the previous step for the second ACI card.
8	If the CI-A slot in the master shelf is to be equipped with an ACI card, insert an ACI card into this slot. If not equipped with an ACI card, skip to the next step.  <b>Requirement:</b> On the ACI card just installed, the FL lamp and SRC FL lamps are lit red, but both lamps go off approximately 20 seconds after the card is installed, and the SRC ACT lamp lights green.
9	If the CI-B slot in the master shelf is to be equipped with an ACI card, insert an ACI card into this slot. If not equipped with an ACI card, skip to the next step.  <b>Requirement:</b> On the ACI card just installed, the FL lamp and SRC FL lamps are lit red for approximately 20 seconds after the card is installed. The SRC ACT lamp should remain off.

Chart 5. CI/ACI Card Test (Contd)

STEP	PROCEDURE
10	<p>Press the XFR pushbutton on one of the CI/ACI cards.</p> <p><b>Requirement:</b> The lit SRC ACT/SRC ACTIVE lamp indication transfers to the other CI/ACI card.</p>
11	<p>Press the XFR pushbutton on the other CI/ACI card.</p> <p><b>Requirement:</b> The lit SRC ACT/SRC ACTIVE lamp indication transfers back to the original CI/ACI card.</p>
12	<p>Remove the CI/ACI card with its SRC ACT/SRC ACTIVE lamp lit.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp lights on the other CI/ACI card.</p>
13	<p>Reinsert the removed CI/ACI card.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp remains lit on the other CI/ACI card.</p>
14	<p>Remove the CI/ACI card with its SRC ACT/SRC ACTIVE lamp lit.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp on the original CI/ACI card lights.</p>
15	<p>Reinsert the removed CI/ACI card.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp remains lit on the other CI/ACI card.</p>
16	<p>Press the XFR pushbutton on the other CI/ACI card to transfer active status to the CI/ACI A card.</p> <p><b>Requirement:</b> The lit SRC ACT/SRC ACTIVE lamp indication transfers back to the other CI/ACI card.</p>
17	<p>If the DCD-ST2 shelf is to be equipped with ST2 or ST2E clock cards, set the ST3/ST2 switch (SW1) on the shelf backplane to the ST2 position (Figure 3a). If the shelf is to be equipped with ST3E or ST3 clock cards, leave SW1 in the ST3 position. If the DCD-400/CIM shelf is the master shelf, skip this step.</p> <p><b>Requirement:</b> If SW1 is set to the ST2 position, the SRC ACT/SRC ACTIVE lamps on both CI/ACI cards will be lit. The transfer (XFR) function between the CI/ACI cards will be disabled.</p>
18	<p>This procedure is completed. Indicate completion of the CI/ACI Card Test on the Test Sign-off form, then proceed to next chart.</p>

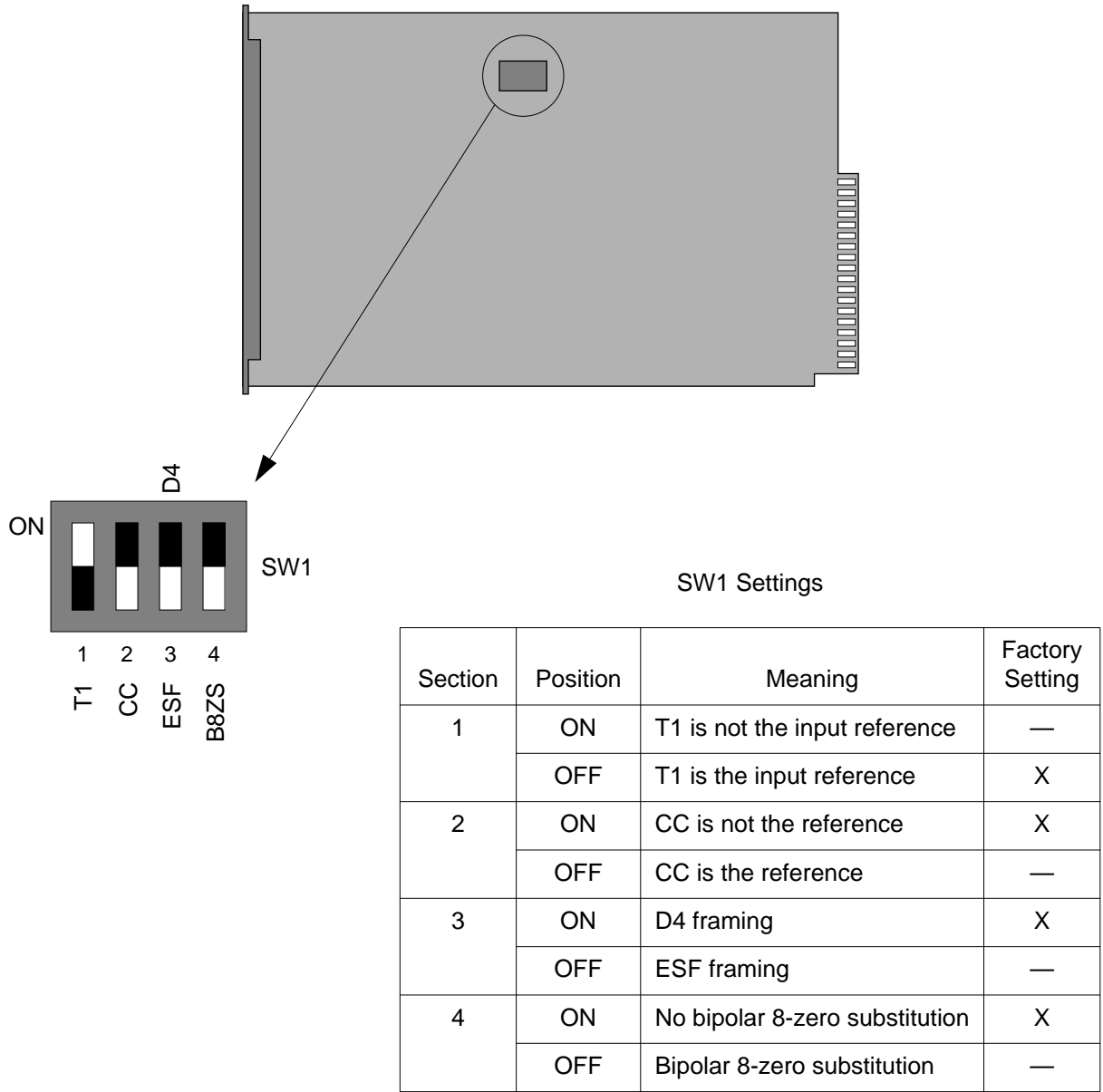


Figure 4. CI Card Switch

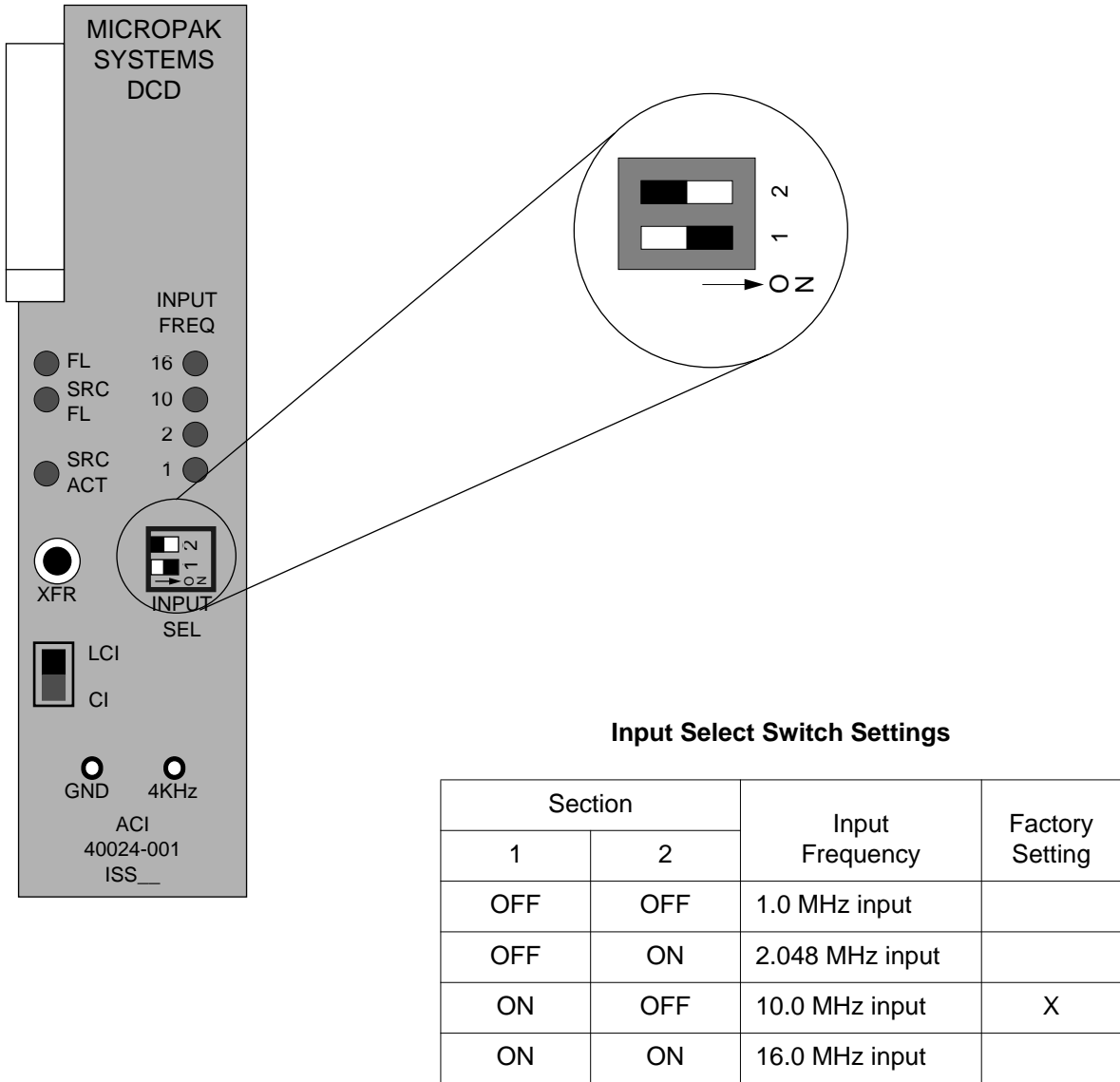


Figure 5. ACI Card Switch

Chart 6. ST2 Card Test (DCD-ST2 Master Shelf Only)

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the ST2 cards. If ST2 cards are not used, or if the master shelf is a DCD-400/CIM Shelf, skip this chart. This procedure assumes the procedure for the CI/ACI cards has been completed and there are input references connected to the shelf's input terminals.</p> <p>There are no switch options on the ST2 card.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The times indicated in the procedure are from the time the card is powered (inserted in the shelf).</li> <li>2. If the ST2 card is Issue D or earlier, the oscillator stabilization period is approximately 1 hour and is software controlled (not a function of oscillator temperature). If Issue E or later, the rubidium temperature is checked upon insertion and the oscillator may stabilize in less than one hour.</li> <li>3. If the FAIL lamp lights on an ST2 card at any time, the card has failed and must be replaced.</li> </ol>
1	<p>On the DCD-ST2 master shelf backplane, set the ST2/ST3 switch (SW1) to the ST2 position (Figure 3a).</p> <p><b>Requirement:</b> Both clock input cards' SRC ACT/SRC ACTIVE lamps are lit.</p>
2	<p>In the master shelf, insert the first ST2 card into the ST A slot.</p>
3	<p>In the master shelf, insert the second ST2 card into the ST B slot.</p> <p><b>Note:</b> There is not a waiting period between installation of the first ST2 card and the second ST2 card.</p>
4	<p>During the stabilization period (approximately 40 - 60 minutes), observe the FREE RUN lamp on both ST2s.</p> <p><b>Requirement:</b> On both ST2 cards, the FREE RUN lamp flashes green.</p>
5	<p>After the stabilization period, observe the FREE RUN, REF A, and REF B lamps.</p> <p><b>Requirement:</b> On both ST2s, the FREE RUN lamp stops flashing and goes off. On the ST2 on the left (ST A), the REF A lamp lights green, and on the ST2 on the right (ST B), the REF B lamp lights green.</p> <p><b>Note:</b> If an ST2 does not recognize its associated REF input (ST2 A, REF A and ST2 B, REF B) both ST2 cards will look at the remaining available input and light their appropriate REF lamps. If no inputs are available from either input card, the ST2 cards will remain in FREE RUN and their FREE RUN lamps will light steady.</p>
6	<p>Before the LOCKED lamps light on the ST2 cards, remove both clock input cards (CI/ACI).</p> <p><b>Requirements:</b> The REF lamps on the ST2 card extinguish and the FREE RUN lamps light steadily, one ST2 card's ACTIVE lamp will light.</p>

Chart 6. ST2 Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
7	<p>Connect the multimeter, set to ohms, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and FREERUN (TB11, pins 5 &amp; 6)</li> <li>• CLOCK STATUS A RTN and LOCKED (TB11, pins 9 &amp; 10)</li> <li>• CLOCK STATUS B RTN and FREERUN (TB12, pins 5 &amp; 6)</li> <li>• CLOCK STATUS B RTN and LOCKED (TB12, pins 9 &amp; 10)</li> </ul> <p><b>Requirements:</b> Both A and B FREERUN and LOCKED to RTN are closed (&lt;15 ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets.</p>
8	<p>Reinsert both clock input cards.</p> <p><b>Requirement:</b> After approximately 8 - 40 seconds, the SRC ACT/SRC ACTIVE lamps on the clock input cards light, and the appropriate REF lamps light on the ST2 cards.</p>
9	<p>Connect the multimeter, set to ohms, across the following terminal sets on the shelf backplane.</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and FREERUN (TB11, pins 5 &amp; 6)</li> <li>• CLOCK STATUS B RTN and FREERUN (TB12, pins 5 &amp; 6)</li> </ul> <p><b>Requirements:</b> Both A and B FREERUN to RTN are open (infinite ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets.</p>
10	<p>Approximately 5 minutes (up to 20 minutes for worst-case signal conditions) after the end of the stabilization period, observe the LOCKED and ACTIVE lamps on the ST2 cards.</p> <p><b>Requirement:</b> On both ST2 cards, the LOCKED lamp lights green. On one of the ST2 cards, the ACTIVE lamp is lit green.</p>
11	<p>Connect the multimeter, set to ohms, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and LOCKED (TB11, pins 9 &amp; 10)</li> <li>• CLOCK STATUS B RTN and LOCKED (TB12, pins 9 &amp; 10)</li> </ul> <p><b>Requirements:</b> Both A and B LOCKED to RTN are open (infinite ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets.</p>
12	<p>Press the XFR pushbutton on one of the ST2 cards.</p> <p><b>Requirement:</b> The lit ACTIVE lamp indication transfers to the other ST2 card, the LOCKED lamps remain lit.</p>

Chart 6. ST2 Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
13	<p>Press the XFR pushbutton on the other ST2 card.</p> <p><b>Requirement:</b> The lit ACTIVE lamp indication transfers back to the original card, the LOCKED lamps remain lit.</p>
14	<p>If the ACTIVE lamp on ST2 A is not lit, press the XFR pushbutton on its faceplate to make it active. Remove the clock input A card.</p> <p><b>Requirement:</b> The ACTIVE lamp on the ST2 A card remains lit, the lit REF A lamp goes off and the REF B lamp lights to indicate that the card is now receiving input reference from clock input B card. The LOCKED lamp may go off, if so, it will relight after approximately 5 minutes.</p>
15	<p>Remove the ST2 A card.</p> <p><b>Requirement:</b> The ACTIVE lamp on the ST2 B card lights.</p>
16	<p>Reinsert the ST2 A and clock input A cards.</p> <p><b>Requirement:</b> After the stabilization period (approx. 5 - 60 minutes), the SRC ACT/SRC ACTIVE lamps on the clock input A card, and the REF A and LOCKED lamps on the ST2 A card light, and the ACTIVE lamp on the ST2 B card remains lit.</p>
17	<p>If the ACTIVE lamp on ST2 B is not lit, press the XFR pushbutton on its faceplate to make it active. Remove the clock input B card.</p> <p><b>Requirement:</b> The ACTIVE lamp on the ST2 B card remains lit, the lit REF B lamp goes off and the REF A lamp lights to indicate that the card is now receiving input reference from clock input A card. The LOCKED lamp may go off, if so, it will relight after approximately 5 minutes.</p>
18	<p>Remove the ST2 B card.</p> <p><b>Requirement:</b> The ACTIVE lamp on the ST2 A card lights.</p>
19	<p>Reinsert the ST2 B and clock input B cards.</p> <p><b>Requirement:</b> After the stabilization period (approx. 5 - 60 minutes), the SRC ACT/SRC ACTIVE lamps on the clock input B card and the REF B and LOCKED lamps on the ST2 B card light, and the ACTIVE lamp on the ST2 A card remains lit.</p>
20	<p>Remove both clock input cards.</p> <p><b>Requirement:</b> On both ST2 cards the REF and LOCKED lamps go off, the ACTIVE lamp remains lit on the ST2 B card, and the red HOLDOVER lamps light on both ST2 cards.</p>

Chart 6. ST2 Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
21	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and HOLDOVER (TB11, pins 7 &amp; 8)</li> <li>• CLOCK STATUS B RTN and HOLDOVER (TB12, pins 7 &amp; 8)</li> </ul> <p><b>Requirements:</b> Both A and B HOLDOVER to RTN read &lt;0.1 volts dc.</p> <p><b>Note:</b> The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11) operation. Therefore, ohms cannot be measured across this terminal set.</p>
22	<p>Reinsert both clock input cards.</p> <p><b>Requirement:</b> The REF lamps light on the clock input cards, REF A on the ST2 A, and REF B on the ST2 B lights; the LOCKED lamp on both ST2 cards light and the HOLDOVER lamp on both ST2 cards go out.</p>
23	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and HOLDOVER (TB11, pins 7 &amp; 8)</li> <li>• CLOCK STATUS B RTN and HOLDOVER (TB12, pins 7 &amp; 8)</li> </ul> <p><b>Requirements:</b> Both A and B HOLDOVER to RTN read -48 volts dc.</p> <p><b>Note:</b> The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11) operation. Therefore, ohms cannot be measured across this terminal set.</p>
24	<p>This procedure is completed. Indicate completion of the ST2 Card Test on the Test Sign-off form, then proceed to next chart.</p>



Chart 7. ST2E Card Test (DCD-ST2 Master Shelf Only)

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the ST2E cards. If ST2E cards are not used, or if the master shelf is a DCD-400/CIM shelf, skip this chart. This procedure assumes the procedure for the CI/ACI cards has been completed and there are input references connected to the shelf's input terminals.</p> <p>There are no switch options on the ST2E card.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The times indicated in the procedure are from the time the card is powered (inserted in the shelf).</li> <li>2. If the FAIL lamp lights on an ST2E card at any time, the card has failed and must be replaced.</li> </ol> <p><b>Note:</b> Do not press the DSBL pushbutton switch on the ST2E A card unless that card is going to be removed from the shelf since its output will be disabled for up to 20 minutes. The DSBL pushbutton on the ST2E B card in slot B does not function (ST2E B cannot be disabled).</p>
1	<p>On the DCD-ST2 master shelf backplane, set the ST2/ST3 switch (SW1) to the ST2 position (Figure 3a).</p> <p><b>Requirement:</b> Both clock input cards' SRC ACT/SRC ACTIVE lamps are lit.</p>
2	<p>In the master shelf, insert the first ST2E card into the ST A slot.</p> <p><b>Requirement:</b> HOLDOVER lamp flashes green during the approximately 30 minutes stabilization period.</p>
3	<p>In the master shelf, insert the second ST2E card into the ST B slot.</p> <p><b>Note:</b> No waiting period is necessary between when the first ST2E card and the second ST2E card may be installed.</p> <p><b>Requirement:</b> HOLDOVER lamp flashes green during the approximately 30 minutes stabilization period.</p>
4	<p>After the stabilization period, observe the HOLDOVER, SRC A, and SRC B lamps.</p> <p><b>Requirement:</b> On both ST2E cards, the HOLDOVER lamp stops flashing, and the SRC A lamp lights green on the ST2E A card, and the SRC B lamp lights green on the ST2E B card.</p> <p><b>Note:</b> If an ST2E does not recognize its associated SRC input (ST2E A, SRC A and ST2E B, SRC B) both ST2E cards will look at the remaining available input and light their appropriate SRC lamps. If no inputs are available from either input card, the HOLDOVER lamp lights steady green and the ACTIVE lamp lights green to indicate the ST2E cards are in free-run mode.</p>

Chart 7. ST2E Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
5	<p>Before the ACTIVE lamps light on the ST2E cards, remove both clock input cards.</p> <p><b>Requirements:</b> The SRC lamps on the ST2E cards extinguish and the HOLDOVER lamps light steady green and the ACTIVE lamps will light on both ST2E cards to indicate they are in freerun mode.</p>
6	<p>Connect the multimeter, set to ohms, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and FREERUN (TB 11, pins 5 &amp; 6)</li> <li>• CLOCK STATUS A RTN and LOCKED (TB11, pins 9 &amp; 10)</li> <li>• CLOCK STATUS B RTN and FREERUN (TB12, pins 5 &amp; 6)</li> <li>• CLOCK STATUS B RTN and LOCKED (TB12, pins 9 &amp; 10)</li> </ul> <p><b>Requirements:</b> Both A and B FREERUN and LOCKED to RTN are closed (&lt;15 ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets.</p>
7	<p>Reinsert both clock input cards (CI/ACI).</p> <p><b>Requirement:</b> On the clock input cards, after the input source is acquired (approximately 8 - 40 seconds) the SRC ACT/SRC ACTIVE lamps light. The appropriate SRC lamps light, the HOLDOVER lamps go off, and the ACTIVE lamp remains lit on both ST2E cards.</p>
8	<p>Connect the multimeter, set to ohms, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and FREERUN (TB11, pins 5 &amp; 6)</li> <li>• CLOCK STATUS B RTN and FREERUN (TB12, pins 5 &amp; 6)</li> </ul> <p><b>Requirements:</b> Both A and B FREERUN to RTN are open (infinite ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets.</p>
9	<p>Up to 5 minutes later, observe the LKD lamps.</p> <p><b>Requirement:</b> On both ST2E cards, the LKD lamps light green.</p> <p><b>Note:</b> This indicates that the ST2E cards are frequency locked with their input sources.</p>

Chart 7. ST2E Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
10	<p>Connect the multimeter, set to ohms, across the following terminal sets on the shelf backplane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and LOCKED (TB11, pins 9 &amp; 10)</li> <li>• CLOCK STATUS B RTN and LOCK (TB11, pins 9 &amp; 10)</li> </ul> <p><b>Requirement:</b> Both A and B LOCK to RTN are open (infinite ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets.</p>
11	<p>Press the DSBL pushbutton on the ST2E A card.</p> <p><b>Requirement:</b> The LKD and ACTIVE lamps go off, and the HOLDOVER lamp flashes green. The SRC A lamp remains lit.</p>
12	<p>Press the DSBL pushbutton on the ST2E B card.</p> <p><b>Requirement:</b> Nothing happens; the LKD, ACTIVE, and SRC B lamps remain lit.</p> <p><b>Note:</b> The DSBL pushbutton does not function on the ST2E card installed in slot B.</p>
13	<p>Up to 20 minutes later, observe the ST2E A card lamps.</p> <p><b>Requirement:</b> The HOLDOVER lamp stops flashing and goes off. Then the ACTIVE lamp lights, and then the LKD lamp lights.</p>
14	<p>Press the DSBL pushbutton on the ST2E B card.</p> <p><b>Requirement:</b> No lamps change status.</p> <p><b>Note:</b> The DSBL pushbutton does not function on the ST2E card installed in slot B, even if the ST2E card installed in slot A is LKD and ACTIVE.</p>
15	<p>Remove the clock input A card.</p> <p><b>Requirement:</b> The ACTIVE lamp on the ST2E A card remains lit, the lit SRC A lamp goes off and the SRC B lamp lights to indicate that the card is now receiving input reference from clock input B card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>
16	<p>Reinsert the clock input A card.</p> <p><b>Requirement:</b> After the input source is acquired (approximately 8 - 40 seconds), the SRC ACT/SRC ATACTIVE lamp lights on the input A card, and the SRC A lamp lights and the SRC B lamps goes off on the ST2E A card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>

Chart 7. ST2E Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
17	<p>Remove the clock input B card.</p> <p><b>Requirement:</b> The ACTIVE lamp on the ST2E B card remains lit, the lit SRC B lamp goes off, and the SRC A lamp lights to indicate that the card is now receiving input reference from the clock input A card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>
18	<p>Reinsert the clock input B card.</p> <p><b>Requirement:</b> After the input source is acquired (approximately 8 - 40 seconds), the SRC ACT/SRC ATCTIVE lamp lights on the clock input B card. The SRC B lamp lights and the SRC A lamp goes off on the ST2E B card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>
19	<p>Remove both clock input cards.</p> <p><b>Requirement:</b> On both ST2E cards the SRC and LKD lamps go off, the ACTIVE lamps remain lit, and the HOLDOVER lamps light red to indicate they are in holdover mode.</p>
20	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf back-plane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and HOLDOVER (TB11, pins 7 &amp; 8)</li> <li>• CLOCK STATUS B RTN and HOLDOVER (TB12, pins 7 &amp; 8)</li> </ul> <p><b>Requirements:</b> Both A and B HOLDOVER to RTN read &lt;0.1 volts dc.</p> <p><b>Note:</b> The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11) operation. Therefore, ohms cannot be measured across this terminal set.</p>
21	<p>Reinsert both clock input cards.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamps light on the clock input cards, the HOLD-OVER lamps on both ST2E cards go off, SRC A on the ST2E A and the SRC B on the ST2E B lights; then the LKD lamps on the ST2E cards light.</p>
22	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf back-plane:</p> <ul style="list-style-type: none"> <li>• CLOCK STATUS A RTN and HOLDOVER (TB11, pins 7 &amp; 8)</li> <li>• CLOCK STATUS B RTN and HOLDOVER (TB12, pins 7 &amp; 8)</li> </ul> <p><b>Requirements:</b> Both A and B HOLDOVER to RTN read -48 volts dc.</p> <p><b>Note:</b> The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11) operation. Therefore, ohms cannot be measured across this terminal set.</p>

## Chart 7. ST2E Card Test (DCD-ST2 Master Shelf Only) (Contd)

STEP	PROCEDURE
23	This procedure is completed. Indicate completion of the ST2E Card Test on the Test Sign-off form, then proceed to next chart.

Chart 8. ST3E Card Test

STEP	PROCEDURE
Use this procedure to verify the operation of the ST3E cards. If ST3E cards are not used, skip this chart. This procedure assumes the procedure for the CI/ACI cards has been completed.	
1	On the rear of the DCD-ST2 master shelf, set the ST3/ST2 switch (SW1) to the ST3 position and the HOLDOVER ALARM switch (SW11-1) to MIN (Figure 3a). If the master shelf is a DCD-400/CIM shelf, skip this step.
2	On both ST3E cards, set SW1, section 5 to OFF to cause a minor alarm in Holdover mode per Figure 6.
3	In the master shelf, insert the first ST3E card into the ST A slot.
4	In the master shelf, insert the second ST3E card into the ST B slot.
5	<p>During the 30-minute (approximately) oscillator stabilization period, observe the FREE RUN lamp on both ST3E cards.</p> <p><b>Requirement:</b> On both ST3E cards, the FREE RUN lamps flash green.</p>
6	<p>After the 30-minute oscillator stabilization period, observe the FREE RUN, REF A, and REF B lamps.</p> <p><b>Requirement:</b> On both ST3E cards, the FREE RUN lamps stop flashing and go off. On both ST3E cards, the REF A or B lamp lights, depending on which clock input (A or B) card's SRC ACT/SRC ACTIVE lamp is lit.</p> <p><b>Note:</b> If a ST3E card does not recognize an input reference signal, the ST3E free runs and the FREE RUN lamp lights green (not flashing).</p>
7	<p>Approximately 5 minutes (up to 20 minutes for worst-case signal conditions) after the end of the 30-minute oscillator stabilization period, observe the LOCKED and ACTIVE lamps on the ST3E cards.</p> <p><b>Requirement:</b> On both ST3E cards, the LOCKED and ACTIVE lamps light green.</p>
8	<p>Press the transfer (XFR) pushbutton on either clock input card. Observe the SRC ACT/SRC ACTIVE lamps on the clock input cards and the REF and LOCKED lamps on the ST3E cards.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp goes off on one clock input card and lights on the other. The lit REF lamp (REF A or REF B) goes off and the other REF lamp lights on both ST3E cards. If the clock input cards are off frequency from each other, the LOCKED lamps on the ST3E cards may go off while converging on the new reference and relight after approximately 5 minutes.</p>

Chart 8. ST3E Card Test (Contd)

STEP	PROCEDURE
9	<p>Press the transfer (XFR) pushbutton on either clock input card to transfer back to the original clock input card. Observe the SRC ACT/SRC ACTIVE lamps on the clock input cards and the REF and LOCKED lamps on the ST3E cards.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp goes off on one clock input card and lights on the other. The lit REF lamp (REF A or REF B) goes off and the other REF lamp lights on both ST3E cards. If the clock input cards are off frequency from each other, the LOCKED lamps on the ST3E cards may go off while converging on the new reference and relight after approximately 5 minutes.</p>
10	<p>If clock input A card SRC ACT/SRC ACTIVE lamp is not lit, press its XFR pushbutton to make it active. Remove clock input A card. Observe the SRC ACT/SRC ACTIVE lamp on the clock input B card and the REF and LOCKED lamps on the ST3E cards.</p> <p><b>Requirement:</b> SRC ACT/SRC ACTIVE lamp on clock input B card lights. The REF A lamp goes off and the REF B lamps light on both ST3E cards. The LOCKED lamp on one or both ST3E cards may go off while converging on the new reference and relight after approximately 5 minutes.</p>
11	<p>Reinsert clock input A card. When the FAIL lamp goes off on clock input A card, observe the REF lamps (A and B) on both ST3E cards.</p> <p><b>Requirement:</b> No change on the lamps.</p>
12	<p>Remove both clock input A and B cards. Observe the lamps on the AI/FA and both ST3E cards.</p> <p><b>Requirement:</b> On the AI/FA card, the MINOR lamp lights. On both ST3E cards, the REF and LOCKED lamps go off, the HOLD OV lamps light, and the ACTIVE lamps remain lit.</p>

Chart 8. ST3E Card Test (Contd)

STEP	PROCEDURE
13	<p>Connect the multimeter across the following Office Alarms, Shelf Status, and Clock Status A and B (DCD-ST2 shelf only) terminal sets on the shelf backplane (see Figure 3). Set the multimeter to ohms scale for all terminal sets except HOLDOVER; set to volts dc scale for Clock Status A and B HOLDOVER terminal sets.</p> <p><u>Office Alarm (all shelf types):</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3 on all shelf types)</p> <p><u>Shelf Status (all shelf types):</u>  MINSI and MINSR (TB2, pins 7 &amp; 8 on all shelf types)</p> <p><u>Clock Status A (DCD-ST2 shelf only):</u>  RTN and HOLDOVER (TB11, pins 7 &amp; 8)  RTN and LOCKED (TB11, pins 9 &amp; 10)</p> <p><u>Clock Status B (DCD-ST2 shelf only):</u>  RTN and HOLDOVER (TB12, pins 7 &amp; 8)  RTN and LOCKED (TB12, pins 9 &amp; 10)</p> <p><b>Requirement:</b> All alarm contacts, except HOLDOVER, are closed (&lt;15 ohms) and HOLDOVER reads &lt;0.1 volts.</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets. The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11-1) operation on DCD-ST2 shelves. Therefore, ohms cannot be measured across this terminal set.</p>
14	<p>Reinsert both clock input cards. After the FAIL lamps go off (approximately 8 to 40 seconds), observe the lamps on the AI/FA and both ST3E cards after about 5 minutes.</p> <p><b>Requirement:</b> On both ST3E cards, the REF A or B lamp is lit (depending on which clock input [A or B] card's SRC ACT/SRC ACTIVE lamp is lit), the LOCKED and ACTIVE lamps are lit, and the HOLD OV lamp is off. The MINOR lamp on the AI/FA is off.</p>



Chart 8. ST3E Card Test (Contd)

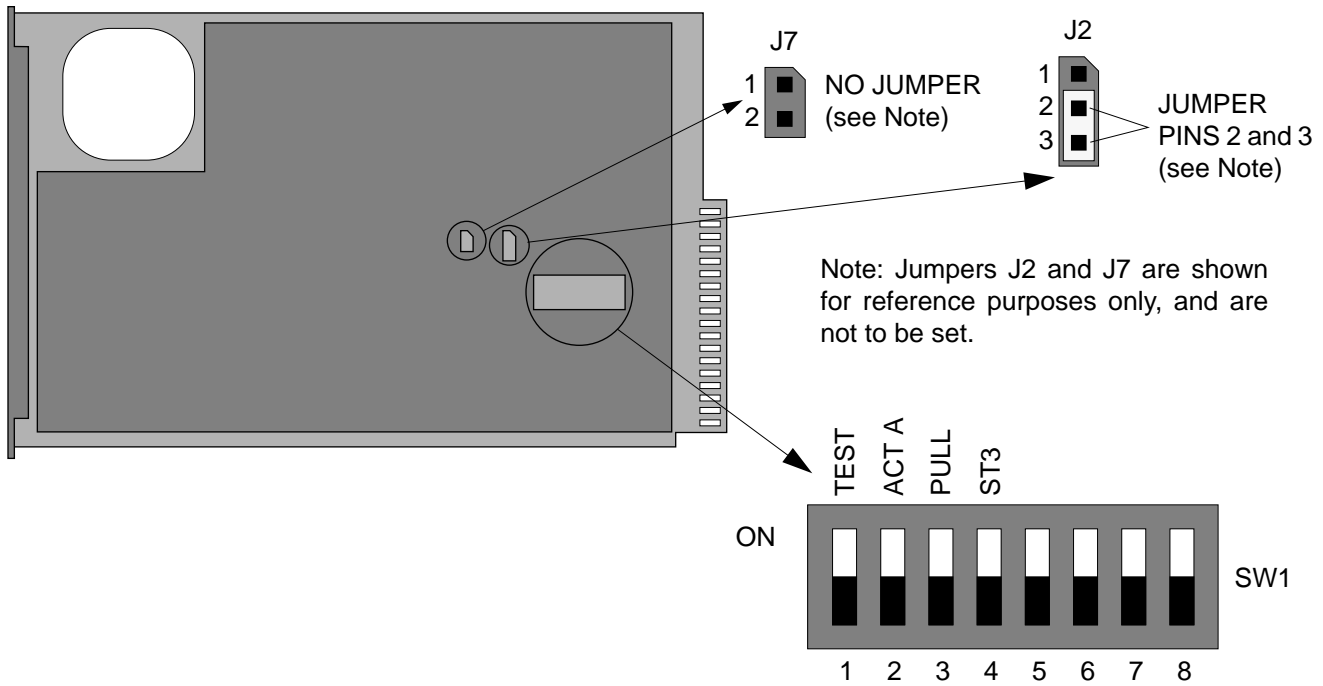
STEP	PROCEDURE
15	<p>Connect the multimeter across the following Office Alarms, Shelf Status, and Clock Status A and B (DCD-ST2 shelf only) terminal sets on the shelf backplane (see Figure 3). Set the multimeter to ohms scale for all terminal sets except HOLDOVER; set to volts dc scale for Clock Status A and B HOLDOVER terminal sets.</p> <p><u>Office Alarm (all shelf types):</u>  MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3 on all shelf types)</p> <p><u>Shelf Status (all shelf types):</u>  MINSI and MINSR (TB2, pins 7 &amp; 8 on all shelf types)</p> <p><u>Clock Status A (DCD-ST2 shelf only):</u>  RTN and HOLDOVER (TB11, pins 7 &amp; 8)  RTN and LOCKED (TB11, pins 9 &amp; 10)</p> <p><u>Clock Status B (DCD-ST2 shelf only):</u>  RTN and HOLDOVER (TB12, pins 7 &amp; 8)  RTN and LOCKED (TB12, pins 9 &amp; 10)</p> <p><b>Requirement:</b> All alarm contacts, except HOLDOVER, are open (infinite ohms), and HOLDOVER reads -48 volts.</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets. The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11-1) operation. Therefore, ohms cannot be measured across this terminal set.</p>
16	<p>Remove both ST3E cards. On both ST3E cards, set SW1, section 5 to cause a major alarm in Hold-over mode per Figure 6. On the DCD-ST2 shelf only, set HOLDOVER ALARM switch SW11-1 to MAJ on the shelf backplane.</p>
17	<p>Reinsert both ST3E cards and wait approximately 35 minutes for the following requirements to be met.</p> <p><b>Requirement:</b> On both ST3E cards, the REF A or B lamp lights, depending on which clock input (A or B) card's SRC ACT/SRC ACTIVE lamp is lit, and the LOCKED and ACTIVE lamps are lit green.</p>
18	<p>Remove both clock input cards. Observe the lamps on the AI/FA and both ST3E cards.</p> <p><b>Requirement:</b> The MAJOR and MINOR lamps light on the AI/FA card. On both ST3E cards, the REF and LOCKED lamps go off, and the HOLD OV lamp lights.</p>

Chart 8. ST3E Card Test (Contd)

STEP	PROCEDURE
19	<p>Connect the multimeter across the following Office Alarms, Shelf Status, and Clock Status A and B (DCD-ST2 shelf only) terminal sets on the shelf backplane (see Figure 3). Set the multimeter to ohms scale for all terminal sets except HOLDOVER; set to volts dc scale for Clock Status A and B HOLDOVER terminal sets.</p> <p><u>Office Alarm (on all shelf types):</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status (on all shelf types):</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> </ul> <p><u>Clock Status A (on DCD-ST2 shelf only):</u></p> <ul style="list-style-type: none"> <li>RTN and HOLDOVER (TB11, pins 7 &amp; 8)</li> <li>RTN and LOCKED (TB11, pins 9 &amp; 10)</li> </ul> <p><u>Clock Status B (on DCD-ST2 shelf only):</u></p> <ul style="list-style-type: none"> <li>RTN and HOLDOVER (TB12, pins 7 &amp; 8)</li> <li>RTN and LOCKED (TB12, pins 9 &amp; 10)</li> </ul> <p><b>Requirement:</b> All alarm contacts, except HOLDOVER, are closed (&lt;15 ohms); HOLDOVER reads &lt;0.1 volts.</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets. The HOLDOVER and RTN status terminal set is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11-1) operation on DCD-ST2 shelves. Therefore, ohms cannot be measured across this terminal set.</p>
20	<p>Reinsert both clock input cards. After the FAIL lamps go off, observe the lamps on the AI/FA and both ST3E cards after approximately 5 minutes.</p> <p><b>Requirement:</b> On both ST3E cards, the REF A or B lamp is lit (depending on which clock input card's SRC ACT/SRC ACTIVE lamp is lit), the LOCKED and ACTIVE lamps are lit, and the HOLD OV lamp is off. The MAJOR and MINOR lamps on the AI/FA card are off.</p>

Chart 8. ST3E Card Test (Contd)

STEP	PROCEDURE
21	<p>Connect the multimeter across the following Office Alarms, Shelf Status, and Clock Status A and B terminal sets on the shelf backplane (see Figure 3). Set the multimeter to ohms scale for all terminal sets except HOLDOVER; set to volts dc scale for Clock Status A and B HOLDOVER terminal sets.</p> <p><u>Office Alarm (on all shelf types):</u></p> <ul style="list-style-type: none"> <li>MINOR AUD NO and C (TB2, pins 5 &amp; 6)</li> <li>MINOR VIS NO and C (TB2, pins 2 &amp; 3)</li> <li>MAJOR AUD NO and C (TB3, pins 5 &amp; 6)</li> <li>MAJOR VIS NO and C (TB3, pins 2 &amp; 3)</li> </ul> <p><u>Shelf Status (on all shelf types):</u></p> <ul style="list-style-type: none"> <li>MINSI and MINSR (TB2, pins 7 &amp; 8)</li> <li>MAJSI and MAJSR (TB3, pins 7 &amp; 8)</li> </ul> <p><u>Clock Status A (on DCD-ST2 shelf only):</u></p> <ul style="list-style-type: none"> <li>RTN and HOLDOVER (TB11, pins 7 &amp; 8)</li> <li>RTN and LOCKED (TB11, pins 9 &amp; 10)</li> </ul> <p><u>Clock Status B (on DCD-ST2 shelf only):</u></p> <ul style="list-style-type: none"> <li>RTN and HOLDOVER (TB12, pins 7 &amp; 8)</li> <li>RTN and LOCKED (TB12, pins 9 &amp; 10)</li> </ul> <p><b>Requirement:</b> All alarm contacts, except HOLDOVER, are open (infinite ohms), and HOLDOVER reads -48 volts.</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets. The HOLDOVER and RTN status terminal set (DCD-ST2 shelf only) is connected to -48V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW11-1) operation. Therefore, ohms cannot be measured across this terminal set.</p>
22	<p>Consult the local company Installation Job Specifications as to whether the Holdover mode is to generate a major or minor alarm. If minor, remove both ST3E cards, set SW1, section 5, to MINOR and reinsert the cards. Set the HOLDOVER ALARM switch (SW11-1) to MIN on the DCD-ST2 shelf backplane. If it is to be set for major alarm, proceed to the next step.</p> <p><b>Note:</b> Both ST3E cards and SW3 on the DCD-ST2 shelf backplane <i>must be set</i> for the same mode, either MAJOR or MINOR alarm, in Holdover mode. The DCD-400/CIM shelf does not have a HOLDOVER switch on its backplane.</p>
23	<p>This procedure is completed. Indicate completion of the ST3E Card Test on the Test Sign-off form, then proceed to next chart.</p>



SW1 Switch Settings

Section (Note 1)	Setting	Function	Factory Setting
3 (Note 2)	ON	$\pm 2 \times 10^{-6}$ pull-in	—
	OFF	$\pm 5.6 \times 10^{-6}$ pull-in	X
5 (Notes 3 and 4)	ON	Holdover causes a major alarm (Note 5)	—
	OFF	Holdover causes a minor alarm (Note 5)	X

Notes:

- All sections of switch SW1 not listed must be set to the OFF position.
- If the clock input reference source to the DCD shelf is ST3E quality or better, switch section 3 may be set to ON. If not, it *must be set* to OFF.
- Two versions of the ST3E card exist;
  - p/n 090-40019-01 Issue C or later, setting section 5 of SW1 determines whether hold-over activates a major or minor alarm.
  - p/n 090-40019-03 Issue A, section 5 of SW1 is not functional, and holdover always causes a major alarm.
- Both ST3E cards and HOLDOVER ALARM switch (SW11, position 1) on the DCD-ST2 shelf backplane must be set to the same mode, either MAJOR or MINOR alarm, in Hold-over mode.
- Loss of all input references causes the card to go into Holdover mode.

Figure 6. ST3E Card Switch

Chart 9. ST3 Card Test

STEP	PROCEDURE
	Use this procedure to verify the operation of the ST3 cards. If ST3 cards are not used, skip this chart. This procedure assumes the procedure for the CI/ACI cards has been completed. The ST3 card is completely configured at the factory and no switch or jumper settings to the card are required.
1	On the rear of the DCD-ST2 master shelf, set the ST3/ST2 switch (SW1) to the ST3 position. The HOLDOVER ALARM switch (SW11-1) on the DCD-ST2 backplane does not affect shelf operation when ST3 cards are installed. Neither the DCD-400 nor the DCD-CIM have these two switches.
2	In the master shelf, insert the first ST3 card into the ST A slot.
3	In the master shelf, insert the second ST3 card into the ST B slot.
4	<p>Observe the FAIL and LOCK lamps on both ST3 cards.</p> <p><b>Requirement:</b> On both ST3 cards, the FAIL lamps go off. After approximately 40 seconds, the LOCK lamps go off, and either REF A or B lamp is lit, depending on which clock input (A or B) card's SRC ACT/SCR ACTIVE lamp is lit.</p>
5	<p>Press the transfer (XFR) pushbutton on either clock input card. Observe the SRC ACT/SRC ACTIVE lamps on the clock input cards and the REF and LOCK lamps on the ST3 cards.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp goes off on one clock input card and lights on the other. The lit REF lamp (REF A or REF B) goes off and the other REF lamp lights on both ST3 cards. If the clock input cards are off frequency from each other, the LOCK lamps on the ST3 cards may light momentarily.</p>
6	<p>Press the transfer (XFR) pushbutton on either clock input card to transfer back to the original clock input card. Observe the SRC ACT/SRC ACTIVE lamps on the clock input cards and the REF and LOCK lamps on the ST3 cards.</p> <p><b>Requirement:</b> The SRC ACT/SRC ACTIVE lamp goes off on one clock input card and lights on the other. The lit REF lamp (REF A or REF B) goes off and the other REF lamp lights on both ST3 cards. If the clock input cards are off frequency from each other, the LOCK lamps on the ST3 cards may light momentarily.</p>
7	<p>If clock input A card SRC ACT/SRC ACTIVE lamp is not lit, then press its XFR pushbutton to make it active. Remove clock input A card. Observe the SRC ACT/SRC ACTIVE lamp on the clock input B card and the REF and LOCK lamps on the ST3 cards.</p> <p><b>Requirement:</b> SRC ACT/SRC ACTIVE lamp on clock input B card lights. The REF A lamp goes off and the REF B lamp lights on both ST3 cards. The LOCKED lamp on one or both ST3 cards may light momentarily.</p> <p><b>Caution: DO NOT perform this test on in-service DCD shelves because it will adversely affect network elements receiving timing from the shelf.</b></p>

Chart 9. ST3 Card Test (Contd)

STEP	PROCEDURE
8	<p>Reinsert clock input A card. When the FAIL lamp goes off on clock input A card, observe the REF lamps (A and B) on both ST3 cards.</p> <p><b>Requirement:</b> No change on the lamps.</p>
9	<p>Remove both clock input cards. Observe the lamps on the AI/FA and both ST3 cards.</p> <p><b>Requirement:</b> The MAJOR and MINOR lamps light on the AI/FA card. On both ST3 cards, the REF lamps go off, and the FAIL and LOCK lamps light red.</p> <p><b>Caution: DO NOT perform this test on in-service DCD shelves because it will adversely affect network elements receiving timing from the shelf.</b></p>
10	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c):</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)  MAJOR AUD NO and C (TB3, pins 5 &amp; 6)  MAJOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)  MAJSI and MAJSR (TB3, pins 7 &amp; 8)</p> <p><b>Requirement:</b> All alarm contacts are closed (&lt;15 ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets.</p>
11	<p>Reinsert both clock input cards. After the FAIL lamps go off, observe the lamps on the AI/FA and both ST3 cards.</p> <p><b>Requirement:</b> On both ST3 cards, the REF A or B lamp is lit (depending on which clock input card's SRC ACT/SRC ACTIVE lamp is lit), and the LOCK and FAIL lamps are off. The MAJOR and MINOR lamps on the AI/FA card are off.</p>

Chart 9. ST3 Card Test (Contd)

STEP	PROCEDURE
12	<p>Connect the multimeter, set to ohms, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 3c):</p> <p><u>Office Alarm:</u></p> <p>MINOR AUD NO and C (TB2, pins 5 &amp; 6)  MINOR VIS NO and C (TB2, pins 2 &amp; 3)  MAJOR AUD NO and C (TB3, pins 5 &amp; 6)  MAJOR VIS NO and C (TB2, pins 2 &amp; 3)</p> <p><u>Shelf Status:</u></p> <p>MINSI and MINSR (TB2, pins 7 &amp; 8)  MAJSI and MAJSR (TB3, pins 7 &amp; 8)</p> <p><b>Requirement:</b> All alarm contacts are open (infinite ohms).</p> <p><b>Note:</b> Ohms cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets.</p>
13	<p>This procedure is completed. Indicate completion of the ST3 Card Test on the Test Sign-off form, then proceed to next chart.</p>

Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only)

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the MCA/MCA-2 card. If the MCA/MCA-2 card is not required, skip to the next chart. This procedure assumes that installation of the ST2, ST2E, ST3E, or ST3 cards has been completed. The MCA/MCA-2 card is not required for a DCD-CIM Master or Expansion Shelf.</p> <p>An MCA/MCA-2 card is not required if unprotected outputs are desired. If this condition applies to the system being setup, proceed to the next chart.</p>
1	<p>On each MCA card, set SW1 and SW2 as per the following:</p> <p>SW1:</p> <ul style="list-style-type: none"> <li>• Section 1 (MSTR/SLVE) to MSTR (ON)</li> <li>• Section 2 (AUTO/MAN) to AUTO (ON)</li> <li>• Sections 3 &amp; 4 to OFF</li> </ul> <p>SW2:</p> <ul style="list-style-type: none"> <li>• (MSTR/SLVE) to MASTER</li> </ul> <p>On each MCA-2 card, set SW1 as per the following:</p> <ul style="list-style-type: none"> <li>• Section 1 (MSTR/SLVE) to MSTR (ON)</li> <li>• Section 2 (AUTO/MAN) to AUTO (ON)</li> <li>• Sections 3 through 8 to the OFF position</li> </ul>
2	<p>Insert the cards into the MC slot in each shelf (master and expansion shelves) requiring an MCA or MCA-2 card. Consult the local company Installation Job Specifications to determine which shelves require MCA or MCA-2 cards.</p> <p><b>Requirement:</b> The AUTO lamp lights after all lamps momentarily light and go off.</p>
3	<p>Obtain two TOxA cards of the same type (i.e., two TOTA card), for each shelf installed. Set the two left sections of SW1 on each card (sections 1 and 2 on some TOxA cards and sections 4 and 3 on other TOxA cards) to different settings (i.e., on TOTA cards, set one card for D4 framing, and the other card for ESF framing).</p>
4	<p>Insert one of the TOxA cards into slot TO1 of each master and expansion shelf. Insert the other card into the HS TOC slot of each shelf installed.</p> <p><b>Requirement:</b> The ST, INPUT and OPTION (i.e., D4 or ESF on TOTA cards) lamps are lit green on both card on all shelves.</p> <p><b>Note:</b> The cards should have different OPTION lamps, i.e., D4 is lit on the TO1 card, and ESF is lit on the HS TOC card.</p>



Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only) (Contd)

STEP	PROCEDURE
5	<p>Setup a dual trace 100 MHz oscilloscope using the manufacturer's manual and Table C. Clip the scope probes' ground leads together. Connect an appropriate value Test Load Impedance resistor (see Figure 9 through Figure 12 for the type of TOxA card used) across the two scope probes. At the output panel, connect the scope probes across each of the TO1 card's outputs (refer to Table D and Table E for output terminals). Leave the scope probes connected to the last output port checked.</p> <p><b>Requirement:</b> The output waveforms must be as shown in the waveform diagrams (Figure 9 through Figure 12, depending on the card type used).</p>
6	<p>Remove the TOxA card in slot TO1 to activate an automatic protection switch to the HS TOC card. Observe the lamps on the AI/FA, MCA/MCA-2, HS TOC TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR and MINOR lamps are off</li> <li>• MCA/MCA-2 card: AUTO lamp flashes for 6 seconds and stays lit</li> <li>• HS TOC TOxA card: Lit OPTION lamp goes off and the OPTION lamp that was lit on the removed TO1 TOxA card lights on the HS TOC TOxA card</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO1 and HS TOC are lit</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 5)</li> </ul>
7	<p>Reinsert the TOxA card in slot TO1. Wait 10 seconds, then press the pushbutton over slot HS TOC (on the Output Protection/Spare Select Panel) and hold for 3 seconds to release the protection switch. Observe the lamps on the AI/FA, MCA/MCA-2, HS TOC TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR and MINOR lamps are off</li> <li>• MCA/MCA-2 card: MAN lamp flashes for 6 seconds and goes off</li> <li>• HS TOC TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO1 and HS TOC go off</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 5)</li> </ul>

Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only) (Contd)

STEP	PROCEDURE
8	<p>Simultaneously press and hold for 3 seconds, the pushbuttons over slots TO1 and HS TOC (on the Output Protection/Spare Select Panel) to activate a manual protection switch to the HS TOC card. Observe the lamps on the AI/FA, MCA/MCA-2, HS TOC TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR, and MINOR lamps are off</li> <li>• MCA/MCA-2 card: MAN lamp flashes continuously for as long as the protection switch is activated</li> <li>• HS TOC TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO1 and HS TOC are lit</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 5)</li> </ul>
9	<p>Press the pushbutton over slot HS TOC (on the Output Protection/Spare Select Panel) and hold for 3 seconds to release the protection switch. Observe the lamps on the AI/FA, MCA-5, HS TOC TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR and MINOR lamps are off</li> <li>• MCA/MCA-2 card: MAN lamp stops flashing after 6 seconds and goes off</li> <li>• HS TOC TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO1 and HS TOC go off</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 5)</li> </ul>
10	<p>Move the TOxA card from slot HS TOC to slot HS TOT and repeat Steps 6 through 9, substituting the HS TOT slot and pushbutton for the HS TOC slot and pushbutton.</p>
11	<p>Remove the TOxA card from slot HS TOT. Move the TOxA card in slot TO1 to slot TO2. Insert the other TOxA card in slot HS TOC.</p>
12	<p>Repeat Steps 5 through 11, progressing one TO slot each time until slots TO1 through TO10 (TO4 for DCD-ST2 shelf) have been tested with HS TOC and HS TOT slots. Move the oscilloscope probes to an output port on the output panel for the TOx slot being tested.</p>
13	<p>Remove the MCA/MCA-2 card. Set switch SW1, section 5 (MAJOR) to ON. Reinsert the MCA-2 card.</p>

Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only) (Contd)

STEP	PROCEDURE
14	<p>Remove the TOxA card in slot TO10 (TO4 for DCD-ST2 shelf) to activate an automatic protection switch to slot HS TOT. Observe the lamps on the AI/FA, MCA-2, HS TOT TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR lamp lights</li> <li>• MCA-2 card: AUTO lamp flashes for 6 seconds and remains lit</li> <li>• HS TOT TOxA card: Lit OPTION lamp goes off and the OPTION lamp that was lit on the removed TO10 (TO4 for DCD-ST2) TOxA card lights on the HS TOT TOxA card</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT are lit</li> <li>• Oscilloscope: The waveform on the scope returns when the switch operation is completed (scope connection was made in Step 12)</li> </ul>
15	<p>Reinsert the TOxA card in slot TO10 (TO4 for DCD-ST2 shelf). Wait 10 seconds, then press the pushbutton over slot HS TOT (on the Output Protection/Spare Select Panel) and hold for 3 seconds to release the protection switch. Observe the lamps on the AI/FA, MCA-2, HS TOT TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR lamp goes off</li> <li>• MCA-2 card: MAN lamp flashes for 6 seconds and goes off</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT go off</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>

Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only) (Contd)

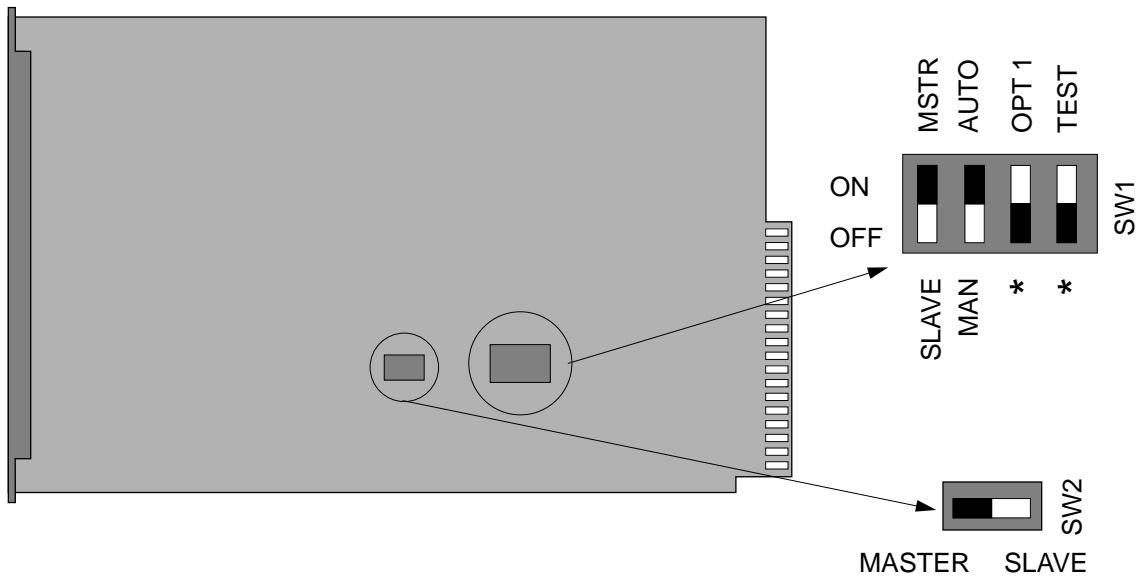
STEP	PROCEDURE
16	<p>Simultaneously press and hold for 3 seconds, the pushbuttons over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT (on the Output Protection/Spare Select Panel) to activate a manual protection switch to the HS TOT card. Observe the lamps on the AI/FA, MCA-2, HS TOT and TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR lamp lights</li> <li>• MCA-2 card: MAN lamp flashes continuously for as long as the protection switch is activated</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT are lit</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>
17	<p>Press the pushbutton over slot HS TOT (on the Output Protection/Spare Select Panel) and hold for 3 seconds to release the protection switch. Observe the lamps on the AI/FA, MCA-2, HS TOT and TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MAJOR lamp goes off</li> <li>• MCA-2 card: MAN lamp stops flashing after 6 seconds and goes off</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT go off</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>
18	<p>Remove the MCA-2 card. Set switch SW1, section 5 (MAJOR) to OFF, and section 3 (MINOR) to ON. Reinsert the MCA-2 card.</p>

Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only) (Contd)

STEP	PROCEDURE
19	<p>Remove the TOxA card in slot TO10 (TO4 for DCD-ST2 shelf) to activate an automatic protection switch to slot HS TOT. Observe the lamps on the AI/FA, MCA-2, HS TOT TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MINOR lamp lights</li> <li>• MCA-2 card: AUTO lamp flashes for 6 seconds and stays lit</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT are lit</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>
20	<p>Reinsert the TOxA card in slot TO10 (TO4 for DCD-ST2 shelf). Wait 10 seconds, then press and hold for 3 seconds, the pushbutton over slot HS TOT (on the Output Protection/Spare Select Panel) to release the protection switch. Observe the lamps on the AI/FA, MCA-2, HS TOT TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MINOR lamp goes off</li> <li>• MCA-2 card: MAN lamp flashes for 6 seconds and goes off</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT go off</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>

Chart 10. MCA/MCA-2 Card Test (DCD-ST2/400 Master and Expansion Shelves Only) (Contd)

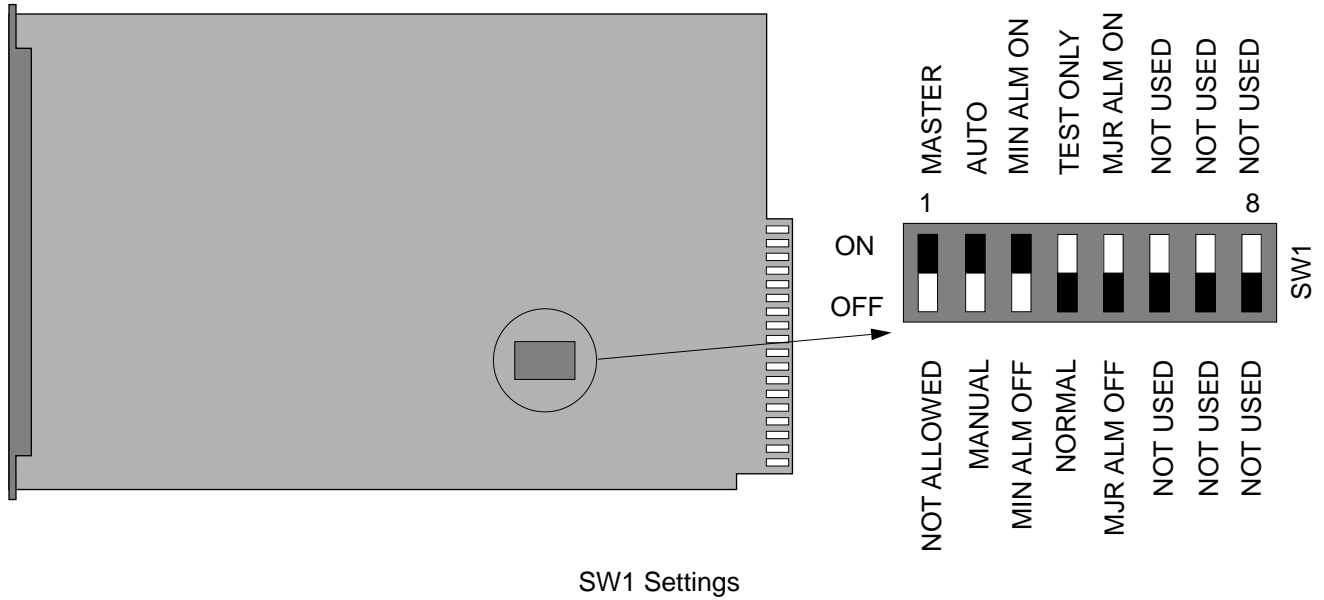
STEP	PROCEDURE
21	<p>Simultaneously press the pushbuttons over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT (on the Output Protection/Spare Select Panel) and hold for 3 seconds to activate a manual protection switch to the HS TOT card. Observe the lamps on the AI/FA, MCA-2, HS TOT TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MINOR lamp lights</li> <li>• MCA-2 card: MAN lamp flashes continuously for as long as the protection switch is activated</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT are lit</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>
22	<p>Press and hold for 3 seconds, the pushbutton over slot HS TOT (on the Output Protection/Spare Select Panel) to release the protection switch. Observe the lamps on the AI/FA, MCA-2, HS TOT TOxA cards, and the Output Protection/Spare Select Panel. Also observe the oscilloscope waveform.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• AI/FA card: MINOR lamp goes off</li> <li>• MCA-2 card: MAN lamp stops flashing after 6 seconds and goes off</li> <li>• HS TOT TOxA card: No change to OPTION lamps</li> <li>• Output Protection/Spare Select Panel: Pushbutton lamps over slots TO10 (TO4 for DCD-ST2 shelf) and HS TOT go off</li> <li>• Oscilloscope: The waveform on the scope returns when switch operation is completed (scope connection was made in Step 12)</li> </ul>
23	<p>Perform this step only if an MCA-2 card is used. (Skip this step if the MCA card is used.) Consult the local company Installation Job Specifications as to whether the MCA-2 card is to be set to generate a major alarm, minor alarm, or no alarm when a protection switch is activated. If it is to be set for MINOR, proceed to the next step. If it is to be set for MAJOR or NO ALARM, remove the MCA-2 card and set SW1, section 3 to OFF, and section 5 to ON for MAJOR; set sections 3 and 5 to OFF for NO ALARM. Reinsert the MCA-2 card and proceed to the next step.</p>
24	<p>This procedure is completed. Indicate completion of the MCA/MCA-2 Card Test on the Test Sign-off form, then proceed to next chart.</p>



**MCA Switch Settings**

Section	Setting	Function	Factory Setting
<b>SW1</b>			
MSTR	ON	Master mode of operation (used with SW2)	X
SLAVE	OFF	Not allowed (see Note)	
AUTO	ON	Auto switching mode	X
MAN	OFF	Manual switching mode	
OPT 1	ON	Future use	
*	OFF	Normal	X
TEST	ON	Factory use only	
*	OFF	Normal	X
<b>SW2</b>			
MASTER	ON	Master mode of operation (used with SW1)	X
SLAVE	OFF	Not allowed (see Note)	
Note: SLAVE mode must not be used. Always set SW1 and SW2 to MSTR and MASTER.			

Figure 7. MCA Card Switches



SW1 Settings

Section	Setting	Function	Factory Setting
1	ON	Master mode of operation	X
	OFF	Not allowed (see Note)	—
2	ON	Auto switching mode	X
	OFF	Manual switching mode	—
3	ON	Minor alarm will be generated when protection switching occurs. If this is set to ON, section 5 must be set to OFF.	X
	OFF	Minor alarm disabled	—
4	ON	Not allowed	—
	OFF	Normal	X
5	ON	Major alarm will be generated when protection switching occurs. If this is set to ON, section 3 must be set to OFF.	—
	OFF	Major alarm disabled	X
6	—	Not Used	—
7	—	Not Used	—
8	—	Not Used	—

Note: SLAVE mode must not be used. Always set SW1 section 1 to Master.

Figure 8. MCA-2 Card Switch



Table D. DB9 Output Connections (MMP Module)

DB9 CONNECTOR		CARD							
		TOTA, TOCA (DS1 or CC)		TOLA (RS-422)		TOLA (TTL)		TOAA (ANALOG)	
LABEL	PIN	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD
J2	9 5 1	1	T R S	5	— — —	C	C9 and C10 — —		
	4 3 1		2		T R S				
J3	9 5 1	3	T R S	4	— — —	7 8 —	C7 C8	2	T S —
	4 3 1	4	T R S		D+ D- S	— — —	D7 D8		
J4	9 5 1	5	T R S	3	— — —	5 6	C5 C6 —		
	4 3 1	6	T R S		D+ D- S	— — —	D5 D6		
J5	9 5 1	7	T R S	2	— — —	3 4	C3 C4 —		
	4 3 1	8	T R S		D+ D- S	— — —	D3 D4 —		
J6	9 5 1	9	T R S	1	— — —	1 2	C1 C2 —		
	4 3 1	10	T R S		D+ D- S	— — —	D1 D2		

Legend: T=Tip C=Digital Ground S=Shield Ground\* D+=Data, +422 R=Ring D=Data, TTL D- =Data, -422  
 \* It is preferable to ground the shield at the timing source end only, but certain vendor applications may require grounding at the receive end. However, under no circumstances should the shield be connected to frame ground at both ends unless one end is capacitor coupled to ground.

Table E. Wire-Wrap Output Connections (MMP Module or Wire-Wrap Panel)

WIRE-WRAP LEADS *		TOTA, TOCA (DS1 or CC)		TOLA (RS-422)**		TOLA (TTL)***		TOAA (ANALOG)	
OUTPUT	PIN	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD
1	T R S	1	T R S	1	D+ D-	2 1	D2 D1		
2	T R S	2	T R S			— —	C2 C1		
3	T R S	3	T R S	2	D+ D-	4 3	D4 D3	2 (Note 1)	T S —
4	T R S	4	T R S			— —	C4 C3		
5	T R S	5	T R S	3	D+ D-	6 5	D6 D5		
6	T R S	6	T R S			—	C6 C5		
7	T R S	7	T R S	4	D+ D-	8 7	D8 D7		
8	T R S	8	T R S			— —	C8 C7	1 (Note 1)	T S —
9	T R S	9	T R S	5	D+ D-	10 9	D10 D9		
10	T R S	10	T R S			—	TP1 C9 and C10		

Legend: T=Tip C=Digital Ground S=Shield Ground (Note 2) D+=Data, +422 R=Ring D=Data, TTL D- =Data, -422

\* In the wire-wrap leads column, the paired outputs of 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, use the Tip (T) of the odd-numbered output and the Tip of even-numbered output as one TTL output. The paired outputs of 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, use the Ring of the odd-numbered output and the Ring of even-numbered output as the other TTL output.

\*\* When using TOLA RS-422, connect the output cable T and R leads to the odd-numbered wire-wrap T and R leads, respectively. The T lead connects internally to the TOLA RS-422 driver D+ and the R lead to the driver D- lead. The RS-422 output is across the T (D+) and R (D-) leads.

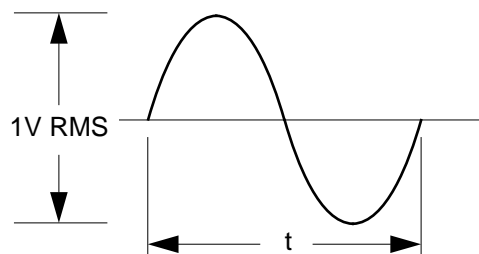
\*\*\* For TOLA TTL operation, two outputs are derived from each RS-422 driver. One output across T (Dn) and T (Cn) leads, and the other outputs is across R (D-) and R (Cn) leads (e.g., D2 and C2 are output 2, D1 and C1 are output 1).

1. When using TOAA, connect the shield lead of the coax cable to the Ring (R) pin of the wire-wrap panel.
2. It is preferable to ground the shield at the timing source end only, but certain vendor applications may require grounding at the receive end. However, under no circumstances should the shield be connected to frame ground at both ends unless one end is capacitor coupled to ground.

Table F. SCIU Wire-Wrap Connections (MMP Module or Wire-Wrap Panel)

WIRE-WRAP LEADS		CONNECTION	LEAD	WIRE-WRAP LEADS		CONNECTION	LEAD
OUTPUT	PIN			OUTPUT	PIN		
1	T R S	B OUT	T R S	6	T R S	UNIT FAIL	SI RTN
2	T R S	A IN	T R S	7	T R S	DS1B FAIL	SI RTN
3	T R S	WARNING	SI RTN	8	T R S	DS1A FAIL	SI RTN
4	T R S	SLIP	SI RTN	9	T R S	B IN	T R S
5	T R S	—	—	10	T R S	A OUT	T R S

Legend: T=Tip C=Digital Ground S=Shield Ground\* D+=Data, +422 R=Ring D=Data, TTL D- =Data, -422  
 \* It is preferable to ground the shield at the timing source end only, but certain vendor applications may require grounding at the receive end. However, under no circumstances should the shield be connected to frame ground at both ends unless one end is capacitor coupled to ground.

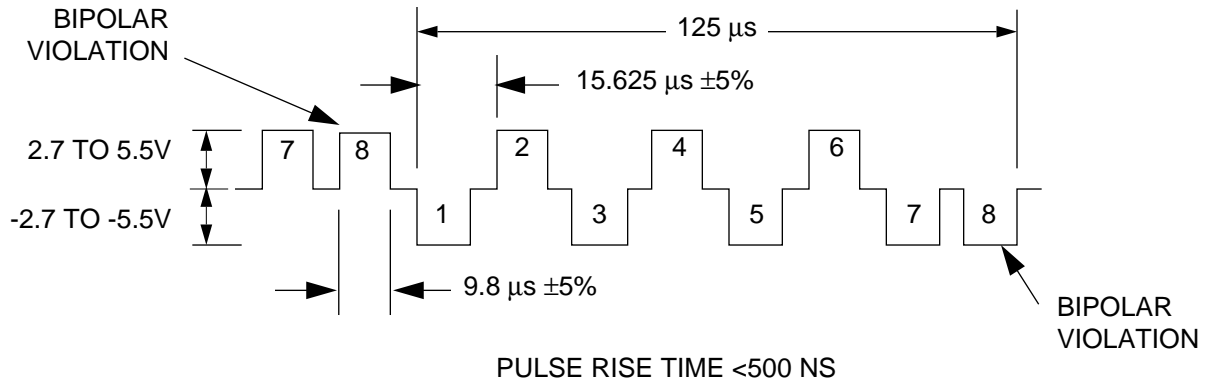


- t = 125 μs for 8 kHz
- 15.625 μs for 64 kHz
- 1.9531 μs for 512 kHz
- 1.0 μs for 1.0 MHz
- 0.48828 μs for 2.048 MHz

Test Load Impedance: 75 ohms for coax cable

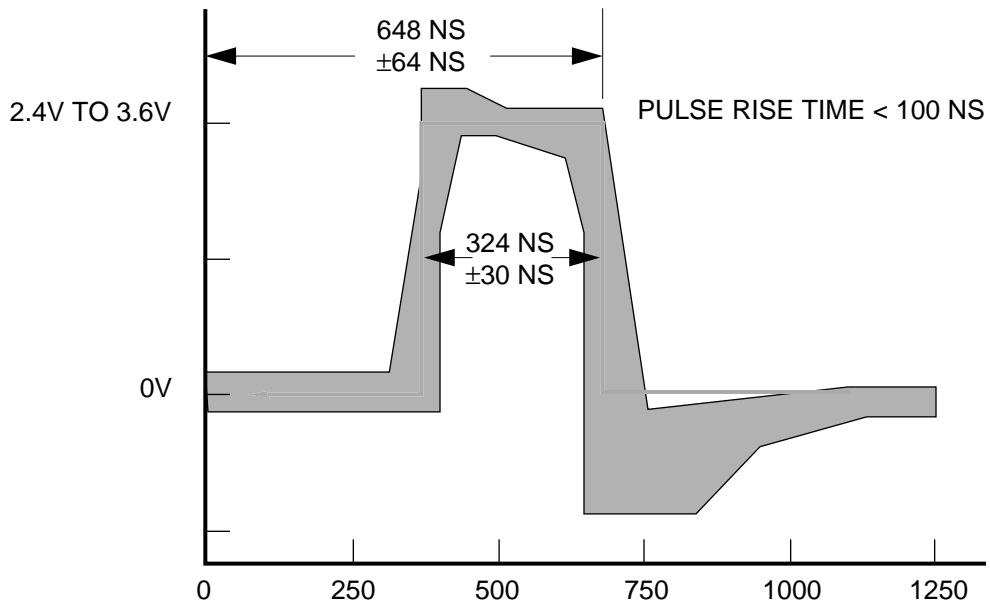
Note: All values are nominal

Figure 9. TOAA Card Output Waveform



Test Load Impedance: 133 ohms for 22 AWG twisted pair cable

Figure 10. TOCA Card Output Waveform

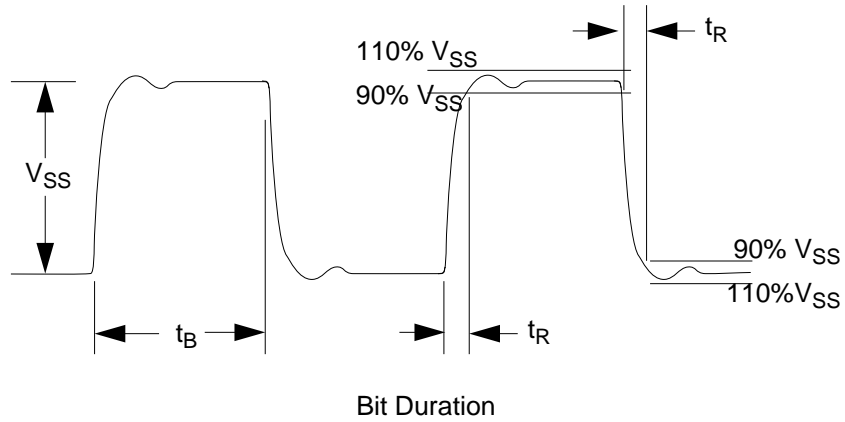


Test Load Impedance: 100 ohms for 22 AWG twisted pair cable. 75 ohms for coax cable

Note: only the positive pulse is shown. The negative pulse is an upside-down mirror image of the positive pulse.

Figure 11. TOTA Card Output Waveform

$t_B$  = Bit time duration (4 kb/s to 1.544 Mb/s)  
 $t_R \leq t_B/10$   
 $V_{SS}$  = Difference in steady-state voltages:  
 2 to 6V pp for RS-422 (balanced) into 100  $\Omega$   
 >3V for RS-423 (unbalanced) into 450  $\Omega$   
 >+3V from GND and >-3V from GND for RS-232 into 3 to 7 k $\Omega$



Data Rate	$t_B$	$t_R$
4 kb/s	125 $\mu$ s	$\leq 12.5 \mu$ s
4.8 kb/s	104.1 $\mu$ s	$\leq 10.41 \mu$ s
8 kb/s	62.5 $\mu$ s	$\leq 6.25 \mu$ s
9.6 kb/s	52 $\mu$ s	$\leq 5.2 \mu$ s
19.2 kb/s	26 $\mu$ s	$\leq 2.6 \mu$ s
56 kb/s	8.9 $\mu$ s	$\leq 890$ ns
64 kb/s	7.8 $\mu$ s	$\leq 780$ ns
256 kb/s	1.95 $\mu$ s	$\leq 195$ ns
384 kb/s	1.3 $\mu$ s	$\leq 130$ ns
512 kb/s	977 ns	$\leq 97.7$ ns
768 kb/s	651 ns	$\leq 65.1$ ns
1.536 Mb/s	326 ns	$\leq 32.6$ ns
1.544 Mb/s	324 ns	$\leq 32.4$ ns

Test Load Impedance: 100 ohms for 22 AWG twisted pair cable

Figure 12. TOLA Card Output Waveform

Chart 11. Timing Output Card Test

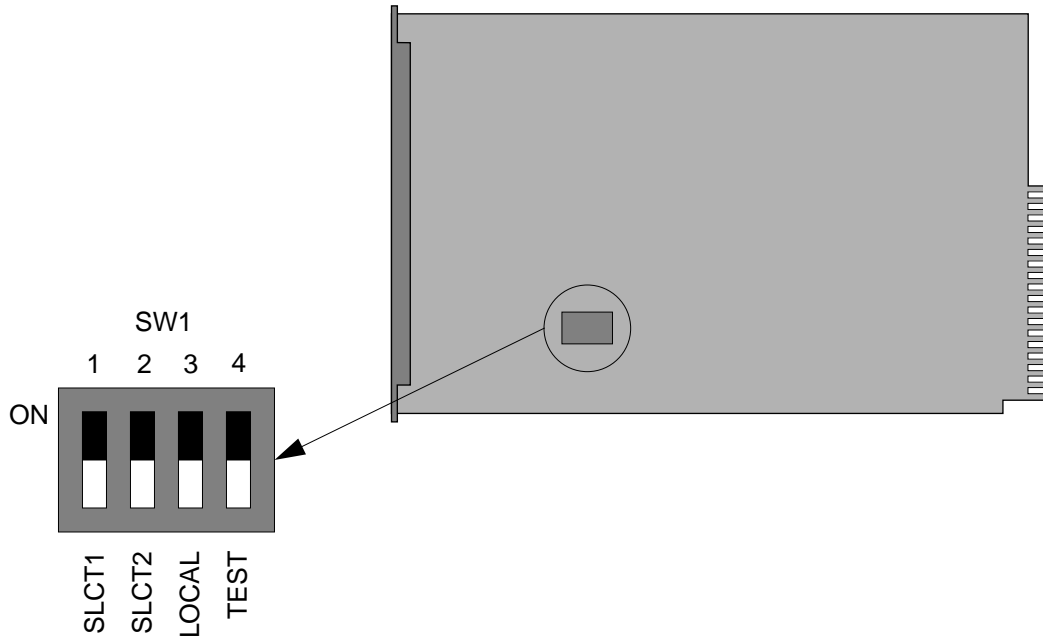
STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the Timing Output (TOxA) cards. This procedure assumes the procedure for the MCA/MCA-2 card has been completed.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. On TOCA and TOTA cards, all 10 outputs are identical.</li> <li>2. Only 2 hot spare (HS) slots are available; therefore, only 2 types of TOxA cards can be protected in a single shelf. If all cards in the shelf are the same type (all TOCA, TOTA, TOAA-0x, or TOLA-0x), only one HS card (of the same type) is required. Refer to Table G for TOxA card type incompatibilities.</li> <li>3. If an MCA/MCA-2 card is not installed, automatic protection switching is not available.</li> <li>4. The timing output cabling to network elements must be disconnected during this test.</li> </ol>
1	<p>Set the option switches on each TOxA card according to the local company Installation Job Specifications. Refer to Figure 13 through Figure 16 for option settings.</p>
2	<p>Insert all TOxA cards in the TOx (x=1 through 10 [x=1 through 4 for the DCD-ST2 shelf]) slots in all installed shelves (master and expansions) according to the local company Installation Job Specifications.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• On the TOxA cards just installed, the FAIL and PORT ALM lamps are off. <b>Note:</b> If the FAIL lamp lights, replace the card.</li> <li>• The INPUT and ST lamps light green (indicating the cards are receiving reference signals from the CI and ST cards). <b>Note:</b> If the INPUT and ST lamps do not light, retest the CI/ACI and ST cards.</li> <li>• The OPTION lamps are lit (i.e., D4 and ESF lamps on a TOTA card) per options selected in Step 1.</li> </ul>
3	<p>Check each output of the cards just installed in the TOx slots at the output panel using a dual-trace 100 MHz oscilloscope. Table D lists the output pins in the DB9 connector module, and Table E lists the output signal pins when using a wire-wrap module or panel. Table C lists the oscilloscope settings. The output waveforms must be as shown in the waveform diagrams (Figure 9 through Figure 12, depending on the card type used). The scope probes <i>must</i> be terminated in the Test Load Impedance as stated in the waveform figures.</p>
4	<p>If the shelf is equipped with an MCA/MCA-2 card, install TOxA cards in the HS TOC and HS TOT slots (these must be the same type as the TOxA cards to be protected in the TOxA slots) according to the local company Installation Job Specifications.</p>

Chart 11. Timing Output Card Test (Contd)

STEP	PROCEDURE
5	<p>Activate and release a manual protection switch on each TOxA card installed, in all installed shelves (master and expansions). The switch is activated by simultaneously pressing and holding for 3 seconds, the pushbuttons over the TOx slot and a like TOxA card in an HS slot. The switch is released by pressing and holding for 3 seconds, the pushbutton over the HS slot.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• Upon activation, pushbutton lamps over the TOx and HS cards are lit.</li> <li>• Upon release, pushbutton lamps over the TOx and HS cards go off.</li> </ul>
6	Connect all the timing outputs per TMSL 097-40000-57, DCD Installation practice.
7	If SCIU cards are installed, proceed to the next chart, otherwise, testing of the DCD system is completed. Complete the Test Sign-off form.

Table G. TOxA Card Incompatibility

CARD IN HS SLOT	DO NOT INSTALL IN ANY TOx OR HS SLOT IN THE SHELF	CARD IN HS SLOT	DO NOT INSTALL IN ANY TOx OR HS SLOT IN THE SHELF
TOAA-01	TOAA-02, TOAA-03, TOLA-07	TOLA-04	TOLA-01, TOLA-02
TOAA-02	TOAA-01, TOAA-03, TOLA-07	TOLA-05	TOCA
TOAA-03	TOAA-01, TOAA-02, TOLA-07	TOLA-06	TOTA
TOAA-05	No restrictions	TOLA-07	TOAA-01, TOAA-02, TOAA-03
TOCA	TOLA-05	TOGA	No restrictions
TOLA-01	TOLA-02, TOLA-04	TOTA	TOLA-06
TOLA-02	TOLA-01, TOLA-04	TOEA	No restrictions
TOLA-03	No restrictions		



SW1 Settings

1	2	3	4	Meaning	Factory Setting
ON	ON	—	—	64 kHz or 8 kHz*	X
ON	OFF	—	—	512 kHz	—
OFF	ON	—	—	1.0 MHz	—
OFF	OFF	—	—	2.048 MHz	—
—	—	ON	—	Not used	X
—	—	OFF	—	Not used	—
—	—	—	ON	Normal	X
—	—	—	OFF	Not allowed	—

\* 64 kHz for -01 and -02; 8 kHz for -03; 5 MHz for -05.

Figure 13. TOAA Card Switch



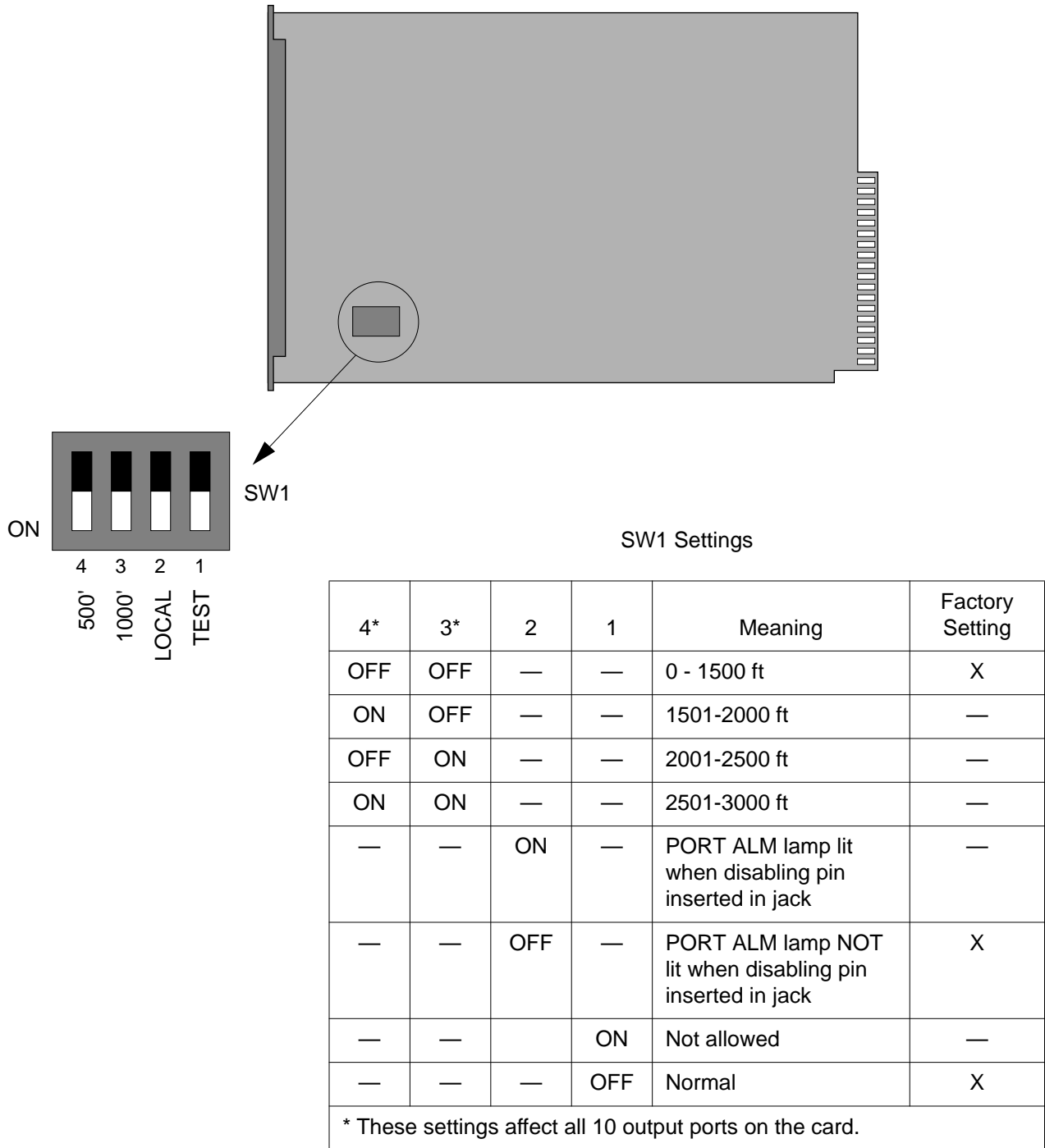


Figure 14. TOCA Card Switch

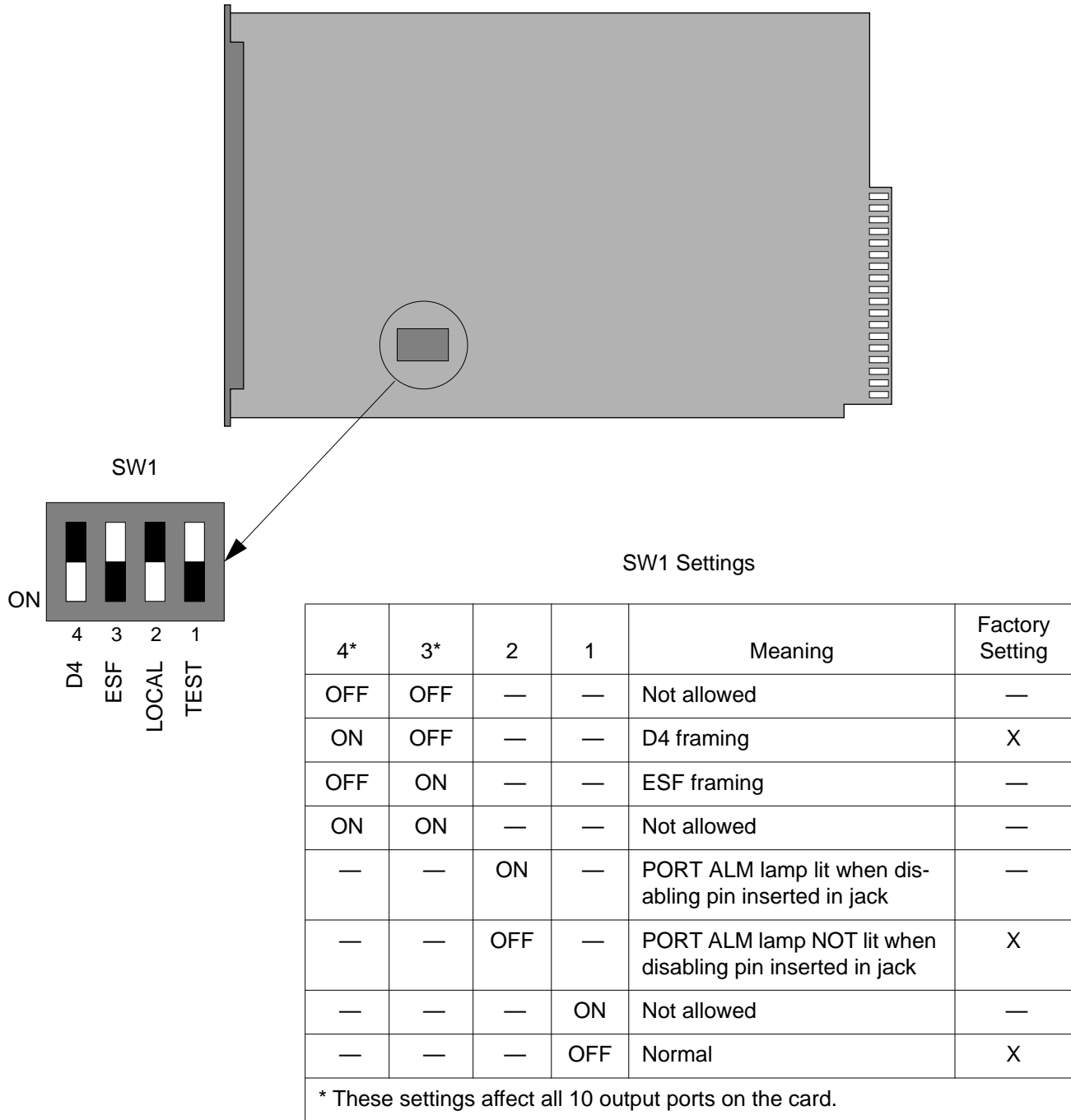
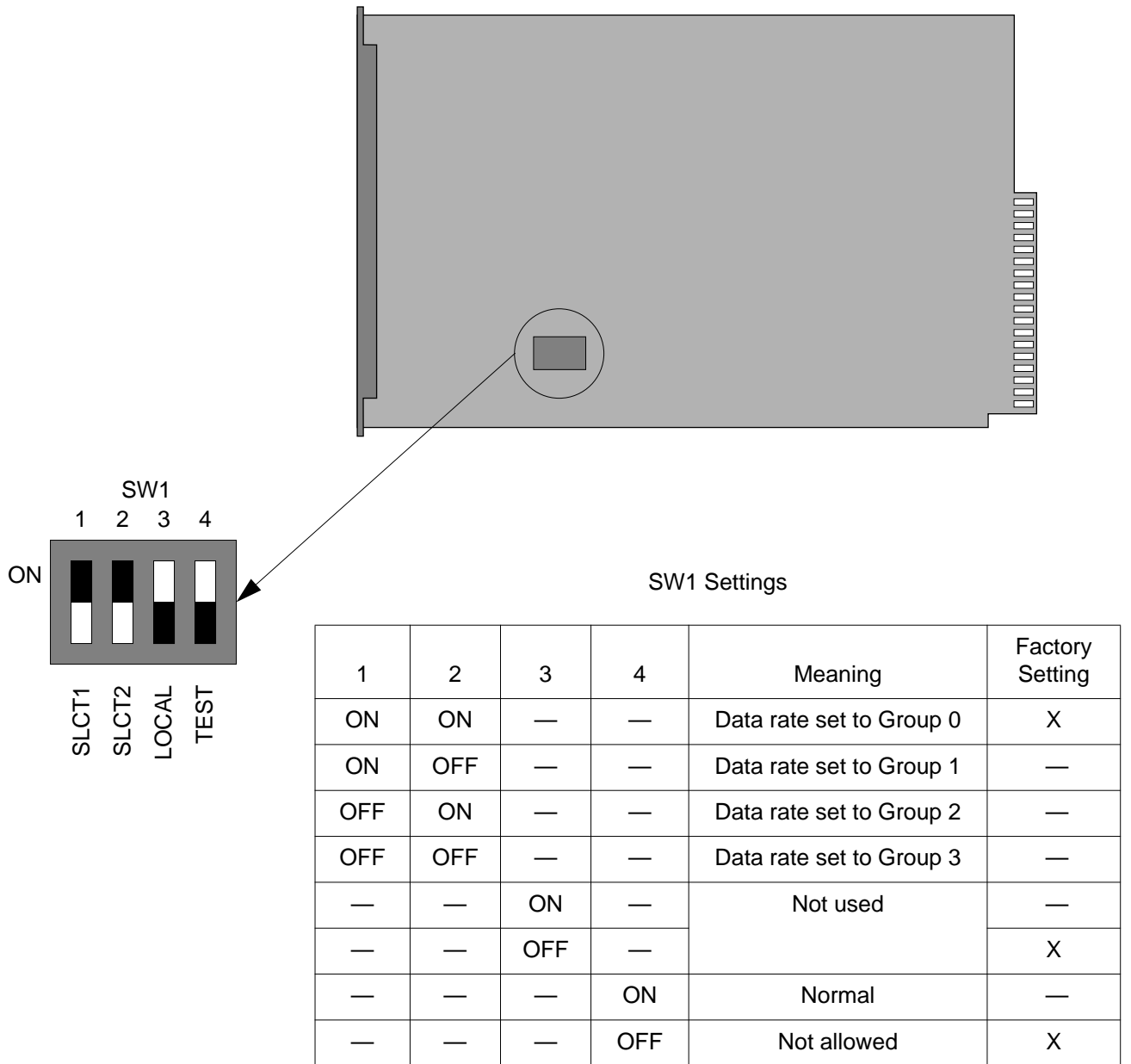


Figure 15. TOTA Card Switch



Note: Refer to the specifications in TMSL 097-40000-55, General Description and Specifications for the output frequencies of each group.

Figure 16. TOLA Card Switch

Chart 12. SCIU Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of SCIU cards. This procedure assumes the installation has been completed per TMSL 097-40000-57, DCD Installation. If SCIU cards are not required, testing of the DCD is completed.</p> <p>Equipment required: A DS1 Bit Error Rate Test Set (BERTS). This procedure assumes that standard level access jack sets (i.e., DSX-1) were cabled to the SCIU wire-wrap module or panel.</p> <p><b>Note:</b> If jack sets are not connected to the SCIU wire-wrap module, the BERTS will need to be clipped to the Network Element (NE) ends of the cables connected to the SCIU wire-wrap module or panel.</p>
1	Set up the BERTS transmit signal to match the framing format and line coding similar to the traffic-carrying system in which the SCIU card will be inserted.
2	<p>Set the option switches on each SCIU card as per the following (refer to Figure 17):</p> <ul style="list-style-type: none"> <li>• Set SW1, sections 1 to 6 and 8 to 10 to OFF, and section 7 to ON.</li> <li>• Set SW3, sections 1 to 5 for the cable length from the output module to the DSX for A direction of transmission and section 6 to 10 for the B direction.</li> <li>• Set SW4, sections 1 and 2 to ON, and sections 3 and 4 to OFF.</li> </ul>
3	<p>Connect the 0 dB DSX (3 volts b-p) transmit signal from the BERTS to the SCIU jack set EAST A IN jack with a patch cord. Connect another patch cord from the SCIU jack set WEST A OUT jack to receive jack on the BERTS. Start the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> No DS1 parameters are exceeded (no errors) on the BERTS receiver.</p>
4	<p>Move the BERTS transmit patch cord from the EAST A IN jack to the WEST B IN jack. Move the BERTS receive patch cord from the WEST A OUT jack to the EAST B OUT jack. Start the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> No DS1 parameters are exceeded (no errors) on the BERTS receiver.</p>
5	After the test, leave the BERTS patch cords up.
6	<p>Insert an SCIU card in the first TOx slot, and check its lamp status.</p> <p><b>Requirement:</b> On the SCIU card just installed, the FAIL lamp lights and goes off, the SYNC and DS1B lamps light green, and the DS1A lamp lights red. On the AI/FA card, the MAJOR lamp is lit red to indicate that the DS1A receive signal is not present.</p> <p><b>Note:</b> If the FAIL lamp remains lit, replace the card. If the SYNC lamp is lit red, the card is not receiving system reference from the clock input or clock cards, or expansion bus cable; verify the clock input/clock cards are operating correctly in the master shelf. If in an expansion shelf, verify the master to expansion cable is installed correctly.</p>

Chart 12. SCIU Card Test (Contd)

STEP	PROCEDURE
7	<p>Remove the SCIU card and change SW1, section 7 to OFF, and section 8 to ON. Reinsert the card.</p> <p><b>Requirement:</b> The MINOR lamp on the AI/FA card is lit (MAJOR lamp goes off on AI/FA card 6 - 10 seconds after the SCIU card is removed).</p>
8	<p>Start the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> No DS1 parameters are exceeded (no errors) on the BERTS receiver.</p>
9	<p>Move the BERTS transmit patch cord from the WEST B IN jack to the EAST A IN jack. Move the BERTS receive patch cord from the EAST B OUT jack to the WEST A OUT jack. Restart the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> No DS1 parameters are exceeded, except slips on the BERTS receiver. On the SCIU card, the DS1B lamp is lit red, the DS1A lamp is lit green, the bit slip lamps (0, 64, and 128) alternately light and go off, and the SLIP and HI SLIP lamps are lit red. The MAJOR and MINOR lamps on the AI/FA card are off.</p>
10	<p>Remove the SCIU card and change SW1, section 8 to OFF, and section 9 to ON. Reinsert the card.</p> <p><b>Requirement:</b> The MAJOR lamp is lit on the AI/FA card to indicate DS1B receive signal is not present. DS1B lamp is lit red on the SCIU card.</p>
11	<p>Remove the SCIU card and change SW1, section 9 to OFF, and section 10 to ON. Reinsert the card.</p> <p><b>Requirement:</b> The MINOR lamp is lit on the AI/FA card. DS1B lamp is lit red on the SCIU card (MAJOR lamp goes off on AI/FA card 6 - 10 seconds after the SCIU card is removed).</p>
12	<p>Remove the SCIU card and change SW1, section 10 to OFF, and section 3 to ON. Reinsert the card.</p> <p><b>Requirement:</b> Initially, the MAJOR and MINOR lamps are off on the AI/FA card. When the SLIP lamp on the SCIU card lights red (may take several minutes), the MAJOR lamp lights on the AI/FA card (MINOR lamp goes off on AI/FA card 6 - 10 seconds after the SCIU card is removed).</p>
13	<p>Remove the SCIU card and change SW1, section 3 to OFF, and section 4 to ON. Reinsert the card.</p> <p><b>Requirement:</b> When the SLIP lamp on the SCIU card lights red (may take several minutes), the MINOR lamp lights on the AI/FA card (MAJOR lamp goes off on AI/FA card 6 - 10 seconds after the SCIU card is removed).</p>

Chart 12. SCIU Card Test (Contd)

STEP	PROCEDURE
14	<p>Remove the SCIU card and change SW1, section 4 to OFF, and section 1 to ON. Reinsert the card.</p> <p><b>Requirement:</b> First the SLIP lamp on the SCIU card lights red after several minutes (the MAJOR and MINOR lamps on the AI/FA card are off), then after several more minutes, the HI SLIP lamp on the SCIU card lights red, and the MAJOR lamp on the AI/FA card lights (MINOR lamp goes off on AI/FA card 6 - 10 seconds after the SCIU card is removed).</p>
15	<p>Remove the SCIU card and change SW1, section 1 to OFF, and section 2 to ON. Reinsert the card.</p> <p><b>Requirement:</b> After several minutes the HI SLIP lamp on the SCIU card lights red, and the MINOR lamp on the AI/FA card lights (MAJOR lamp goes off on AI/FA card 6 - 10 seconds after the SCIU card is removed).</p>
16	<p>Remove the SCIU card and change SW1, section 2 to OFF. Reinsert the card and wait for the SLIP and HI SLIP lamps to light (may take several minutes).</p> <p><b>Requirement:</b> The MAJOR and MINOR lamps on the AI/FA card are off.</p>
17	<p>Connect a patch cord from a MON jack cabled to an NE that is being timed from the DCD shelf, to the external clock reference jack on the BERTS. Restart the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> No DS1 parameters are exceeded (no errors or slips) on the BERTS receiver.</p>
18	<p>At the SCIU card, press the RESET pushbutton on the front panel.</p> <p><b>Requirement:</b> The SLIP and HI SLIP lamps go off. If the 64 or 128 bit slip lamps were lit, they remain lit.</p>
19	<p>If the 64 or 128 bit slip lamps are lit, remove and reinsert the SCIU card.</p> <p><b>Requirement:</b> The SLIP, HI SLIP, and all bit slip lamps are off and remain off for 5 minutes.</p>
20	<p>Remove SCIU card and verify and/or set switch SW4, section 1 to ON, and section 4 to OFF and reinsert the card in the shelf. Set the BERTS receive to Auto Signal Detect. Restart the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> BERTS receiver sees same signal format as transmitted from the BERTS and no parameters are exceeded (no errors or slips).</p>
21	<p>Remove the transmit patch cord from the BERTS.</p> <p><b>Requirement:</b> The BERTS receiver sees a framed all-ones signal.</p>

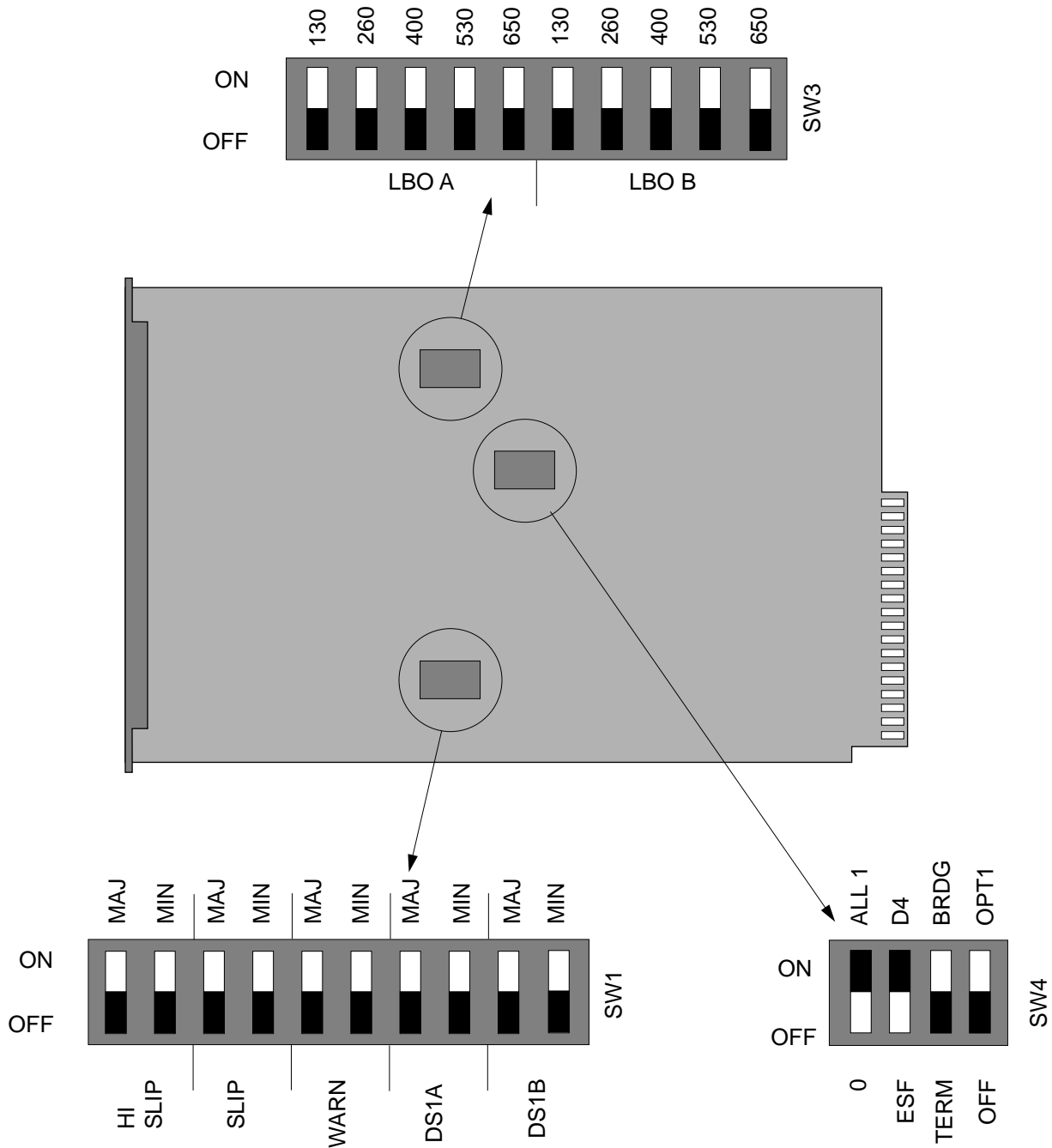
Chart 12. SCIU Card Test (Contd)

STEP	PROCEDURE
22	<p>Reinsert the BERTS transmit patch cord.</p> <p><b>Requirement:</b> BERTS receiver changes from framed all-ones back to BERTS transmit signal.</p>
23	<p>Send an out-of-frame (OOF) condition from the BERTS.</p> <p><b>Requirement:</b> BERTS receives a framed all-ones signal.</p>
24	<p>Restore framing from BERTS transmitter.</p> <p><b>Requirement:</b> BERTS receiver changes from framed all-ones back to BERTS transmit signal.</p>
25	<p>Remove SCIU card and set switch SW4, position 1 to OFF, and position 4 to ON and reinsert the card in the shelf. Restart the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> BERTS receiver sees same signal format as transmitted for the BERTS and no parameters are exceeded (no errors or slips).</p>
26	<p>Remove the transmit patch cord from the BERTS.</p> <p><b>Requirement:</b> BERTS receiver sees a loss-of-signal (LOS).</p>
27	<p>Reinsert the BERTS transmit patch cord.</p> <p><b>Requirement:</b> BERTS receiver sees the BERTS transmit signal.</p>
28	<p>Send OOF condition from the BERTS.</p> <p><b>Requirement:</b> BERTS receiver sees OOF.</p>
29	<p>Reinsert BERTS transmit patch cord.</p> <p><b>Requirement:</b> BERTS receiver sees the BERTS transmit signal.</p>
30	<p>On the SCIU card, insert a disabling pin (provided) in the BYPASS jack on the front panel. Restart the BERTS test.</p> <p><b>Requirement:</b> On the SCIU card, the BYPASS lamp is lit red. On a 5 minute BERTS test, no DS1 parameters are exceeded (no errors or slips). On the SCIU card, the SLIP, HI SLIP, and bit slip lamps are off.</p>
31	<p>Remove the patch cord from the BERTS external clock reference jack. Restart the BERTS test and observe the receiver for 5 minutes.</p> <p><b>Requirement:</b> No DS1 parameters are exceeded on the BERTS receiver. On the SCIU card, the SLIP, HI SLIP, and bit slip lamps are off.</p>

Chart 12. SCIU Card Test (Contd)

STEP	PROCEDURE
32	<p>Remove the disabling pin from the BYPASS jack on the SCIU/ESCIU card.</p> <p><b>Requirement:</b> The BYPASS lamp goes off.</p>
33	<p>Remove the BERTS patch cords from the SCIU access jacks.</p>
34	<p>Remove the SCIU card and set option switches (SW1, SW3, and SW4) according to local company Installation Job Specifications (refer to Figure 17, Table H, and Table I). Reinsert card in the shelf.</p> <p><b>Note:</b> SW1 (sections 5 and 6) WARN alarm option on the SCIU card must always be set to OFF. The WARN alarm is associated with the 128 bit slip lamp on the front panel of the SCIU card, and there is no way to reset or clear this alarm until a full frame slip occurs.</p>
35	<p>Repeat Steps 2 through 34 for each SCIU card to be installed in all shelves.</p>
36	<p>This procedure is completed. Indicate completion of the SCIU Card Test on the Test Sign-off form. The acceptance testing of all DCD shelves and cards is completed.</p>





Notes:

1. See Table H for the SCIU card option switch settings.
2. Factory settings for SW1 and SW3 are OFF.
3. Factory settings for SW4: 0 / ALL 1 and ESF/D4 to ON, TERM/BRDG and OFF/OPT 1 to OFF.
4. WARN MAJ and MIN switch positions on SW1 must always be set to OFF.
5. On SW1, MAJ and MIN switch positions for each alarm (HI SLIP, SLIP, DS1A, and DS1B) are mutually exclusive – one ON and the other OFF – or both OFF for NO ALARM for that condition.

Figure 17. SCIU Card Switches

Table H. SCIU Option Settings

SECTION	SETTING	RESULT
<b>SWITCH SW1 (Note 1)</b>		
HI SLIP MAJ	ON	Major alarm
HI SLIP MIN	OFF	
HI SLIP MAJ	OFF	Minor alarm
HI SLIP MIN	ON	
HI SLIP MAJ	OFF	No alarm
HI SLIP MIN	OFF	
SLIP MAJ	ON	Major alarm
SLIP MIN	OFF	
SLIP MAJ	OFF	Minor alarm
SLIP MIN	ON	
SLIP MAJ	OFF	No alarm
SLIP MIN	OFF	
WARN MAJ	ON	Major alarm (See Note 2)
WARN MIN	OFF	
WARN MAJ	OFF	Minor alarm (See Note 2)
WARN MIN	ON	
WARN MAJ	OFF	No alarm (See Note 2)
WARN MIN	OFF	
DS1A MAJ	ON	Major alarm
DS1A MIN	OFF	
DS1A MAJ	OFF	Minor alarm
DS1A MIN	ON	
DS1A MAJ	OFF	No alarm
DS1A MIN	OFF	
DS1B MAJ	ON	Major alarm
DS1B MIN	OFF	
DS1B MAJ	OFF	Minor alarm
DS1B MIN	ON	

Table H. SCIU Option Settings (Contd)

SECTION	SETTING	RESULT
DS1B MAJ	OFF	No alarm
DS1B MIN	OFF	
<b>SWITCH SW3 (Note 3)</b>		
LBO A - 130	ON	0 - 130'
LBO A - 260	ON	130 - 260'
LBO A - 400	ON	260 - 400'
LBO A - 530	ON	400 - 530'
LBO A - 650	ON	530 - 650'
LBO B - 130	ON	0 - 130'
LBO B - 260	ON	130 - 260'
LBO B - 400	ON	260 - 400'
LBO B - 530	ON	400 - 530'
LBO B - 650	ON	530 - 650'
<b>SWITCH SW4</b>		
0 / ALL 1	See Table I	
ESF / D4	ON	D4 (SF)Framing
	OFF	ESF Framing
TERM / BRDG (See Note 4)	ON	Bridging mode
	OFF	Terminated mode
OFF / OPT1	See Table I	
<b>Notes:</b> 1. Factory settings for SW1 and SW3 are OFF. 2. It is recommended the WARN option not be set for alarm activation. If set for alarm activation, the alarm cannot be retired with the RESET button. The WARN alarm is associated with the 128 lamp. 3. Only one LBO A switch can be in the up position at the same time, and only one LBO B switch can be in the up position at the same time. 4. Set to TERM when SCIU is cabled into the live traffic bit stream in both directions to retime it. Set to BRDG only when the SCIU is to monitor the live traffic bit stream (cabled from DS1 through bridging resistors to EAST A IN only).		

Table I. SCIU SW4 0/ALL 1 and OFF/OPT1 Section Settings

SECTION	SETTING	RESULT	
		INPUT LOS	INPUT OOF
0 / ALL 1	OFF	LOS output	LOS output
OFF / OPT1	OFF		
0 / ALL 1	OFF	LOS output	Received signal output
OFF / OPT1	ON		
0 / ALL 1	ON	Framed all-ones output	Framed all-ones output
OFF / OPT1	OFF		
0 / ALL 1	ON	Framed all-ones output	Received signal output
OFF / OPT1	ON		

Note: Factory settings for SW4: 0 / ALL 1 and ESF/D4 to ON, TERM/BRDG and OFF/OPT 1 to OFF.

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Table J. Test Sign-off

CHART #	TEST	MASTER	EXP #1	EXP #2	EXP #3
<p>Place a check mark or initials beside each individual test after test is completed. When all tests have been completed, sign and date at the bottom.</p> <p><b>Note:</b> The test and acceptance procedures listed in this document are recommended guidelines. The Test Sign-off form is for customer use only. When completed, file locally, as per local company practice.</p>					
1	Power Test				
2	Amplitude Verification Test				
3	FA Card Test				
4	AI Card Test				
5	CI or ACI Card Test				
6	ST2 Card Test				
7	ST2E Card Test				
8	ST3E Card Test				
9	ST3 Card Test				
10	MCA/MCA-2 Card Test				
11	Timing Output Card Test				
12	SCIU Card Test				
<p>DCD System Test and Acceptance completed by:</p> <p>Date:</p> <p>Comments:</p>					