

DIGITAL CLOCK DISTRIBUTOR

519 HIGH DENSITY

TEST AND ACCEPTANCE

CONTENTS	PAGE	Figures (Contd)	Page
1. GENERAL	2	3. Expansion Shelf	11
2. ACCEPTANCE TEST PROCEDURES.....	3	4. MIS Card Switch and Jumpers	17
A. Power Test	3	5. MRC-T Card Switches	21
B. Amplitude Verification Test	3	6. MRC-EA Card Switches	22
C. Card Test	9	7. ACI Card Switch	27
Charts		8. CI-EA Card Switch	30
1. Power Test	5	9. CI Card Switch	33
2. Amplitude Verification Test	8	10. DCIM-EA Card Switch	36
3. MIS Card Test	12	11. DCIM-T Card Switch	37
4. MRC Card Test	18	12. ST2E or TNC-E Card Switch	42
5. ACI Card Test	25	13. ST3E Card Switch	51
6. CI-EA Card Test	28	14. TNC Card Switch	52
7. CI Card Test	31	15. EA10, EA20, EA10M, and EA20M Card Switches	69
8. DCIM-EA or DCIM-T Card Test.....	34	16. EA10, EA20, EA10M, EA20M, TOEA, TO-EA, TO-EAN, and TO-EA5 Card Digital Output Waveform	72
9. ST2E or TNC-E Card Test	38	17. EA10, EA20, EA10M, EA20M, TO-EA, TO-EAN, TO-EA5, and TOGA Card Analog Output Waveform.....	73
10. ST2 Card Test	43	18. TOAA Card Switch	75
11. ST3E or TNC Card Test	47	19. TOLA Card Switch	76
12. ST3E Card Test.....	53	20. TOTL Card Switches	79
13. ST2E or TNC-E with ST3E or TNC Card Test	56	21. TOAA Card Output Waveform	80
14. ST2E or TNC-E with ST3E Card Test.....	60	22. TOLA Card Output Waveform	80
15. EA10, EA20, EA10M, or EA20M Card Test	67	23. TOTA, TOTA-5, TOTA-M, TOTL Card Output Waveform	81
16. TOAA, TOLA, or TOTL Card Test	74	24. TOCA Card Switch	83
17. TOCA, TOEA, or TOTA Card Test	82	25. TOEA Card Switch	84
18. TO-EA Card Test	87	26. TOTA Card Switch	85
19. TO-EAN Card Test	91	27. TOCA Card Output Waveform	86
20. TO-EA5 Card Test	94	28. TO-EA Card Switch	89
21. TOTA-5 or TOTA-M Card Test	98	29. TO-EAN Card Switches	92
22. TOGA Card Test	101	30. TO-EA5 Card Switches	96
23. SCIU or ESCIU Card Test	104	31. TOTA-5 Card Switch	99
24. PSM Card Test.....	115	32. TOTA-M Card Switch	100
25. MIS Card System Management Setup	120	33. TOGA Card Switch.....	103
Figures		34. SCIU Card Switches	109
1. DCD-519 HD Shelf (Rear View)	7	35. ESCIU Card Switches	112
2. Master Shelf with Quartz Clock Cards ..	10	36. PSM Card Switches	116

Tables	Page
A. Master Shelf Test Flow	4
B. Expansion Shelf Test Flow	4
C. Typical Oscilloscope Settings	9
D. MRC-EA Card Switch SW1 Settings	23
E. MRC-T Card Switch SW1 Settings	24
F. MRC Card Switch SW3 Settings	24
G. Wire-Wrap Output Connections	64
H. DB9 Output Connections	65
I. Wire-Wrap Output Connections (RS-232) for TOLA-03 Only	66
J. EA10, EA20, EA10M, and EA20M Switch Settings.	70
K. TOLA Card Output Frequencies	77
L. TOLA Card Output Frequencies (from DB9 Connector)	78
M. TO-EA Switch Settings	90
N. TO-EAN Switch Settings	93
O. TO-EA5 Switch Settings	97
P. SCIU Option Settings	110
Q. SCIU SW4 0 / ALL 1 and OFF / OPT1 Section Settings	111
R. SCIU or ESCIU Wire-Wrap Connections .	111
S. ESCIU Option Settings	113
T. ESCIU SW1 0/ALL 1 and OFF/OPT1 Section Settings	114
U. PSM-T and PSM-E Card Switch SW1 Settings	117
V. PSM-EA Card Switch SW1 Settings.	117
W. PSM-T Card Switch SW3 Settings	118
X. PSM-E and PSM-EA Card Switch SW3 Settings	119
Y. Test Sign-off	122

1. GENERAL

1.01 This section provides test and acceptance procedures for the Digital Clock Distributor 519 High Density (DCD-519 HD). When acceptance testing has been completed, file the Sign-off sheet locally, per local company practice.

1.02 This section was reissued for the reasons listed below. Changes and additions are marked by change bars.

- Changed Figure 4 to show the new location of SW1 for a Rev. B or later MIS card.
- Changed Chart 16 to include information for all TOAA cards.

- Changed Figures 18 and 21 to include information for all TOAA cards.

- Changed Figures 31 and 32 to show SW1 as a 10-position switch.

1.03 Symmetricom is a registered trademark of Symmetricom, Inc. DCD and Version 5 are trademarks of Symmetricom, Inc. All other product names, service marks, trademarks, and registered trademarks used in this document are the property of their respective owners.

1.04 The following abbreviations are used in this document:

ACO	alarm cutoff
AWG	American wire gauge
B8ZS	bipolar 8-zero substitution
CAS	channel associated signaling
CC	composite clock
CCS	common channel signaling
CI	Clock Input
CRC	cyclic redundancy check
D4	D4 framing format
ESF	extended superframe
GPS	global positioning system
LOS	loss of signal
OOF	out of frame
TL1	Transaction Language 1
TNC	Transit Node Clock
TO	Timing output card or slot

Notes:

1. Where information is common to the MRC-EA, MRC-EA^{V5}, MRC-T, MRC-T^{V5}, ACI, CI-EA, CI, DCIM-EA and DCIM-T cards, these cards are collectively referred to as clock input cards.
2. Where information is common to the DCIM-EA and DCIM-T cards, these cards are collectively referred to as DCIM cards.
3. Where information is common to the MRC-EA, MRC-EA^{V5}, MRC-T, and MRC-T^{V5} cards, these cards are collectively referred to as MRC cards.
4. Where information is common to the PSM-EA, PSM-EA^{V5}, PSM-E, PSM-E^{V5}, PSM-T, and PSM-T^{V5} cards, these cards are collectively referred to as PSM cards.

5. Where information is common to the TNC-E, TNC, ST2E, and the ST3E cards, these cards are collectively referred to as clock cards.
6. Where information is common to the TNC-E and the ST2E cards, these cards are collectively referred to as rubidium clock cards.
7. Where information is common to the TNC and ST3E cards, these cards are collectively referred to as quartz clock cards.
8. Where information is common to the EA10, EA20, EA10M, and EA20M cards, these cards are collectively referred to as EA cards.
9. "Interface panel" is used when referring to either the input/output panel of the master shelf or the output panel of the expansion shelf.
10. The Enhanced Transit Node Clock (TNC-E) card and the Enhanced Stratum-2 (ST2E) clock card are identical in specifications, functions, controls and indicators, and acceptance test procedures. The TNC-E name uses ITU standard terminology; the ST2E name uses ANSI standard terminology. The TNC-E and ST2E cards are interchangeable.

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, contact your local Symmetricom distributor, or Symmetricom's Customer Technical Assistance Center (CTAC) at one of the following:

- +44 1483 510300 (U.K.)
- +1 408 428 7907 (U.S.A.)

Note: The following toll-free number is available in some countries to access the CTAC office in the U.S.A.:

- +1 888 367 7966 (U.S.A.)

2.02 The acceptance testing should be performed after installing and connecting the master and expansion shelves, 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 the Installation section of this manual, to make these connections.

2.03 Perform the acceptance test procedures in the order listed in Table A first, then perform the tests in Table B for each installed expansion shelf; if not equipped with a particular card, proceed to the next step in the list.

2.04 The procedures listed in this section assume that this is an initial installation of a DCD-519 HD System. For procedures for an existing system, refer to the Maintenance section of this manual.

A. Power Test

2.05 Use this procedure to verify the power connections to shelf. This test assumes the DCD-519 HD Shelf has been physically and electrically installed per the Installation section of this manual. To perform the power test, refer to Chart 1.

Caution: *This test cannot be performed on a DCD-519 HD Shelf supplying timing to network equipment. This test must be performed prior to using the DCD-519 HD Shelf to time network elements (NE). Failure to observe this caution will result in service interruption.*

B. Amplitude Verification

2.06 Use this procedure for verifying that clock input signal(s) are within the specified input voltage range. This test assumes the DCD-519 HD Shelf has been physically and electrically installed per the Installation section of this manual. To perform the amplitude verification test, refer to Chart 2.

Table A. Master Shelf Test Flow

CHART	TITLE
Notes: 1. Perform the tests on the master shelf in the order shown. If not equipped with a particular card type, skip to the next chart. 2. Do not use a TOTA-M card in the same shelf as a TOTA-5 card.	
Chart 1	Power Test
Chart 2	Amplitude Verification Test (optional)
Chart 3	MIS Card Test
Chart 4	MRC Card Test
Chart 5	ACI Card Test
Chart 6	CI-EA Card Test
Chart 7	CI Card Test
Chart 8	DCIM-EA or DCIM-T Card Test
Chart 9	ST2E or TNC-E Card Test
Chart 10	ST2 Card Test
Chart 11	ST3E or TNC Card Test
Chart 12	ST3E Card Test
Chart 13	ST2E or TNC-E with ST3E or TNC Card Test
Chart 14	ST2E or TNC-E with ST3E Card Test
Chart 15	EA10, EA20, EA10M, or EA20M Card Test
Chart 16	TOAA, TOLA, or TOTL Card Test
Chart 17	TOCA, TOEA, or TOTA Card Test
Chart 18	TO-EA Card Test
Chart 19	TO-EAN Card Test
Chart 20	TO-EA5 Card Test
Chart 22	TOGA Card Test
Chart 21	TOTA-5 or TOTA-M Card Test (Note 2)

Table A. Master Shelf Test Flow (Contd)

CHART	TITLE
Chart 23	SCIU or ESCIU Card Test
Chart 24	PSM Card Test
Chart 25	MIS Card System Management Setup

Table B. Expansion Shelf Test Flow

CHART	TITLE
Notes: 1. Perform the tests on the expansion shelf in the order shown. If not equipped with a particular card type, skip to the next chart. 2. Do not use a TOTA-M card in the same shelf as a TOTA-5 card.	
Chart 1	Power Test
Chart 2	Amplitude Verification Test (optional)
Chart 3	MIS Card Test
Chart 15	EA10, EA20, EA10M, or EA20M Card Test
Chart 16	TOAA, TOLA, or TOTL Card Test
Chart 17	TOCA, TOEA, or TOTA Card Test
Chart 18	TO-EA Card Test
Chart 19	TO-EAN Card Test
Chart 20	TO-EA5 Card Test
Chart 22	TOGA Output Card Test
Chart 21	TOTA-5 or TOTA-M Card Test (Note 2)
Chart 23	SCIU or ESCIU Card Test
Chart 24	PSM Card Test
Chart 25	MIS Card System Management Setup

Chart 1. Power Test

STEP	PROCEDURE																		
	<p>Use this procedure to verify power connections to the shelf. The DCD-519 HD Shelves do 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 the Installation section of this manual.</p> <p>Test Equipment: Digital Multimeter, Fluke 77 or equivalent</p>																		
	<p>Caution: Do not perform this procedure on DCD-519 HD Shelves that are supplying timing to network elements. Failure to observe this caution will result in a service interruption.</p>																		
1	<p>Ensure all plug-in cards are removed from the shelf under test.</p>																		
2	<p>Ensure all fuses are removed from the fuse panel which powers the shelf under test.</p>																		
3	<p>Disconnect the -48 V A and -48 V B power leads from the shelf power terminal blocks TB1 and TB2 on the rear of the shelf (leave the battery [RTN] leads connected to the shelf) (refer to Figure 1).</p>																		
4	<p>At the shelf end of the battery leads, use the multimeter to measure the voltage between the following:</p> <table border="0" data-bbox="272 863 1065 1052"> <thead> <tr> <th data-bbox="272 863 451 894"><u>Test Point</u></th> <th data-bbox="581 863 732 894"><u>Test Point</u></th> <th data-bbox="894 863 1065 894"><u>Measurement</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="272 894 451 926">Battery A lead</td> <td data-bbox="581 894 732 926">battery B lead</td> <td data-bbox="938 894 984 926">0 V</td> </tr> <tr> <td data-bbox="272 926 451 957">Battery A lead</td> <td data-bbox="581 926 704 957">TB2: RTN</td> <td data-bbox="938 926 984 957">0 V</td> </tr> <tr> <td data-bbox="272 957 451 989">Battery A lead</td> <td data-bbox="581 957 704 989">TB2: FRM</td> <td data-bbox="938 957 984 989">0 V</td> </tr> <tr> <td data-bbox="272 989 451 1020">Battery B lead</td> <td data-bbox="581 989 704 1020">TB1:RTN</td> <td data-bbox="938 989 984 1020">0 V</td> </tr> <tr> <td data-bbox="272 1020 451 1052">Battery B lead</td> <td data-bbox="581 1020 704 1052">TB1: FRM</td> <td data-bbox="938 1020 984 1052">0 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the voltage shown in the Measurement column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Measurement</u>	Battery A lead	battery B lead	0 V	Battery A lead	TB2: RTN	0 V	Battery A lead	TB2: FRM	0 V	Battery B lead	TB1:RTN	0 V	Battery B lead	TB1: FRM	0 V
<u>Test Point</u>	<u>Test Point</u>	<u>Measurement</u>																	
Battery A lead	battery B lead	0 V																	
Battery A lead	TB2: RTN	0 V																	
Battery A lead	TB2: FRM	0 V																	
Battery B lead	TB1:RTN	0 V																	
Battery B lead	TB1: FRM	0 V																	
5	<p>Reconnect the A and B battery leads to the power terminal block (TB1 and TB2) -48 V A and -48 V B terminal sets on the shelf under test.</p>																		
6	<p>Verify that the shelf causes a battery alarm if all power is lost to the shelf by connecting the multimeter, set to resistance, across the SHELF STATUS BATTALM and BATTRTN terminal sets on the shelf backplane (Figure 1).</p> <p>Requirement: The multimeter indicates <10 Ω.</p>																		
7	<p>In the power source fuse panel (use a 7.5 A to 10 A size fuse), install the A fuse for the shelf under test.</p> <p>Requirement: On the front panel of the shelf, the -48 V A lamp lights red.</p>																		
8	<p>Use the multimeter to measure the voltage between the -48 V A and RTN terminal sets on the power terminal block (TB2) on the shelf under test.</p> <p>Requirement: The multimeter indicates -42 V dc to -56 V dc.</p>																		
9	<p>In the power source fuse panel, install the B fuse (7.5 A to 10 A size fuse) for the shelf under test.</p> <p>Requirement: On the front panel of the shelf, the -48 V B lamp lights red.</p>																		

Chart 1. Power Test (Contd)

STEP	PROCEDURE
10	<p>Use the multimeter to measure the voltage between the –48 V B and RTN terminal sets on the power terminal block (TB1) on the shelf under test.</p> <p>Requirement: The multimeter indicates –42 V dc to –56 V dc.</p>
11	<p>At the shelf front panel, install a 5 A fuse in the –48 V A receptacle with a flat-blade screwdriver.</p> <p>Requirement: On the front panel of the shelf, the –48 V A lamp goes off.</p>
12	<p>At the shelf front panel, install a 5 A fuse in the –48 V B receptacle with a flat-blade screwdriver.</p> <p>Requirement: On the front panel of the shelf, the –48 V B lamp goes off.</p>
13	<p>Connect the multimeter, set to maximum resistance, across the SHELF STATUS BATTALM and BATTRTN terminal sets on the shelf backplane (Figure 1).</p> <p>Requirement: The multimeter indicates >1 M Ω.</p>
14	<p>Repeat Steps 1 through 12 for any other shelves in the DCD-519 HD System.</p>
15	<p>This procedure is completed. Indicate completion of the Power Test on the Test Sign-off form, then proceed to the next chart.</p>

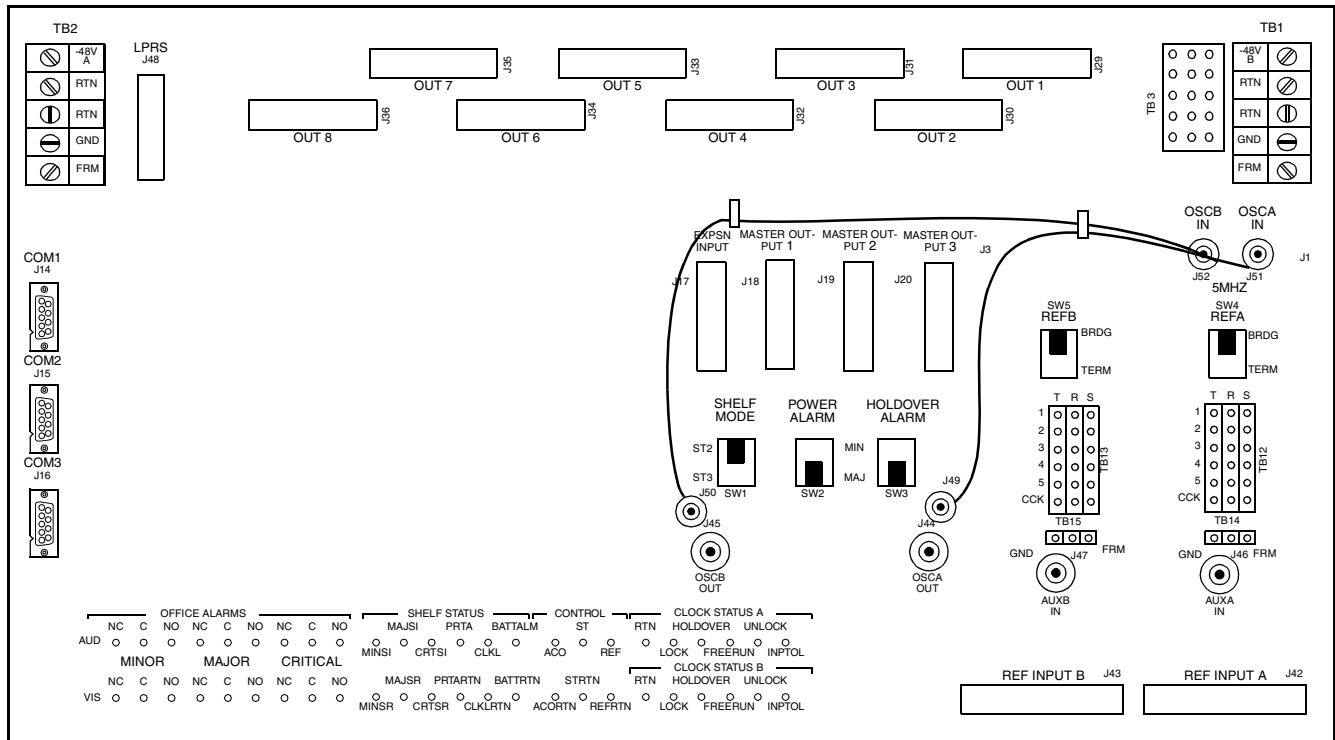


Figure 1. DCD-519 HD Shelf (Rear View)

Chart 2. Amplitude Verification Test

STEP	PROCEDURE
Use this procedure to verify the clock input signal(s) is within the specified input voltage range. 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 the channel 1 and 2 probe ground leads together. Connect the channel 1 and 2 probes (with resistor) to T and R of each DCD Shelf input terminals (refer to Figure 1), or wire-wrap input modules, as applicable.
3	<p>Verify that the clock input signal(s) are within the specified input voltage range and meet the prescribed template. Consult local company Installation Job Specifications for the type of input signals installed and on which DCD-519 HD input connectors. Set the oscilloscope controls for the expected signals per Table C.</p> <p>Requirement: Input signal ranges are as follows:</p> <ul style="list-style-type: none"> a. E1 Terminated: 2.37 V \pm10% base-to-peak, 120 Ω terminated b. E1 Bridged: 0.237 V \pm10% base-to-peak, 120 Ω terminated c. DS1 Terminated: 1.0 V to 3.5 V base-to-peak, 100 Ω terminated d. DS1 Bridged: 0.10 V to 0.35 V base-to-peak, 100 Ω terminated e. CC: 1.5 V to 4.0 V base-to-peak, 135 Ω terminated <p>Note: Although the voltage may appear within range, the pulses may be distorted. 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 Ω to 120 Ω, 1/4 W resistor across the Tip and Ring input terminal sets on the DCD-519 HD 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 the next chart.

Table C. Typical Oscilloscope Settings*

CONTROL	SETTING
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 E1 (TOEA, TO-EA, TO-EAN) for CC (TOCA) for 1.544 Mb/s (TOTA) for Analog (TOAA) for G.703 Analog (TOGA, TO-EA, TO-EAN) for Logic Level (TOLA)	2.048 Mb/s: 0.1 μ s 20 μ s 500 ns 60 kHz: 10 μ s 2.048 MHz: 0.1 μ s 4 kb/s: 0.5 ms 8 kb/s: 0.1 ms 64 kb/s: 10 μ s 564 kb/s: 2 μ s 384 kb/s: 2 μ s 512 kb/s: 2 μ s 768 kb/s: 2 μ s 1.536 Mb/s: 0.5 μ s 1.5446 Mb/s: 0.5 μ s 2.048 Mb/s: 0.1 μ s
“A” Sweep	FULL
Horizontal Position Control	mid-range
“A” Triggering: Slope Coupling Source	+ or – AC INT
<p>* Consult the oscilloscope manufacturer’s manual for details and operating instructions.</p> <p>Note: Adjust the oscilloscope’s volts-per-division scale to the appropriate level to get a measurable pulse amplitude on the screen; for example, to measure a 0 dB DSX (TERM) signal, set the volts-per-division scale to 1 V per division; to measure a –20 dB DSX (BRDG) signal, set the volts-per-division scale to 100 mV per division.</p>	

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.

2.07 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.

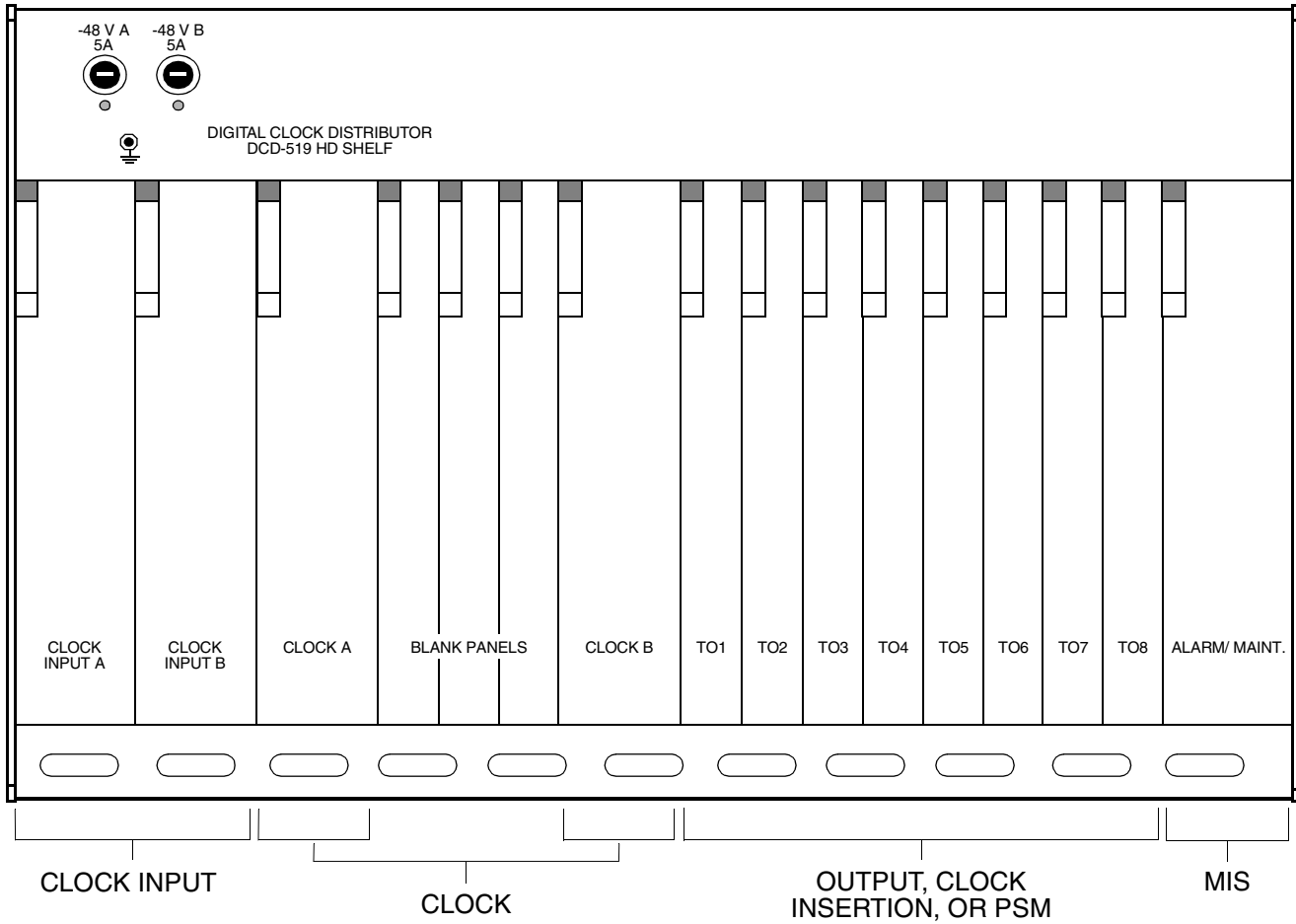
Note: Always use two hands to install cards, especially rubidium clock cards.

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

2.08 If a TimeScan product is used in the Test and Acceptance process, whenever a procedure refers to the User Guide or Operations manual, use the appropriate action in the TimeScan product.

2.09 If the alarm and timing outputs have been connected, they must be disconnected to check the outputs of the timing output cards.

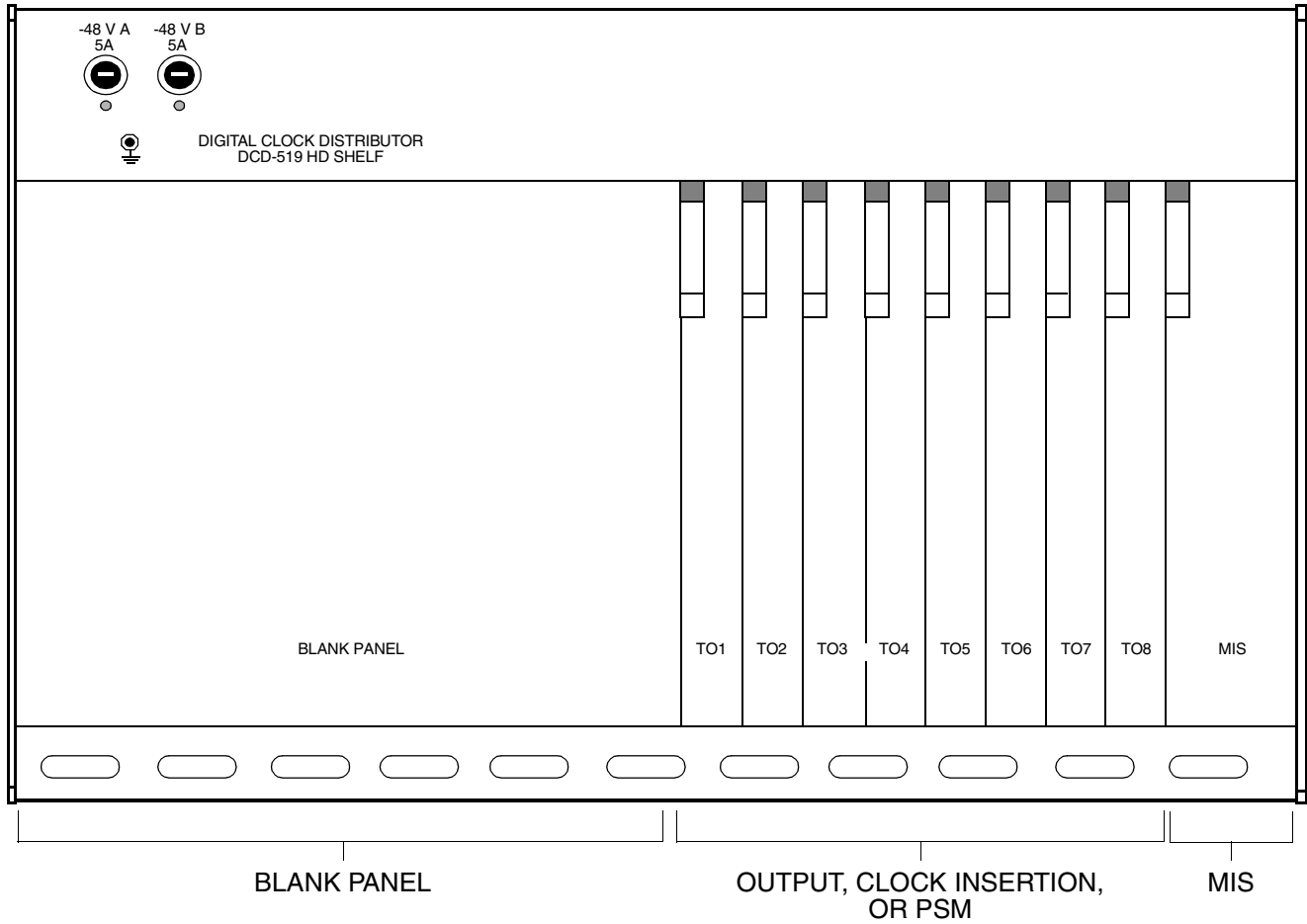
2.10 Refer to Figure 2 and Figure 3 for master and expansion shelf card slot positions, respectively. The procedures for the Test and Acceptance of the cards are described on Charts 3 to 25 of this document.



Notes:

1. Redundant output card pairs must be installed in slots TO1/TO2, TO3/TO4, TO5/TO6, and TO7/TO8.
2. The PSM card cannot be installed in slot TO3/TO4.
3. If two rubidium clock cards are installed, TO slots TO1 through TO3 are occupied by the rubidium clock card in the ST B slot.

Figure 2. Master Shelf with Quartz Clock Cards



Notes:

- 1 Timing for the expansion shelf is provided by the master shelf, so clock cards and clock input cards are not required.
- 2. Redundant output card pairs must be installed in slots TO1/TO2, TO3/TO4, TO5/TO6, and TO7/TO8.
- 3. The PSM card cannot be installed in slot TO3/TO4.

Figure 3. Expansion Shelf

Chart 3. MIS Card Test

STEP	PROCEDURE
	<p>Use this procedure to install a 090-45018-05 MIS card (MIS^{V5} card) into the DCD-519 HD Shelf. After all of the cards in the shelf are installed, another procedure populates the standard MIS card's database and allows the card to be the network management node for the DCD Shelf.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. All MIS cards in a DCD-519 HD System must have the same software version. 2. See the TL1 User's Guide in the software package for instructions about commands indicated in this procedure. 3. The MIS card allows communication with all three COM ports on the rear panel as follows (all ports are set to 9600 baud at the factory, and function equally well if external equipment is set at even, odd, or no parity, 7 or 8 data bits, and 1 stop bit): <ul style="list-style-type: none"> COM1: Configurable for 1200 or 9600 baud via TL1 command only. COM2: Configurable for 1200 or 9600 baud, and even, odd, or no parity via switch setting only. COM3: Configurable for 1200 or 9600 baud via TL1 command only. LOCAL COMM (front): Same as COM2. Cannot function if COM2 is enabled. 4. If an MIS card is removed from the shelf, COM1 and COM3 retain the configuration that was set via TL1 command. 5. 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 the alarm systems apply -48 V at the alarm leads and ground on the return leads. To adequately test the MIS card, perform one of the following: <ol style="list-style-type: none"> a. Disconnect the office alarm system and remote telemetry equipment from the DCD-519 HD Shelf to perform the ohmmeter tests, then reconnect the leads. 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 centralized alarm surveillance and control center. 6. After the INIT-SYS command is completed in this procedure, ignore any messages that may appear on the terminal until the last chart in this test and acceptance process. 7. Since no clock cards or clock input cards are installed, the CRITICAL alarm is active after the MIS card is installed. 8. The MINOR alarm lamp flashes when the MIS card checks the shelf and downloads the database. Wait for the lamp to stop flashing before continuing. 9. If the installation uses an MIS^{V5} card in a remote system, do the following: <ul style="list-style-type: none"> • Verify the communication ports on the remote MIS^{V5} are set to the factory default (term1 or term2). <p>Test Equipment: Digital volt/ohm meter</p>
1	Set switch SW1 on the MIS card (see Figure 4) according to the factory settings.
2	If COM1 or COM3 are used, skip this step. Check the MIS card RS-232 settings to assure communications with the external terminal or computer (see Figure 4).

Chart 3. MIS Card Test (Contd)

STEP	PROCEDURE
3	<p>When the RS-232 communications settings on the MIS card are correct, insert the MIS card into the slot labeled “MI” in the DCD-519 HD master shelf.</p> <p>Requirement: The MIS card performs a lamp test, and the MINOR lamp flashes for up to 1 minute. The CRITICAL and MINOR lamps remain lit.</p>
4	<p>Use the terminal to enter a semicolon and a carriage return.</p> <p>Requirement: The terminal displays a three-line message from the MIS as follows:</p> <pre data-bbox="415 632 867 772"> TELECOM <date> <time> M <ctag> DENY ICNV ; </pre> <p>Where <date> and <time> are the date and time in the MIS card, <ctag> is a random number, and all upper-case letters are shown as they should appear. (See the appropriate TL1 User’s Guide for TL1 language definitions.)</p>
5	<p>Refer to the Software Release Document Release for the appropriate software version to install and activate the software.</p>
6	<p>Use the INIT-SYS command with the appropriate <ph> value (see below and the TL1 User’s Guide).</p> <p><ph> 3:</p> <ul data-bbox="302 1150 1430 1276" style="list-style-type: none"> • Deletes all card information from the database • Retains all security information as previously entered, including the users and passwords • Retains the source ID (SID) as previously entered • Retains all communication parameters as previously entered <p><ph> 9:</p> <ul data-bbox="302 1346 1463 1499" style="list-style-type: none"> • Deletes all card information from the database • Resets all security information to the factory settings • Resets the source ID (SID) to the factory settings, including only one user named “super” with a password of “sparky” • Resets all communication parameters to factory settings <p>Requirement: The terminal indicates a completed command.</p>
7	<p>Set the POWER ALARM switch (SW2) on the shelf backplane to MAJ (see Figure 1).</p>
8	<p>Remove fuse “–48 V A” from the front panel of the shelf with a flat-blade screwdriver.</p> <p>Requirement: The red lamp under the –48 V A fuse on the Output Protection/Spare Select Panel front panel lights. On the MIS card, the MAJOR, MINOR, and CRITICAL lamps are lit.</p>

Chart 3. MIS Card Test (Contd)

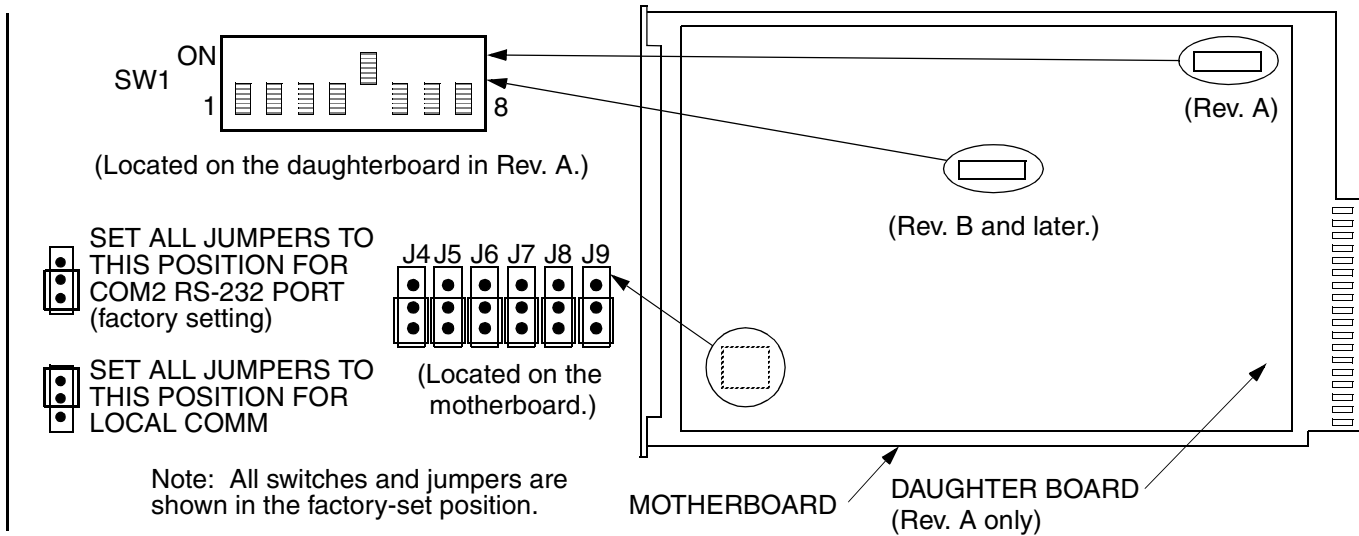
STEP	PROCEDURE																																															
9	Connect the multimeter, set to resistance (for the MINOR AUD, MINOR VIS, MINSI, MAJOR AUD, MAJOR VIS, and MAJSI tests) or to volts dc (for the BATT ALM test) as appropriate, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 1);																																															
	<table border="0"> <thead> <tr> <th><u>Type</u></th> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Result</u></th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD: NO</td> <td>MINOR AUD: C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS: NO</td> <td>MINOR VIS: C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD: NO</td> <td>MAJOR AUD: C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS: NO</td> <td>MAJOR VIS: C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>CRITICAL VIS: NO</td> <td>CRITICAL VIS: C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>CRITICAL VIS: NO</td> <td>CRITICAL VIS: C</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>CRTSI</td> <td>CRTSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>BATTALM</td> <td>BATTRTN</td> <td><0.1 V</td> </tr> </tbody> </table>	<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>	OFFICE ALARM	MINOR AUD: NO	MINOR AUD: C	<10 Ω	OFFICE ALARM	MINOR VIS: NO	MINOR VIS: C	<10 Ω	OFFICE ALARM	MAJOR AUD: NO	MAJOR AUD: C	<10 Ω	OFFICE ALARM	MAJOR VIS: NO	MAJOR VIS: C	<10 Ω	OFFICE ALARM	CRITICAL VIS: NO	CRITICAL VIS: C	<10 Ω	OFFICE ALARM	CRITICAL VIS: NO	CRITICAL VIS: C	<10 Ω	SHELF STATUS	MINSI	MINSR	<10 Ω	SHELF STATUS	MAJSI	MAJSR	<10 Ω	SHELF STATUS	CRTSI	CRTSR	<10 Ω	SHELF STATUS	BATTALM	BATTRTN	<0.1 V			
<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>																																													
OFFICE ALARM	MINOR AUD: NO	MINOR AUD: C	<10 Ω																																													
OFFICE ALARM	MINOR VIS: NO	MINOR VIS: C	<10 Ω																																													
OFFICE ALARM	MAJOR AUD: NO	MAJOR AUD: C	<10 Ω																																													
OFFICE ALARM	MAJOR VIS: NO	MAJOR VIS: C	<10 Ω																																													
OFFICE ALARM	CRITICAL VIS: NO	CRITICAL VIS: C	<10 Ω																																													
OFFICE ALARM	CRITICAL VIS: NO	CRITICAL VIS: C	<10 Ω																																													
SHELF STATUS	MINSI	MINSR	<10 Ω																																													
SHELF STATUS	MAJSI	MAJSR	<10 Ω																																													
SHELF STATUS	CRTSI	CRTSR	<10 Ω																																													
SHELF STATUS	BATTALM	BATTRTN	<0.1 V																																													
	Requirement: The multimeter indicates the readings shown in the Result column.																																															
10	Press the ACO pushbutton on the MIS card.																																															
	Requirement: The audible office alarm silences (if connected). On the MIS card, the ACO lamp lights green.																																															
11	Connect the multimeter, set to resistance (for the MINOR AUD, MINOR VIS, MINSI, MAJOR AUD, MAJOR VIS, and MAJSI tests) or to volts dc (for the BATT ALM test) as appropriate, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 1);																																															
	<table border="0"> <thead> <tr> <th><u>Type</u></th> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Result</u></th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD: NO</td> <td>MINOR AUD: C</td> <td>Open</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS: NO</td> <td>MINOR VIS: C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD: NO</td> <td>MAJOR AUD: C</td> <td>Open</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS: NO</td> <td>MAJOR VIS: C</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>BATTALM</td> <td>BATTRTN</td> <td><0.1 V</td> </tr> </tbody> </table>	<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>	OFFICE ALARM	MINOR AUD: NO	MINOR AUD: C	Open	OFFICE ALARM	MINOR VIS: NO	MINOR VIS: C	<10 Ω	OFFICE ALARM	MAJOR AUD: NO	MAJOR AUD: C	Open	OFFICE ALARM	MAJOR VIS: NO	MAJOR VIS: C	<10 Ω	SHELF STATUS	MINSI	MINSR	<10 Ω	SHELF STATUS	MAJSI	MAJSR	<10 Ω	SHELF STATUS	BATTALM	BATTRTN	<0.1 V															
<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>																																													
OFFICE ALARM	MINOR AUD: NO	MINOR AUD: C	Open																																													
OFFICE ALARM	MINOR VIS: NO	MINOR VIS: C	<10 Ω																																													
OFFICE ALARM	MAJOR AUD: NO	MAJOR AUD: C	Open																																													
OFFICE ALARM	MAJOR VIS: NO	MAJOR VIS: C	<10 Ω																																													
SHELF STATUS	MINSI	MINSR	<10 Ω																																													
SHELF STATUS	MAJSI	MAJSR	<10 Ω																																													
SHELF STATUS	BATTALM	BATTRTN	<0.1 V																																													
	Requirement: The multimeter indicates the readings shown in the Result column.																																															
12	Replace the -48 V A fuse, using a flat-blade screwdriver to lock in place.																																															
	Requirement: The -48 V A fuse lamp goes off. On the MIS card, the MAJOR and MINOR lamps go off after up to 12 seconds, and the ACO lamp stays lit (because the CRITICAL lamp is lit).																																															

Chart 3. MIS Card Test (Contd)

STEP	PROCEDURE																																
13	<p>Connect the multimeter, set to resistance (for the MINOR AUD, MINOR VIS, MINSI, MAJOR AUD, MAJOR VIS, and MAJSI tests) or to volts dc (for the BATT ALM test) as appropriate, across the following Office Alarm and Shelf Status terminal sets on the shelf backplane (see Figure 1);</p> <table border="1" data-bbox="321 436 1304 695"> <thead> <tr> <th>Type</th> <th>Test Point</th> <th>Test Point</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD: NO</td> <td>MINOR AUD: C</td> <td>Open</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS: NO</td> <td>MINOR VIS: C</td> <td>Open</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD: NO</td> <td>MAJOR AUD: C</td> <td>Open</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS: NO</td> <td>MAJOR VIS: C</td> <td>Open</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td>Open</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td>Open</td> </tr> <tr> <td>SHELF STATUS</td> <td>BATTALM</td> <td>BATTRTN</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Result column.</p>	Type	Test Point	Test Point	Result	OFFICE ALARM	MINOR AUD: NO	MINOR AUD: C	Open	OFFICE ALARM	MINOR VIS: NO	MINOR VIS: C	Open	OFFICE ALARM	MAJOR AUD: NO	MAJOR AUD: C	Open	OFFICE ALARM	MAJOR VIS: NO	MAJOR VIS: C	Open	SHELF STATUS	MINSI	MINSR	Open	SHELF STATUS	MAJSI	MAJSR	Open	SHELF STATUS	BATTALM	BATTRTN	-42 V to -56 V
Type	Test Point	Test Point	Result																														
OFFICE ALARM	MINOR AUD: NO	MINOR AUD: C	Open																														
OFFICE ALARM	MINOR VIS: NO	MINOR VIS: C	Open																														
OFFICE ALARM	MAJOR AUD: NO	MAJOR AUD: C	Open																														
OFFICE ALARM	MAJOR VIS: NO	MAJOR VIS: C	Open																														
SHELF STATUS	MINSI	MINSR	Open																														
SHELF STATUS	MAJSI	MAJSR	Open																														
SHELF STATUS	BATTALM	BATTRTN	-42 V to -56 V																														
14	<p>Remove fuse “-48 V B” from the Output Protection/Spare Select Panel on the DCD-519 HD Shelf, using a flat-blade screwdriver.</p> <p>Requirement: The red lamp under the -48 V A fuse on the Output Protection/Spare Select Panel front panel lights. On the MIS card, the MAJOR lamp lights red, the MINOR lamp lights yellow, and the ACO lamp goes off. The the new alarm condition resets the ACO.</p>																																
15	<p>Press the ACO pushbutton on the MIS card.</p> <p>Requirement: The audible office alarm silences (if connected). On the MIS card, the ACO lamp lights green.</p>																																
16	<p>Replace the -48 V B fuse, using a flat-blade screwdriver to lock in place.</p> <p>Requirement: The -48 V B fuse lamp and the MIS MAJOR and MINOR lamps go off (after approximately 6 seconds to 12 seconds). The ACO lamp stays lit due to the lit CRITICAL lamp.</p>																																
17	<p>Remove both fuses from the Output Protection/Spare Select Panel on the DCD-519 HD Shelf, using a flat-blade screwdriver.</p> <p>Requirement: All lamps on the MIS card and shelf go out. The -48 V A and -48 V B lamps on the Output Protection/Spare Select panel light red.</p>																																
18	<p>Replace both fuses, using a flat-blade screwdriver to lock in place.</p> <p>Requirement: The CRITICAL, MAJOR, and MINOR lamps on the MIS light, then go off, one at a time (the CRITICAL lamp lights to indicate there are no input and clock cards in the shelf). The -48 V A and -48 V B lamps are off on the Output Protection/Spare Select panel.</p>																																
19	<p>Set the POWER ALARM switch (SW2) on the shelf backplane to MIN (see Figure 1).</p>																																

Chart 3. MIS Card Test (Contd)

STEP	PROCEDURE
20	<p>Remove fuse “-48 V A” from the Output Protection/Spare Select Panel on the DCD-519 HD Shelf with a flat-blade screwdriver.</p> <p>Requirement: The red lamp under the -48 V A fuse on the Output Protection/Spare Select Panel front panel lights, and the MINOR lamp on the MIS card lights yellow.</p>
21	<p>Press the ACO pushbutton on the MIS card.</p> <p>Requirement: The audible office alarm silences (if connected). On the MIS card, the ACO lamp lights green.</p>
22	<p>Replace the -48 V A fuse, using a flat-blade screwdriver to lock in place.</p> <p>Requirement: -48 V A fuse lamp and MIS MINOR lamp go off, the ACO lamp stays lit (because the CRITICAL alarm is active).</p>
23	<p>Remove fuse “-48 V B” from the Output Protection/Spare Select Panel on the DCD-519 HD Shelf, using a flat-blade screwdriver.</p> <p>Requirement: The red lamp under the -48 V B fuse on the Output Protection/Spare Select Panel front panel lights, and the MINOR lamp on the MIS card lights yellow. The ACO lamp on the MIS card goes off. The new alarm resets the ACO.</p>
24	<p>Press the ACO pushbutton on the MIS card.</p> <p>Requirement: The audible office alarm silences (if connected). On the MIS card, the ACO lamp lights green.</p>
25	<p>Replace the -48 V B fuse, using a flat-blade screwdriver to lock in place.</p> <p>Requirement: -48 V B fuse lamp, MIS MINOR lamp goes off. The ACO lamp stays lit due to the lit CRITICAL lamp.</p>
26	<p>Set the POWER ALARM switch (SW2) on the shelf backplane (see Figure 1) to conform to the requirements for this installation.</p>
27	<p>Repeat the previous steps in this procedure for each shelf that requires an MIS card.</p>
28	<p>This procedure is completed. Indicate completion of the MIS Card Test on the Test Sign-off form.</p>



SW1 Switch Settings

SW1 Section	Position	Description	Factory Setting
1 (Note 1)	On	1200 Baud	—
	Off	9600 Baud	X
2 and 3 (Note 1)	2=on, 3=any	Odd Parity	—
	2=off, 3=on	Even Parity	—
	2=off, 3=off	No Parity	X
4	On	Password protection enabled	—
	Off	Password protection disabled	X
5	On	When power is applied (or recycled), the MIS card downloads its configuration database to the standard cards in the shelf. Only those standard cards in the same slot and with the same serial number as the configuration database receive the download.	X
	Off	The MIS card does not download its configuration database (not recommended).	—
6	Off	Factory set. Do not change.	X
7 (Notes 2, 3)	On	Installed in a remote system or expansion shelf	—
	Off	Installed in a master shelf	X
8	Off	Factory set. Do not change.	X

Notes:

- Sections 1, 2, and 3 set the RS-232 baud rate and parity for COM2 and the LOCAL COMM port only.
- If installing an MIS in a remote system, be sure the master-to-remote cable is not connected, and the expansion shelves are not connected.
- To transfer information between an MIS card in a master system and an MIS card in a remote system, connect the COM 3 ports between the two master shelves.

Figure 4. MIS Card Switch and Jumpers

Chart 4. MRC Card Test

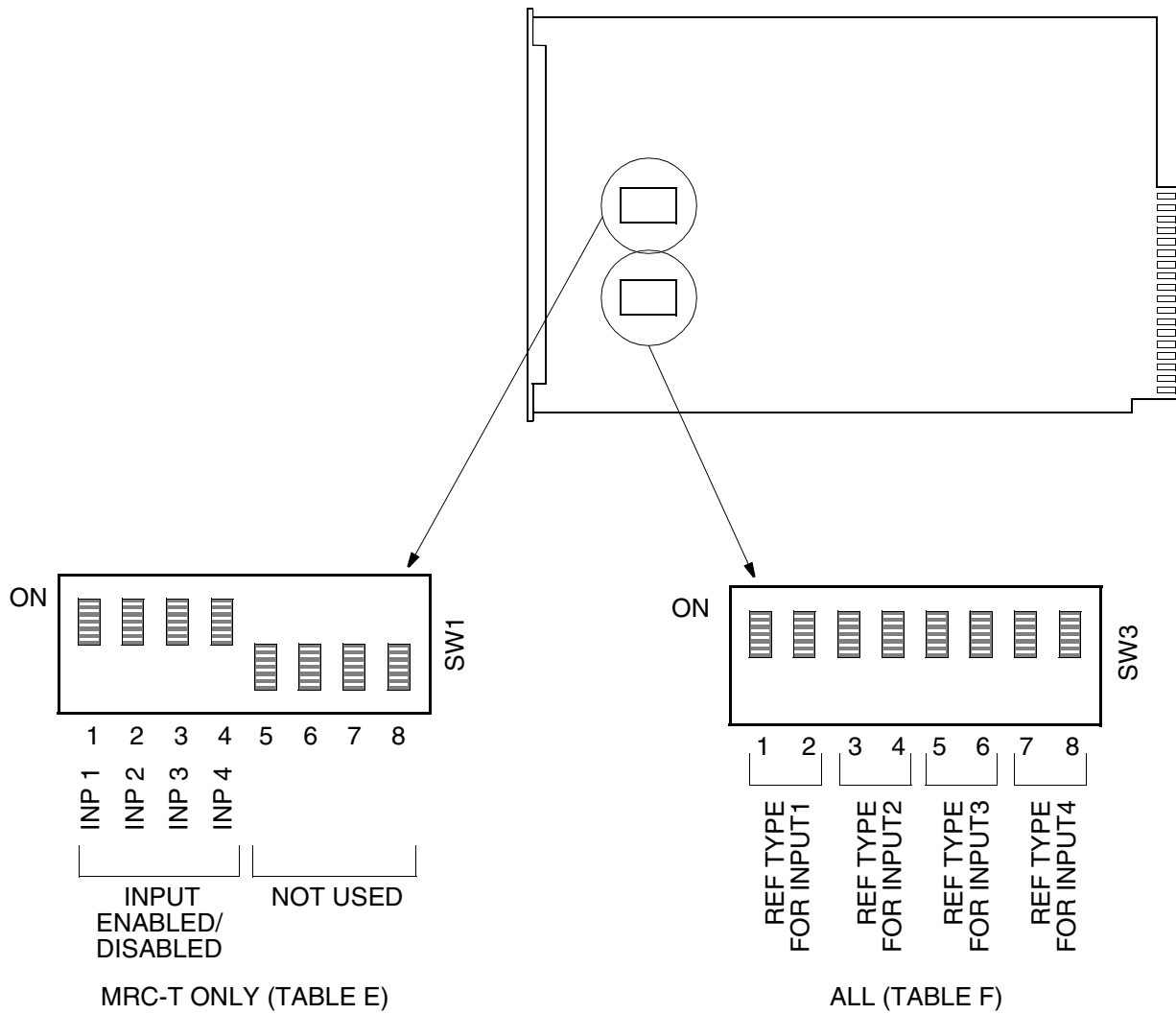
STEP	PROCEDURE
	<p>Use this procedure to install the MRC cards and verify operation. This procedure assumes the input reference signals have been connected per the Installation section of this manual.</p> <p>Caution: <i>Clock cards are placed in the shelf in Step 1 for testing the MRC cards. This procedure does not test the clock cards. Clock cards are tested in a separate chart.</i></p> <p>Test Equipment: None</p>
1	<p>For test purposes, insert two clock cards into the ST slots in the shelf.</p> <p>Note: If installing an ST2E, ST2, or TNC-E clock card in combination with an ST3E, ST3, or TNC clock card, it is imperative that the ST2E, ST2, or TNC-E be installed first and allowed to stabilize before installing the other clock card. Failure to allow the ST2E, ST2, or TNC-E to stabilize first results in incorrect timing from the clock cards.</p>
2	<p>Observe the clock lamps.</p> <p>Requirement: On the ST2, ST3E, or TNC cards: the FREE RUN lamp lights green (steady), and the ACTIVE lamp lights green after the warm-up (stabilization) period. On the ST2E or TNC-E cards: the HOLD OVER lamp lights green (steady), and the ACTIVE lamp lights green after the warm-up (stabilization) period.</p>
3	<p>On the rear of the master shelf, set the ST3/ST2 switch (SW1) (Figure 1) to the ST3 position.</p> <p>Note: Only those clock card lamps that are identified in the Requirements paragraphs of this procedure are applicable to this test.</p>
4	<p>On the DCD-519 HD master shelf backplane, set switches SW4 and SW5 (REF A and REF B) to the BRDG position.</p>
5	<p>Set switches SW1 and SW3 on the MRC card to conform to the requirements for this installation (Figure 5 and Figure 6) per Installation Job Specifications.</p> <p>Note: CRC4 framing for the MRC-EA cards are selectable via TL1 commands through the MIS card only; CRC4 framing is set by the software to be enabled. Refer to the TL1 User's Guide for instructions.</p>
6	<p>If not equipped with a second MRC card, skip this step. Repeat the previous step for the second MRC card.</p>
7	<p>Insert an MRC card into the MR A slot in the master shelf, insert a second MRC card into the MR B slot if using two MRC cards, and wait 3 minutes.</p> <p>Note: The MRC card performs a lamp test and qualifies equipped input signals. Lamps for disabled inputs are off. After 3 minutes, REF lamps for enabled inputs are lit red when an input signal is not present, and green when a valid input signal is present. The STATUS lamp for the active input is lit green, all other STATUS lamps are off.</p>

Chart 4. MRC Card Test (Contd)

STEP	PROCEDURE
8	<p>10 minutes after inserting an MRC card into the shelf, observe the MRC card lamps.</p> <p>Requirement: The FAIL lamp is off, the REF lamps for the enabled inputs are lit green, and the REF lamps for the disabled inputs are off. The SRC ACTIVE lamp on the card in the MR A slot is lit green. The SRC ACTIVE lamp on the card in the MR A slot is off. The STATUS lamp for the active input is lit green; all other STATUS lamps are off. Do not proceed to the next step until these requirements are met.</p>
9	<p>Observe the clock lamps.</p> <p>Requirement: On both clocks: the LKD lamp is lit green, the ACTIVE lamp is lit green. The SRC A lamp on the card in the ST A slot is lit green. The SRC B lamp on the card in the ST B slot is lit green.</p>
10	<p>If not equipped with a second MRC card, go to Step 12.</p> <p>Press and hold the XFR pushbutton for approximately 2 seconds, and release.</p> <p>Requirement: The SRC ACTIVE lamp on the card in MR B lights, and the SRC ACTIVE lamp on the card in MR A goes off.</p>
11	<p>Press and hold the XFR pushbutton for approximately 2 seconds, and release.</p> <p>Requirement: The SRC ACTIVE lamp on the card in MR B lights, and the SRC ACTIVE lamp on the card in MR A goes off.</p>
12	<p>On the rear of the shelf, locate the highest-priority input to the MRC card in the MR A slot and perform one of the following:</p> <p>If using a wire-wrap module, short the T and R leads with a short clip lead (6 in max).</p> <p>If using a connectorized module, remove the coaxial connector from the input module to remove the signal.</p> <p>Requirement: On the MRC card, the REF lamp for the shorted or removed input is lit red, and the adjacent STATUS lamp is off. The STATUS lamp for the second priority input is lit green. On the MIS card, the MINOR lamp is lit yellow.</p> <p>If the last valid input has been shorted or removed in this step, in addition, the SRC ACTIVE lamp on the MRC card in the MR A slot goes off, and the SRC ACTIVE lamp on the MRC card in the MR B slot lights. On the MIS card, the MAJOR lamp is lit red.</p> <p>Note: Do not remove shorting jumpers or reinstall coaxial connectors until directed.</p>
13	<p>Repeat the previous step for each remaining input in descending order of priority (refer to Figure 5 for the MRC-T card or Figure 6 for the MRC-EA card) on the MRC card in the MR A slot.</p>

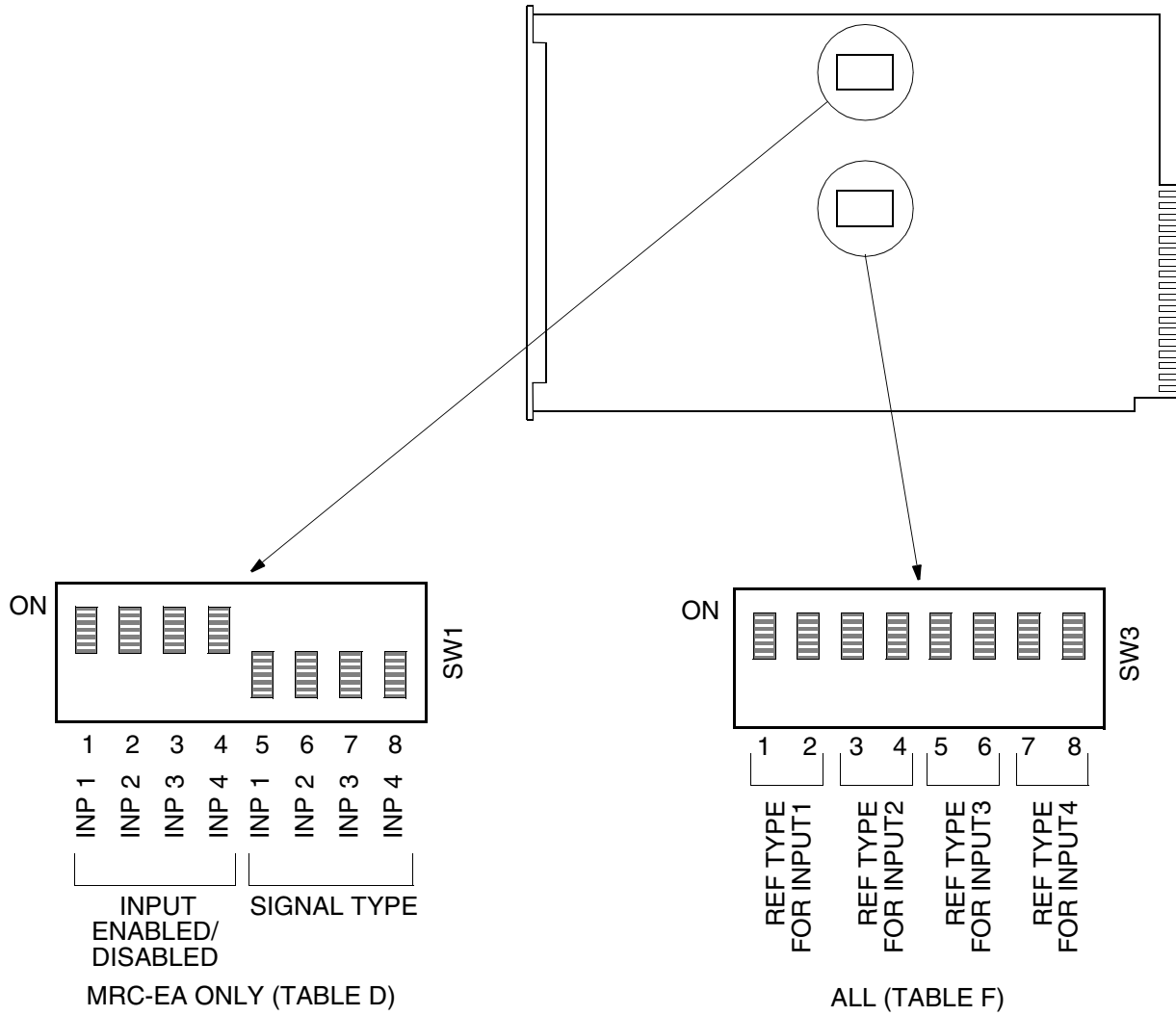
Chart 4. MRC Card Test (Contd)

STEP	PROCEDURE
14	<p>Remove all shorting jumpers or replace the coax connector (positioned in Steps 12 and 13) on the shelf backplane for the card in the MR A slot, wait 3 minutes to 5 minutes, then observe the lamps.</p> <p>Requirement: On the installed MRC cards, The FAIL lamp is off, the REF lamps for the enabled inputs are lit green, the REF lamps for the disabled inputs are off, and the SRC ACTIVE lamp is lit green (only one MRC is SRC ACTIVE when ST3E or TNC cards are used [ST3 shelf mode]). Also, the STATUS lamps are all off except for the active (highest-priority) input which is lit green. On the MIS card, all lamps are off. Do not proceed to the next step until these requirements are met.</p>
15	<p>If not equipped with a second MRC card, skip this step. Repeat Steps 12, 13, and 14 for the MRC card in the MR B slot.</p>
16	<p>Set the ST3/ST2 switch (SW1) on the rear panel (Figure 1) to conform to the requirements for this installation: Set SW1 to the ST2 position if one or more ST2E, ST2, or TNC-E clock cards, or 090-45010-54 and -57 MRC cards will be installed in the shelf. Set SW1 to the ST3 position if no ST2E, ST2, or TNC-E clock cards will be installed in the shelf.</p> <p>Requirement: If equipped with a second MRC card and the switch is in the ST2 position, the SRC ACT lamps on both MRC cards are lit. The transfer (XFR) function between the MRC cards is disabled.</p>
17	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
18	<p>This procedure is completed. Indicate completion of the MRC Card Test on the Test Sign-off form.</p>



Note: All switches are shown in the factory-set position.

Figure 5. MRC-T Card Switches



Note: All switches are shown in the factory-set position.

Figure 6. MRC-EA Card Switches

Table D. MRC-EA Card Switch SW1 Settings

SECTION	POSITION	MEANING	FACTORY SETTING
1	ON	Input 1 enabled	X
	OFF	Input 1 disabled	—
2	ON	Input 2 enabled	X
	OFF	Input 2 disabled	—
3	ON	Input 3 enabled	X
	OFF	Input 3 disabled	—
4	ON	Input 4 enabled	X
	OFF	Input 4 disabled	—
5	ON	Input 1 - Analog	—
	OFF	Input 1 - E1	X
6	ON	Input 2 - Analog	—
	OFF	Input 2 - E1	X
7	ON	Input 3 - Analog	—
	OFF	Input 3 - E1	X
8	ON	Input 4 - Analog	—
	OFF	Input 4 - E1	X

Table E. MRC-T Card Switch SW1 Settings

SECTION	POSITION	MEANING	FACTORY SETTING
1	ON	Input 1 enabled	X
	OFF	Input 1 disabled	—
2	ON	Input 2 enabled	X
	OFF	Input 2 disabled	—
3	ON	Input 3 enabled	X
	OFF	Input 3 disabled	—
4	ON	Input 4 enabled	X
	OFF	Input 4 disabled	—
5 to 8	ON	Not Used	—
	OFF		X

Table F. MRC Card Switch SW3 Settings

REFERENCE TYPE CONNECTED TO INPUT	SECTIONS 1 & 2 (FOR INPUT 1)		SECTIONS 3 & 4 (FOR INPUT 2)		SECTIONS 5 & 6 (FOR INPUT 3)		SECTIONS 7 & 8 (FOR INPUT 4)		FACTORY SETTING
	ON	OFF	ON	OFF	ON	OFF	ON	OFF	
Network	ON	ON	ON	ON	ON	ON	ON	ON	X
LORAN	ON	OFF	ON	OFF	ON	OFF	ON	OFF	—
GPS	OFF	ON	OFF	ON	OFF	ON	OFF	ON	—
Cesium	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	—

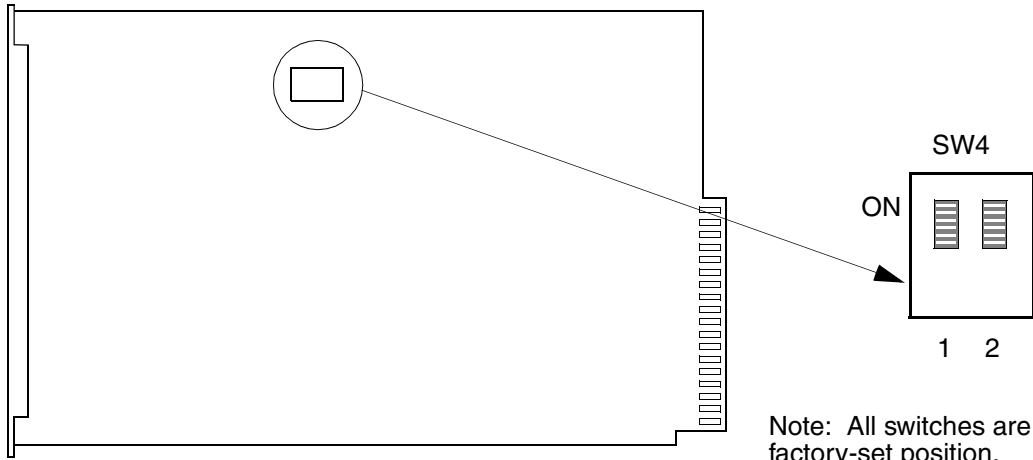
Note: The sections of SW3 are used to identify the reference type connected to each input.
 Example: If the reference type on input 1 is Cesium, set positions 1 and 2 of SW3 to OFF.

Chart 5. ACI Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the ACI cards. This procedure assumes the input reference signals have been connected per the Installation section of this manual. Consult the local company Installation Job Specifications to determine the type of input card to be installed in the MRA and MRB slots in the shelf. The SW4 (REFA) and SW5 (REFB) switches should have been set during installation for the level of signals (BRDG or TERM) connected to the shelf.</p> <p>Note: If installing an ACI card in a remote system, contact your local Symmetricom distributor or Symmetricom's CTAC.</p> <p>Test Equipment: None</p>
1	On the master shelf rear panel, set the ST2/ST3 switch (Figure 1) to the ST3 position for this test, regardless of the type of clock card to be installed.
2	Set sections 1 and 2 of switch SW4 (Figure 7) on each ACI card to be installed to match the frequency of the input reference signal for this installation.
3	<p>Insert an ACI card into the MR A slot in the master shelf.</p> <p>Requirement: On the ACI card just installed, the FAIL lamp and SRC FAIL lamps are lit red. Both lamps go off approximately 20 seconds after the card is installed. After the card has warmed up, the SRC ACT lamp is lit green.</p>
4	<p>If not equipped with a second ACI card, skip to Step 14. Insert the second ACI card into the MR B slot in the master shelf.</p> <p>Requirement: On the ACI card just installed, the FAIL lamp and SRC FAIL lamps are lit red. Both lamps go off approximately 20 seconds after the card is installed. After the card has warmed up, the SRC ACT lamp remains off.</p>
5	<p>Press the XFR pushbutton on one of the ACI cards.</p> <p>Requirement: The lit SRC ACT lamp transfers to the other ACI card.</p>
6	<p>Press the XFR pushbutton on the other ACI card.</p> <p>Requirement: The lit SRC ACT lamp lights on the original ACI card.</p>
7	<p>Remove the ACI card with its SRC ACT lamp lit.</p> <p>Requirement: The SRC ACT lamp lights on the other ACI card.</p>

Chart 5. ACI Card Test (Contd)

STEP	PROCEDURE
8	Reinsert the removed ACI card. <i>Requirement:</i> The SRC ACT lamp remains lit on the other ACI card.
9	Remove the ACI card with its SRC ACT lamp lit. <i>Requirement:</i> The SRC ACT lamp on the original ACI card lights.
10	Reinsert the removed ACI card. <i>Requirement:</i> The SRC ACT lamp remains lit on the other ACI card.
11	Press the XFR pushbutton on either ACI card. <i>Requirement:</i> The lit SRC ACT lamp transfers to the other ACI card.
12	Set the ST2/ST3 switch (SW1) on the backplane to the appropriate position for this installation. <i>Requirement:</i> If SW1 is set to the ST2 position, the SRC ACT lamps on both ACI cards are lit. The transfer (XFR) function between the ACI cards is disabled.
13	Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf. <i>Requirement:</i> The response indicates the command was completed successfully.
14	Indicate completion of the ACI Card Test on the Test Sign-off form.



SW4 Settings

Section		Input Frequency	Factory Setting
1	2		
OFF	OFF	1 MHz	—
OFF	ON	2 MHz (2.048 MHz)	—
ON	OFF	5 MHz	—
ON	ON	10 MHz	X

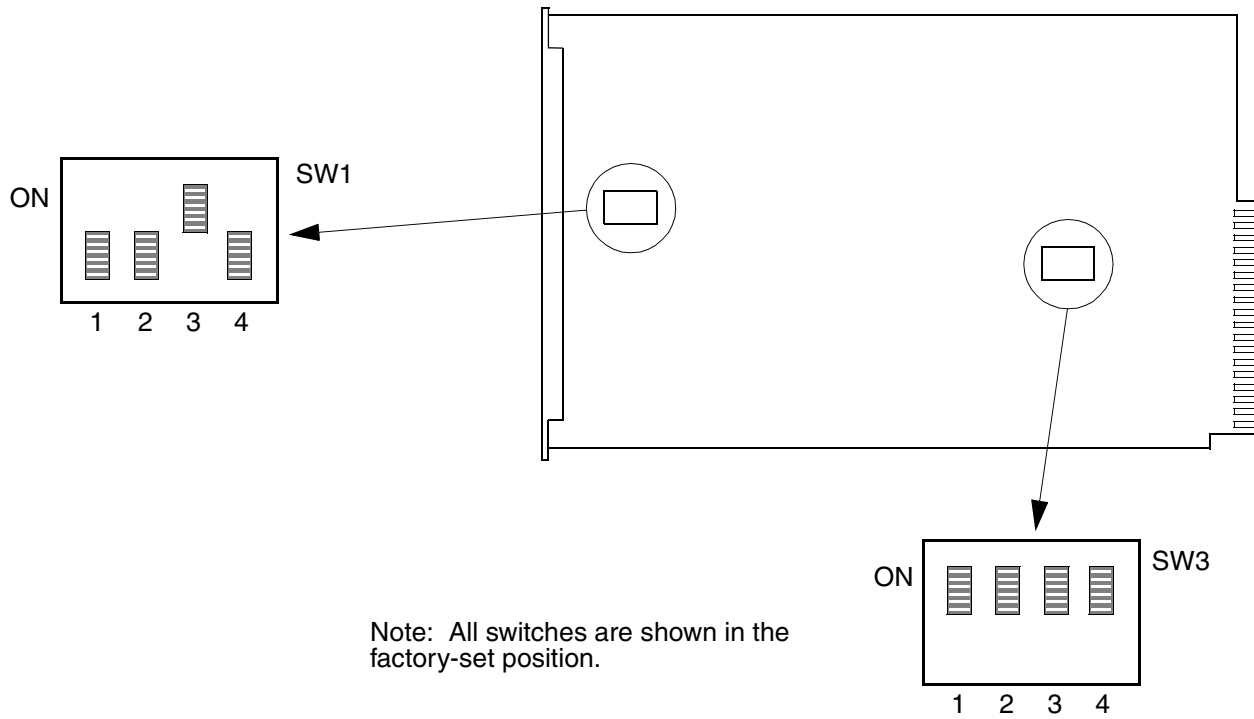
Figure 7. ACI Card Switch

Chart 6. CI-EA Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the CI-EA cards. This procedure assumes the input reference signals have been connected per the Installation section of this manual. Consult the local company Installation Job Specifications to determine the type of input card to be installed in the MRA and MRB slots in the shelf.</p> <p>Note: If installing an CI-EA card in a remote system, contact your local Symmetricom distributor or Symmetricom's CTAC.</p> <p>Test Equipment: None</p>
1	On the master shelf rear panel, set the ST2/ST3 switch (Figure 1) to the ST3 position for this test, regardless of the type of clock card to be installed.
2	Set switches SW1 and SW3 (Figure 8) on each CI-EA card to conform to the requirements for this installation.
3	<p>Insert the first CI-EA card into the MR A slot.</p> <p>Requirement: On the CI-EA card just installed, the E1 lamp is lit green, and the FAIL lamp goes off after approximately 8 seconds to 40 seconds. After the card has warmed up, the SRC ACTIVE lamp lights green.</p>
4	<p>If not equipped with a second CI-EA card, skip to Step 14. Insert the second CI-EA card into the MR B slot in the master shelf.</p> <p>Requirement: On the CI-EA card just installed, the E1 lamp is lit green, and the FAIL lamp goes off after approximately 8 seconds to 40 seconds. The SRC ACTIVE lamp remains off.</p>
5	<p>Press the XFR pushbutton on one of the CI-EA cards.</p> <p>Requirement: The lit SRC ACT lamp transfers to the other CI-EA card.</p>
6	<p>Press the XFR pushbutton on the other CI-EA card.</p> <p>Requirement: The lit SRC ACT lamp lights on the original CI-EA card.</p>
7	<p>Remove the CI-EA card with its SRC ACT lamp lit.</p> <p>Requirement: The SRC ACT lamp lights on the other CI-EA card.</p>
8	<p>Reinsert the removed CI-EA card.</p> <p>Requirement: The SRC ACT lamp remains lit on the other CI-EA card.</p>
9	<p>Remove the CI-EA card with its SRC ACT lamp lit.</p> <p>Requirement: The SRC ACT lamp on the original CI-EA card lights.</p>
10	<p>Reinsert the removed CI-EA card.</p> <p>Requirement: The SRC ACT lamp remains lit on the other CI-EA card.</p>

Chart 6. CI-EA Card Test (Contd)

STEP	PROCEDURE
11	<p>Press the XFR pushbutton on either CI-EA card.</p> <p>Requirement: The lit SRC ACT lamp transfers to the other CI-EA card.</p>
12	<p>Set the ST2/ST3 switch (SW1) on the backplane to conform to the requirements for this installation.</p> <p>Requirement: If SW1 is set to the ST2 position, the SRC ACT lamps on both CI-EA cards are lit. The transfer (XFR) function between the CI-EA cards is disabled.</p>
13	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
14	<p>Indicate completion of the CI-EA Card Test on the Test Sign-off form.</p>



SW1 Settings

Section	Position	Meaning	Factory Setting
1 and 2	Up	Not allowed	—
	Down	Normal	X
3	Up	CRC4 is disabled	X
	Down	CRC4 is enabled	—
4	Up	CAS is disabled	—
	Down	CCS is enabled	X

SW3 Settings

Position	Meaning	Factory Setting
Up	E1 input (2.048 Mb/s)	X
Down	Analog input (2.048 MHz)	—
NOTE: All sections must be set to the same position.		

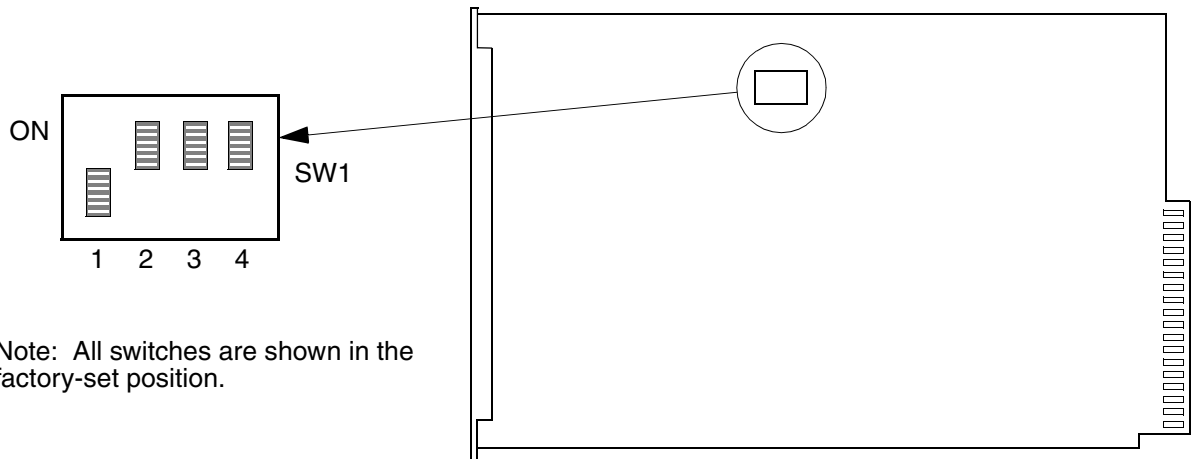
Figure 8. CI-EA Card Switch

Chart 7. CI Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the CI cards. This procedure assumes the input reference signals have been connected per the Installation section of this manual. Consult the local company Installation Job Specifications to determine the type of input card (CI) to be installed in the MRA and MRB slots in the shelf.</p> <p>Note: If installing an CI card in a remote system, contact your local Symmetricom distributor or Symmetricom's CTAC.</p> <p>Test Equipment: None</p>
1	On the master shelf rear panel, set the ST2/ST3 switch (Figure 1) to the ST3 position for this test, regardless of the type of clock card to be installed.
2	Set switch SW1 (Figure 9) on the CI card to conform to the requirements for this installation.
3	If not equipped with a second CI card, skip this step. Repeat the previous step for the second CI card.
4	<p>If the MRA slot is not equipped with a CI card, skip this step. Insert a CI card into the MRA slot.</p> <p>Requirement: On the CI card just installed, the DS1 or CC lamp is lit green, and the FAIL lamp goes off after approximately 8 seconds to 40 seconds. After the card has warmed up, the SRC ACTIVE lamp lights green.</p>
5	<p>If the MRB slot is not equipped with a CI card, skip to Step 13. Insert a CI card into the MRB slot.</p> <p>Requirement: On the CI card just installed, the DS1 or CC lamp is lit green, and the FAIL lamp goes off after approximately 8 seconds to 40 seconds. The SRC ACTIVE lamp remains off.</p>
6	<p>Press the XFR pushbutton on one of the CI cards.</p> <p>Requirement: The lit SRC ACT lamp transfers to the other CI card.</p>
7	<p>Press the XFR pushbutton on the other CI card.</p> <p>Requirement: The lit SRC ACT lamp lights on the original CI card.</p>
8	<p>Remove the CI card with its SRC ACT lamp lit.</p> <p>Requirement: The SRC ACT lamp lights on the other CI card.</p>

Chart 7. CI Card Test (Contd)

STEP	PROCEDURE
9	Reinsert the removed CI card. Requirement: The SRC ACT lamp remains lit on the other CI card.
10	Remove the CI card with its SRC ACT lamp lit. Requirement: The SRC ACT lamp on the original CI card lights.
11	Reinsert the removed CI card. Requirement: The SRC ACT lamp remains lit on the other CI card.
12	Press the XFR pushbutton on either CI card. Requirement: The lit SRC ACT lamp transfers to the other CI card.
13	Set the ST2/ST3 switch (SW1) on the backplane to the appropriate position for this installation. Requirement: If SW1 is set to the ST2 position, the SRC ACT lamps on both CI cards are lit. The transfer (XFR) function between the CI cards is disabled.
14	Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf. Requirement: The response indicates the command was completed successfully.
15	Indicate completion of the CI Card Test on the Test Sign-off form.



SW1 Settings

Section	Position	Meaning	Factory Setting
1	ON	T1 is not the input reference	—
	OFF	T1 is the input reference	X
2	ON	CC is not the reference	X
	OFF	CC is the reference	—
3	ON	D4 framing	X
	OFF	ESF framing	—
4	ON	No bipolar 8-zero substitution	X
	OFF	Bipolar 8-zero substitution	—

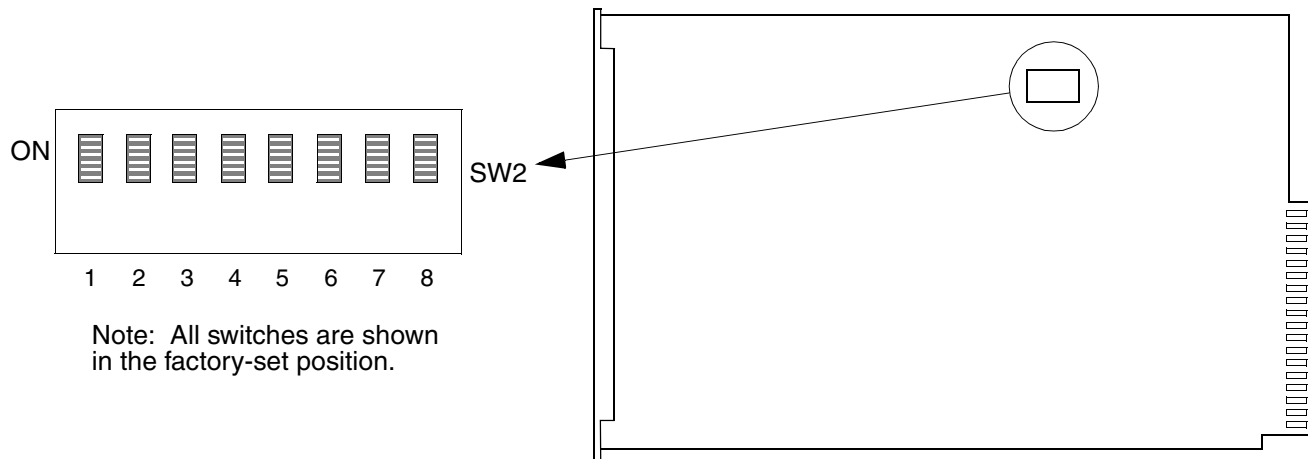
Figure 9. CI Card Switch

Chart 8. DCIM-EA or DCIM-T Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the DCIM-EA or DCIM-T cards. This procedure assumes the input reference signals have been connected per the Installation section of this manual. Consult the local company Installation Job Specifications to determine the type of input card to be installed in the MRA and MRB slots in the shelf.</p> <p>Notes:</p> <ol style="list-style-type: none"> Where information is common to the DCIM-EA and DCIM-T cards, these cards are collectively referred to as DCIM cards. If installing a DCIM card in a remote system, contact your local Symmetricom distributor or Symmetricom's CTAC. <p>Test Equipment: None</p>
1	On the master shelf rear panel, set the ST2/ST3 switch (Figure 1) to the ST3 position for this test, regardless of the type of clock card to be installed.
2	Set switch SW2 (Figure 10 for DCIM-EA, Figure 11 for DCIM-T) on each DCIM card to conform to the requirements for this installation.
3	<p>Insert the first DCIM card into the MR A slot.</p> <p>Requirement: On the DCIM card just installed, the REF 1, REF 2, STATUS 1, and STATUS 2 lamps are lit green, and the FAIL lamp goes off after approximately 1 minute. After the card has warmed up, the SRC ACTIVE lamp lights green.</p>
4	<p>If not equipped with a second DCIM card, skip to Step 14. Insert the second DCIM card into the MR B slot in the master shelf.</p> <p>Requirement: On the DCIM card just installed, the REF 1, REF 2, STATUS 1, and STATUS 2 lamps are lit green, and the FAIL lamp goes off after approximately 1 minute. After the card has warmed up, the SRC ACTIVE lamp lights green.</p>
5	<p>Press the XFR pushbutton on one of the DCIM cards.</p> <p>Requirement: The lit SRC ACTIVE lamp transfers to the other DCIM card.</p>
6	<p>Press the XFR pushbutton on the other DCIM card.</p> <p>Requirement: The lit SRC ACTIVE lamp lights on the original DCIM card.</p>
7	<p>Remove the DCIM card with its SRC ACTIVE lamp lit.</p> <p>Requirement: The SRC ACTIVE lamp lights on the other DCIM card.</p>

Chart 8. DCIM-EA or DCIM-T Card Test (Contd)

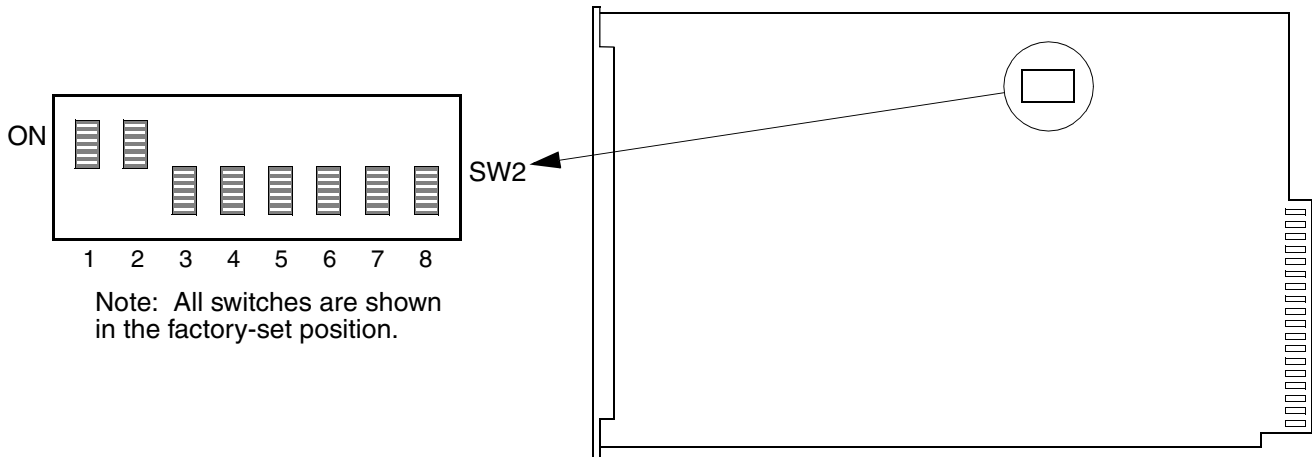
STEP	PROCEDURE
8	<p>Reinsert the removed DCIM card.</p> <p>Requirement: The SRC ACTIVE lamp remains lit on the other DCIM card.</p>
9	<p>Remove the DCIM card with its SRC ACTIVE lamp lit.</p> <p>Requirement: The SRC ACTIVE lamp on the original DCIM card lights.</p>
10	<p>Reinsert the removed DCIM card.</p> <p>Requirement: The SRC ACTIVE lamp remains lit on the other DCIM card.</p>
11	<p>Press the XFR pushbutton on either DCIM card.</p> <p>Requirement: The lit SRC ACTIVE lamp transfers to the other DCIM card.</p>
12	<p>Set the ST2/ST3 switch (SW1) on the backplane to conform to the requirements for this installation.</p> <p>Requirement: If SW1 is set to the ST2 position, the SRC ACTIVE lamps on both DCIM cards are lit. The transfer (XFR) function between the DCIM cards is disabled.</p>
13	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
14	<p>Indicate completion of the DCIM-EA or DCIM-T Card Test on the Test Sign-off form.</p>



SW2 Settings

Section	Position	Meaning	Factory Setting
1	ON	Input Reference 1 Enabled	X
	OFF	Input Reference 1 Disabled	—
2	ON	Input Reference 2 Enabled	X
	OFF	Input Reference 2 Disabled	—
3	ON	Input Reference 1 Digital E1	X
	OFF	Input Reference 1 Analog	—
4	ON	Input Reference 2 Digital E1	X
	OFF	Input Reference 2 Analog	—
5	ON	Input Reference 1 Framing CCS	X
	OFF	Input Reference 1 Framing CAS	—
6	ON	Input Reference 1 Framing without CRC4	X
	OFF	Input Reference 1 Framing with CRC4	—
7	ON	Input Reference 2 Framing CCS	X
	OFF	Input Reference 2 Framing CAS	—
8	ON	Input Reference 2 Framing without CRC4	X
	OFF	Input Reference 2 Framing with CRC4	—

Figure 10. DCIM-EA Card Switch



SW2 Settings

Section	Position	Meaning	Factory Setting
1	ON	Input Reference 1 Enabled	X
	OFF	Input Reference 1 Disabled	—
2	ON	Input Reference 2 Enabled	X
	OFF	Input Reference 2 Disabled	—
3	ON	Not Allowed	—
	OFF	Normal Operation	X
4	ON	Not Allowed	—
	OFF	Normal Operation	X
5	ON	Input Reference 1 Framing D4	—
	OFF	Input Reference 1 Framing ESF	X
6	ON	Not Allowed	—
	OFF	Normal Operation	X
7	ON	Input Reference 2 Framing D4	—
	OFF	Input Reference 2 Framing ESF	X
8	ON	Not Allowed	—
	OFF	Normal Operation	X

Figure 11. DCIM-T Card Switch

Chart 9. ST2E or TNC-E Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of two ST2E or TNC-E cards installed in the same shelf. If the installation is one ST2E or TNC-E and one ST3E or TNC, use the procedure in Chart 13 or Chart 14. This procedure assumes the procedure for the clock input cards has been completed and there are timing supplies connected to the inputs.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. The times indicated in the procedure are from the time the card is powered (inserted in the shelf). 2. If the FAIL lamp lights on an ST2E or TNC-E card at any time, the card has failed and must be replaced. 3. Resistance cannot be measured across certain test points if E2A telemetry equipment is connected to the test points or if an MIS card is installed in the shelf. 4. The HOLDOVER and HOLDOVER RTN terminal set is connected to -48 V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW3) operation. For this reason, resistance cannot be measured across this terminal set. <p>Test Equipment: Digital volt/ohm meter</p>
1	<p>On the rear of the master shelf, set the ST2/ST3 switch (SW1) to the ST2 position (Figure 1).</p> <p>Requirement: Both clock input cards' SRC ACT/SRC ACTIVE lamps are lit.</p>
2	<p>On the ST2E or TNC-E cards, set all sections of SW1 to the OFF (down) position (Figure 12).</p>
3	<p>In the master shelf, insert the first ST2E or TNC-E card into the ST A slot.</p> <p>Requirement: HOLDOVER lamp flashes green during the stabilization period of approximately 60 minutes.</p>
4	<p>In the master shelf, insert the second ST2E or TNC-E card into the ST B slot.</p> <p>Note: No waiting period is necessary between when the first ST2E or TNC-E card and the second ST2E or TNC-E card may be installed.</p> <p>Requirement: HOLDOVER lamp flashes green during the stabilization period of approximately 60 minutes.</p>
5	<p>After the stabilization period, observe the HOLDOVER, SRC A, and SRC B lamps.</p> <p>Requirement: On both ST2E or TNC-E cards, the HOLDOVER lamp goes off, and the SRC A lamp on the ST2E A or TNC-E A card and the SRC B lamp on the ST2E B or TNC-E B card both light green.</p> <p>Note: If an ST2E or TNC-E does not recognize its associated SRC input (ST2E A or TNC-E A, SRC A and ST2E B or TNC-E B, SRC B) both ST2E or TNC-E 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 or TNC-E cards are in holdover mode.</p>

Chart 9. ST2E or TNC-E Card Test (Contd)

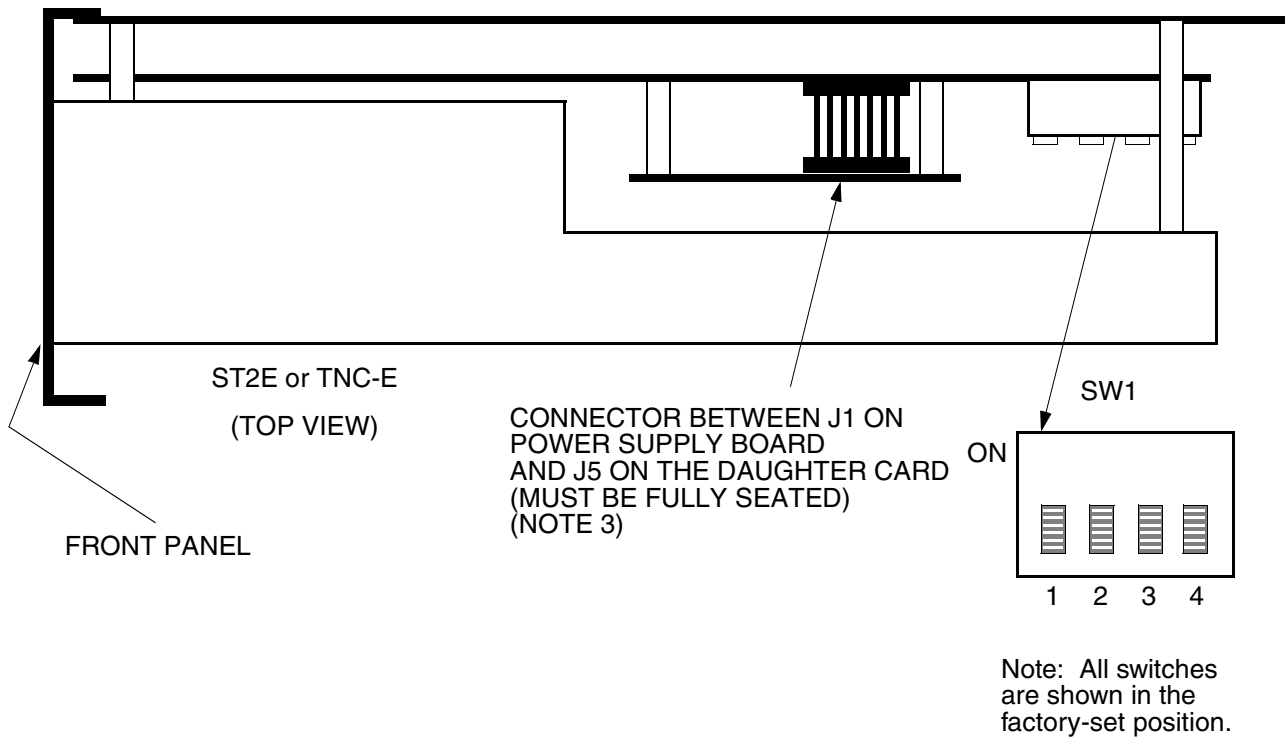
STEP	PROCEDURE															
6	<p>Before the ACTIVE lamps light on the ST2E or TNC-E cards, remove both clock input cards.</p> <p>Requirements: The SRC lamps on the ST2E or TNC-E cards extinguish and the HOLD-OVER lamps light steady green, and the ACTIVE lamps light on both ST2E or TNC-E cards to indicate they are in freerun mode.</p>															
7	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf backplane:</p> <table border="0" data-bbox="302 583 1089 743"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Result</u></th> </tr> </thead> <tbody> <tr> <td>CLOCK STATUS A RTN</td> <td>FREERUN</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS A RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>FREERUN</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Result column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>	CLOCK STATUS A RTN	FREERUN	<0.1 V	CLOCK STATUS A RTN	LOCK	<0.1 V	CLOCK STATUS B RTN	FREERUN	<0.1 V	CLOCK STATUS B RTN	LOCK	<0.1 V
<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>														
CLOCK STATUS A RTN	FREERUN	<0.1 V														
CLOCK STATUS A RTN	LOCK	<0.1 V														
CLOCK STATUS B RTN	FREERUN	<0.1 V														
CLOCK STATUS B RTN	LOCK	<0.1 V														
8	<p>Reinsert both clock input cards.</p> <p>Requirements: On the clock input cards, after the input source is acquired (approximately 8 seconds to 40 seconds for CI/ACI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards), 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 or TNC-E cards.</p>															
9	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf backplane:</p> <table border="0" data-bbox="302 1171 1133 1268"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>CLOCK STATUS A RTN</td> <td>FREERUN</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>FREERUN</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	CLOCK STATUS A RTN	FREERUN	-42 V to -56 V	CLOCK STATUS B RTN	FREERUN	-42 V to -56 V						
<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>														
CLOCK STATUS A RTN	FREERUN	-42 V to -56 V														
CLOCK STATUS B RTN	FREERUN	-42 V to -56 V														
10	<p>In 8 seconds to 40 seconds for ACI or CI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards, observe the LKD lamps on the ST2E or TNC-E cards.</p> <p>Requirement: On both ST2E or TNC-E cards, the LKD lamps light green.</p> <p>Note: This indicates that the ST2E or TNC-E cards are frequency-locked with their input sources.</p>															
11	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf backplane:</p> <table border="0" data-bbox="302 1688 1133 1785"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>CLOCK STATUS A RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	CLOCK STATUS A RTN	LOCK	-42 V to -56 V	CLOCK STATUS B RTN	LOCK	-42 V to -56 V						
<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>														
CLOCK STATUS A RTN	LOCK	-42 V to -56 V														
CLOCK STATUS B RTN	LOCK	-42 V to -56 V														

Chart 9. ST2E or TNC-E Card Test (Contd)

STEP	PROCEDURE									
12	<p>Remove the clock input A card.</p> <p>Requirements: The ACTIVE lamp on the ST2E A or TNC-E 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 clocking from clock input B card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>									
13	<p>Reinsert the clock input A card.</p> <p>Requirements: After the input source is acquired (approximately 8 seconds to 40 seconds for CI/ACI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards), the SRC ACT/SRC ACTIVE lamp lights on the input A card, and the SRC A lamp lights and the SRC B lamps goes off on the ST2E A or TNC-E A card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>									
14	<p>Remove the clock input B card.</p> <p>Requirement: The ACTIVE lamp on the ST2E B or TNC-E 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 clocking from the clock input A card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>									
15	<p>Reinsert the clock input B card.</p> <p>Requirement: After the input source is acquired, the SRC ACT/SRC ACTIVE lamp lights on the clock input B card, and the SRC B lamp lights and the SRC A lamp goes off on the ST2E or TNC-E B card. The LKD lamp may go off, if so, it will relight after approximately 5 minutes.</p>									
16	<p>Remove both clock input cards.</p> <p>Requirement: On both ST2E or TNC-E cards, the SRC and LKD lamps extinguish, the ACTIVE lamps remain lit, and the HOLDOVER lamps light red to indicate they are in holdover mode.</p>									
17	<p>Connect the multimeter set to volts dc across the following terminal sets on the shelf backplane:</p> <table border="0" data-bbox="256 1434 1052 1535"> <thead> <tr> <th data-bbox="345 1434 475 1465"><u>Test Point</u></th> <th data-bbox="716 1434 846 1465"><u>Test Point</u></th> <th data-bbox="948 1434 1052 1465"><u>Reading</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="256 1465 561 1497">CLOCK STATUS A RTN</td> <td data-bbox="683 1465 846 1497">HOLDOVER</td> <td data-bbox="959 1465 1040 1497"><0.1 V</td> </tr> <tr> <td data-bbox="256 1497 561 1528">CLOCK STATUS A RTN</td> <td data-bbox="683 1497 846 1528">HOLDOVER</td> <td data-bbox="959 1497 1040 1528"><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Reading</u>	CLOCK STATUS A RTN	HOLDOVER	<0.1 V	CLOCK STATUS A RTN	HOLDOVER	<0.1 V
<u>Test Point</u>	<u>Test Point</u>	<u>Reading</u>								
CLOCK STATUS A RTN	HOLDOVER	<0.1 V								
CLOCK STATUS A RTN	HOLDOVER	<0.1 V								
18	<p>Reinsert both clock input cards.</p> <p>Requirement: The SRC ACT/SRC ACTIVE lamps light on the clock input cards, the HOLDOVER lamps on both ST2E or TNC-E cards go off, SRC A on the ST2E A or TNC-E A and the SRC B on the ST2E B or TNC-E B lights; then the LKD lamp on the ST2E or TNC-E cards light.</p>									

Chart 9. ST2E or TNC-E Card Test (Contd)

STEP	PROCEDURE									
19	<p>Connect the multimeter set to volts dc across the following terminal sets on the shelf back-plane:</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; border-bottom: 1px solid black;"><u>Test Point</u></th> <th style="text-align: center; border-bottom: 1px solid black;"><u>Test Point</u></th> <th style="text-align: center; border-bottom: 1px solid black;"><u>Reading</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">CLOCK STATUS A RTN</td> <td style="text-align: center;">HOLDOVER</td> <td style="text-align: center;">-42 V to -56 V</td> </tr> <tr> <td style="text-align: center;">CLOCK STATUS A RTN</td> <td style="text-align: center;">HOLDOVER</td> <td style="text-align: center;">-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Reading</u>	CLOCK STATUS A RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS A RTN	HOLDOVER	-42 V to -56 V
<u>Test Point</u>	<u>Test Point</u>	<u>Reading</u>								
CLOCK STATUS A RTN	HOLDOVER	-42 V to -56 V								
CLOCK STATUS A RTN	HOLDOVER	-42 V to -56 V								
20	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>									
21	<p>This procedure is completed. Indicate completion of the ST2E or TNC-E Card Test on the Test Sign-off form.</p>									



Switch SW1 Settings

SECTION	POSITION	MEANING	FACTORY SETTING
2	ON	An ST2E or TNC-E card installed in clock card slot A and an ST3E or TNC card installed in clock card slot B	—
	OFF	Two ST2E or TNC-E cards installed in shelf	X

Notes:

1. When Issue A or B of the ST2E card is installed, do not use the LPR as an input reference source. Issue D (or later) of the ST2E may use an LPR or a network feed as an input reference source.
2. All other sections must be set to OFF (factory setting).
3. Make sure the connector between J1 on the power supply card and J5 on the daughter card is fully seated.

Figure 12. ST2E or TNC-E Card Switch

Chart 10. ST2 Card Test

STEP	PROCEDURE
<p>Use this procedure to verify the operation of the ST2 cards. This procedure assumes the procedure for the clock input cards has been completed and there are clocking supplies connected to the inputs.</p> <p>There are no switch options on the ST2 card.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. The times indicated in the procedure are from the time the card is powered (inserted in the shelf). 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 1 hour. 3. If the FAIL lamp lights on an ST2 card at any time, the card has failed and must be replaced. 4. Resistance cannot be measured across terminal sets if remote telemetry equipment is connected to the terminal sets or if an MIS card is installed in the shelf. 5. The HOLDOVER and RTN status terminal set is connected to -48 V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW3) operation. Therefore, resistance cannot be measured across this terminal set. <p>Test Equipment: Digital volt/ohm meter</p>	
1	<p>On the rear of the master shelf, set the ST2/ST3 switch (SW1) to the ST2 position (Figure 1).</p> <p>Requirement: 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>Note: There is no waiting period between installation of the first ST2 card and the second ST2 card.</p>
4	<p>During the stabilization period (approximately 40 minutes to 60 minutes), observe the FREE RUN lamp on both ST2 cards.</p> <p>Requirement: 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>Requirement: On both ST2 cards, 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>Note: 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.</p> <p>Requirement: 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 10. ST2 Card Test (Contd)

STEP	PROCEDURE															
7	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf back-plane:</p> <table border="0" data-bbox="256 409 1047 567"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>CLOCK STATUS A RTN</td> <td>FREERUN</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS A RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>FREERUN</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	CLOCK STATUS A RTN	FREERUN	<0.1 V	CLOCK STATUS A RTN	LOCK	<0.1 V	CLOCK STATUS B RTN	FREERUN	<0.1 V	CLOCK STATUS B RTN	LOCK	<0.1 V
<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>														
CLOCK STATUS A RTN	FREERUN	<0.1 V														
CLOCK STATUS A RTN	LOCK	<0.1 V														
CLOCK STATUS B RTN	FREERUN	<0.1 V														
CLOCK STATUS B RTN	LOCK	<0.1 V														
8	<p>Reinsert both clock input cards.</p> <p>Requirement: After approximately 8 seconds to 40 seconds (for CI/ACI cards), 1 minute (for DCIM cards), or 2 minutes to 3 minutes (for MRC cards), 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 volts dc scale, across the following terminal sets on the shelf back-plane.</p> <table border="0" data-bbox="256 930 1088 1024"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>CLOCK STATUS A RTN</td> <td>FREERUN</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>FREERUN</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	CLOCK STATUS A RTN	FREERUN	-42 V to -56 V	CLOCK STATUS B RTN	FREERUN	-42 V to -56 V						
<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>														
CLOCK STATUS A RTN	FREERUN	-42 V to -56 V														
CLOCK STATUS B RTN	FREERUN	-42 V to -56 V														
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>Requirement: 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 volts dc scale, across the following terminal sets on the shelf back-plane:</p> <table border="0" data-bbox="256 1388 1088 1482"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>CLOCK STATUS A RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	CLOCK STATUS A RTN	LOCK	-42 V to -56 V	CLOCK STATUS B RTN	LOCK	-42 V to -56 V						
<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>														
CLOCK STATUS A RTN	LOCK	-42 V to -56 V														
CLOCK STATUS B RTN	LOCK	-42 V to -56 V														
12	<p>Press the XFR pushbutton on one of the ST2 cards.</p> <p>Requirement: The lit ACTIVE lamp indication transfers to the other ST2 card, the LOCKED lamps remain lit.</p>															
13	<p>Press the XFR pushbutton on the other ST2 card.</p> <p>Requirement: The lit ACTIVE lamp indication transfers back to the original card, the LOCKED lamps remain lit.</p>															

Chart 10. ST2 Card Test (Contd)

STEP	PROCEDURE
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>Requirement: The ACTIVE lamp on the ST2 A card remains lit, the REF A lamp goes off and the REF B lamp lights to indicate that the card is now receiving clocking 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>Requirement: The ACTIVE lamp on the ST2 B card lights.</p>
16	<p>Reinsert the ST2 A and clock input A cards.</p> <p>Requirement: After the stabilization period (approximately 5 minutes to 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>Remove the ST2 B card.</p> <p>Requirement: The ACTIVE lamp on the ST2 A card lights.</p>
18	<p>Reinsert the ST2 B and clock input B cards.</p> <p>Requirement: After the stabilization period (approximately 5 minutes to 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>
19	<p>Remove both clock input cards.</p> <p>Requirement: 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 10. ST2 Card Test (Contd)

STEP	PROCEDURE						
20	<p>Connect the multimeter, set to volts dc scale (if either an MIS card is installed), across the following terminal sets on the shelf backplane:</p> <table data-bbox="256 411 844 504"> <tr> <td style="text-align: center;"><u>Test Point</u></td> <td style="text-align: center;"><u>Test Point</u></td> </tr> <tr> <td>CLOCK STATUS A RTN</td> <td>HOLDOVER</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>HOLDOVER</td> </tr> </table> <p>Requirement: Both A and B HOLDOVER and HOLDOVER RTN read <0.1 V dc if the MIS card is installed in the shelf.</p>	<u>Test Point</u>	<u>Test Point</u>	CLOCK STATUS A RTN	HOLDOVER	CLOCK STATUS B RTN	HOLDOVER
<u>Test Point</u>	<u>Test Point</u>						
CLOCK STATUS A RTN	HOLDOVER						
CLOCK STATUS B RTN	HOLDOVER						
21	<p>Reinsert both clock input cards.</p> <p>Requirement: 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>						
22	<p>Connect the multimeter, set to volts dc scale, across the following terminal sets on the shelf backplane:</p> <table data-bbox="256 898 844 991"> <tr> <td style="text-align: center;"><u>Test Point</u></td> <td style="text-align: center;"><u>Test Point</u></td> </tr> <tr> <td>CLOCK STATUS A RTN</td> <td>HOLDOVER</td> </tr> <tr> <td>CLOCK STATUS B RTN</td> <td>HOLDOVER</td> </tr> </table> <p>Requirement: Both A and B HOLDOVER and HOLDOVER RTN read -42 V dc to -56 V dc.</p>	<u>Test Point</u>	<u>Test Point</u>	CLOCK STATUS A RTN	HOLDOVER	CLOCK STATUS B RTN	HOLDOVER
<u>Test Point</u>	<u>Test Point</u>						
CLOCK STATUS A RTN	HOLDOVER						
CLOCK STATUS B RTN	HOLDOVER						
23	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>						
24	<p>This procedure is completed. Indicate completion of the ST2 Card Test on the Test Sign-off form.</p>						

Chart 11. ST3E or TNC Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of two 090-40019-01 (ST3E -01) or TNC cards. If the installation includes 090-40019-03 (ST3E -03) cards, perform the procedure in Chart 12. If the installation is one ST2E or TNC-E card and one ST3E or TNC card, use the procedure in Chart 13 or Chart 14.</p> <p>ST3E -01 cards cause major and minor alarms according to the HOLDOVER ALARM switch on the shelf backplane and SW1 on the card. ST3E -03 (090-40019-03) cards cannot cause a minor alarm.</p> <p>Note: Resistance 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 -48 V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW3) operation. Therefore, resistance cannot be measured across this terminal set.</p> <p>Test Equipment: Digital volt/ohm meter</p>
1	On the rear of the master shelf, set the ST3/ST2 switch (SW1) to the ST3 position and the HOLDOVER ALARM switch (SW3) to MAJ (Figure 1).
2	On the ST3E card, set SW1, section 5 ON, all others switches OFF (Figure 13).
3	On the TNC card, ensure that the switches are OFF (Figure 14).
4	Insert the first ST3E or TNC card into the ST A slot in the master shelf.
5	Insert the second ST3E or TNC card into the ST B slot in the master shelf.
6	<p>During the 30 minute (approximately) oscillator stabilization period, observe the FREE RUN lamp on both ST3E or TNC cards.</p> <p>Requirement: On both ST3E or TNC cards, the FREE RUN lamps flash green.</p>
7	<p>After the 30 minute oscillator stabilization period, observe the FREE RUN, REF A, and REF B lamps.</p> <p>Requirement: On both ST3E or TNC cards, the FREE RUN lamps stop flashing and go off. On both ST3E or TNC 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>Note: If an ST3E or TNC card does not recognize an input reference signal, the ST3E or TNC free runs and the FREE RUN lamp lights green (not flashing).</p>
8	<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 or TNC cards.</p> <p>Requirement: On both ST3E or TNC cards, the LOCKED and ACTIVE lamps light green.</p>

Chart 11. ST3E or TNC Card Test (Contd)

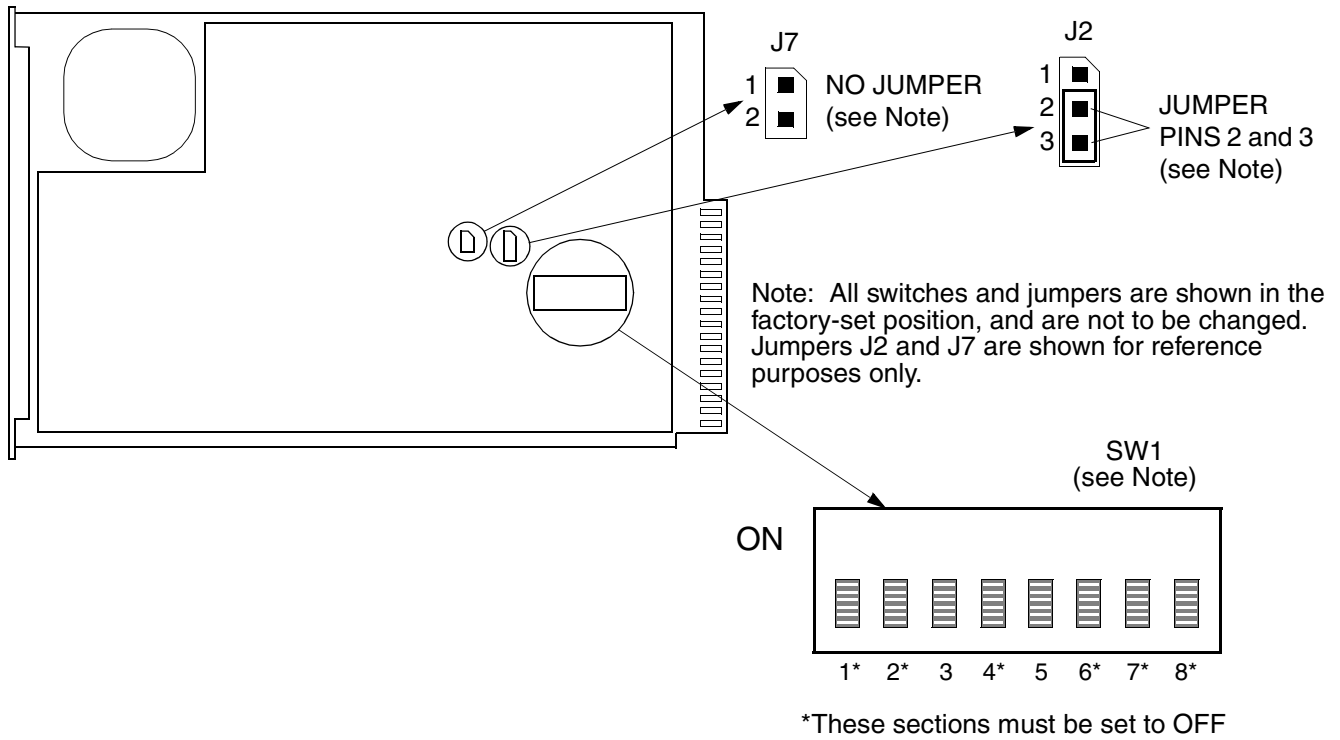
STEP	PROCEDURE
9	<p>Press the transfer (XFR) pushbutton on either clock input card. Observe the SRC ACT/SRC ACTIVE lamps on the clock input cards and the REF and LOCKED lamps on the ST3E or TNC cards.</p> <p>Requirement: The SRC ACT/SRC ACTIVE lamp goes off on one clock input card and lights on the other. The lit REF lamp (REF A or REF B) goes off and the other REF lamp lights on both ST3E or TNC cards. If the clock input cards are off frequency from each other, the LOCKED lamps on the ST3E or TNC cards may go off while converging on the new reference and relight within 5 minutes.</p>
10	<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 or TNC cards.</p> <p>Requirement: 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 or TNC cards. If the clock input cards are off frequency from each other, the LOCKED lamps on the ST3E or TNC cards may go off while converging on the new reference and relight within 5 minutes.</p>
11	<p>If clock input A card SRC ACT/SRC ACTIVE lamp is not lit, press its XFR pushbutton to make it active. Remove the 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 or TNC cards.</p> <p>Requirement: 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 or TNC cards. The LOCKED lamp on one or both ST3E or TNC cards may go off while converging on the new reference and relight after within 5 minutes.</p>
12	<p>Reinsert the clock input A card. When the FAIL lamp goes off on clock input A card (after approximately 8 seconds to 40 seconds for ACI or CI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards), observe the REF lamps (A and B) on both ST3E or TNC cards.</p> <p>Requirement: No change on the lamps.</p>
13	<p>Remove both clock input cards. Observe the lamps on the MIS and both ST3E or TNC cards.</p> <p>Requirement: The MAJOR and MINOR lamps light on the MIS card. On both ST3E or TNC cards, the REF and LOCKED lamps go off, and the HOLD OV lamp lights.</p>

Chart 11. ST3E or TNC Card Test (Contd)

STEP	PROCEDURE																																												
14	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, MAJSI, MINOR AUD, MINOR VIS, and MINSI terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="272 470 1218 821"> <thead> <tr> <th>Type</th> <th>Test Point</th> <th>Test Point</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD NO</td> <td>MINOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS NO</td> <td>MINOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td><10 Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	Type	Test Point	Test Point	Results	OFFICE ALARM	MINOR AUD NO	MINOR AUD C	<10 Ω	OFFICE ALARM	MINOR VIS NO	MINOR VIS C	<10 Ω	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω	SHELF STATUS	MINSI	MINSR	<10 Ω	SHELF STATUS	MAJSI	MAJSR	<10 Ω	CLOCK STATUS A	RTN	HOLDOVER	<0.1 V	CLOCK STATUS A	RTN	LOCK	<0.1 V	CLOCK STATUS B	RTN	HOLDOVER	<0.1 V	CLOCK STATUS B	RTN	LOCK	<0.1 V
Type	Test Point	Test Point	Results																																										
OFFICE ALARM	MINOR AUD NO	MINOR AUD C	<10 Ω																																										
OFFICE ALARM	MINOR VIS NO	MINOR VIS C	<10 Ω																																										
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω																																										
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω																																										
SHELF STATUS	MINSI	MINSR	<10 Ω																																										
SHELF STATUS	MAJSI	MAJSR	<10 Ω																																										
CLOCK STATUS A	RTN	HOLDOVER	<0.1 V																																										
CLOCK STATUS A	RTN	LOCK	<0.1 V																																										
CLOCK STATUS B	RTN	HOLDOVER	<0.1 V																																										
CLOCK STATUS B	RTN	LOCK	<0.1 V																																										
15	<p>Reinsert both clock input cards. Approximately 8 seconds to 40 seconds (for ACI or CI cards), 1 minute (for DCIM cards), or 3 minutes to 5 minutes (for MRC cards) after the FAIL lamps go off, observe the lamps on the MIS and both ST3E or TNC cards.</p> <p>Requirement: On both ST3E or TNC 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 MIS card are off.</p>																																												
16	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, MAJSI, MINOR AUD, MINOR VIS, and MINSI terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="272 1310 1218 1661"> <thead> <tr> <th>Type</th> <th>Test Point</th> <th>Test Point</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD NO</td> <td>MINOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS NO</td> <td>MINOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td>Infinite Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	Type	Test Point	Test Point	Results	OFFICE ALARM	MINOR AUD NO	MINOR AUD C	Infinite Ω	OFFICE ALARM	MINOR VIS NO	MINOR VIS C	Infinite Ω	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω	SHELF STATUS	MINSI	MINSR	Infinite Ω	SHELF STATUS	MAJSI	MAJSR	Infinite Ω	CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS A	RTN	LOCK	-42 V to -56 V	CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS B	RTN	LOCK	-42 V to -56 V
Type	Test Point	Test Point	Results																																										
OFFICE ALARM	MINOR AUD NO	MINOR AUD C	Infinite Ω																																										
OFFICE ALARM	MINOR VIS NO	MINOR VIS C	Infinite Ω																																										
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω																																										
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω																																										
SHELF STATUS	MINSI	MINSR	Infinite Ω																																										
SHELF STATUS	MAJSI	MAJSR	Infinite Ω																																										
CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V																																										
CLOCK STATUS A	RTN	LOCK	-42 V to -56 V																																										
CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V																																										
CLOCK STATUS B	RTN	LOCK	-42 V to -56 V																																										
17	<p>If an ST3E -03 card is being installed, skip to Step 23. On both ST3E cards, set the appropriate switch and section to cause a minor alarm in Holdover mode per Figure 13; on the TNC card, ensure that the switches are set as illustrated in Figure 14. On the shelf backplane, set the HOLDOVER ALARM switch SW3 to MIN.</p>																																												

Chart 11. ST3E or TNC Card Test (Contd)

STEP	PROCEDURE
18	<p>Reinsert both ST3E or TNC cards and wait approximately 35 minutes for the following requirements to be met.</p> <p>Requirement: On both ST3E or TNC cards, the REF A or B lamp lights, depending on which clock input (A or B) card's lamp is lit, and the LOCKED and ACTIVE lamps are lit green.</p>
19	<p>Remove both clock input A and B cards. Observe the lamps on the MIS card and both ST3E or TNC cards.</p> <p>Requirement: On the MIS card, the MINOR lamp lights. On both ST3E or TNC cards, the REF and LOCKED lamps go off, the HOLD OV lamps light, and the ACTIVE lamps remain lit.</p>
20	<p>Reinsert both clock input cards. Approximately 8 seconds to 40 seconds (for ACI or CI cards), 1 minute (for DCIM cards), or 3 minutes to 5 minutes (for MRC cards) after the FAIL lamps go off, observe the lamps on the MIS and both ST3E or TNC cards.</p> <p>Requirement: On both ST3E or TNC 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 MIS is off.</p>
21	<p>Consult the local company Installation Job Specifications as to whether the Holdover mode is to generate a major or minor alarm. If major, remove both ST3E or TNC cards, set the appropriate switch to MAJOR, and reinsert the cards. Set the HOLDOVER ALARM switch (SW3) to MAJ on the shelf backplane. If it is to be set for major alarm, proceed to the next step.</p> <p>Note: Both ST3E or TNC cards and SW3 on the shelf backplane <i>must be set</i> for the same mode, either MAJOR or MINOR alarm, in Holdover mode.</p>
22	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
23	<p>This procedure is completed. Indicate completion of the ST3E or TNC Card Test on the Test Sign-off form.</p>



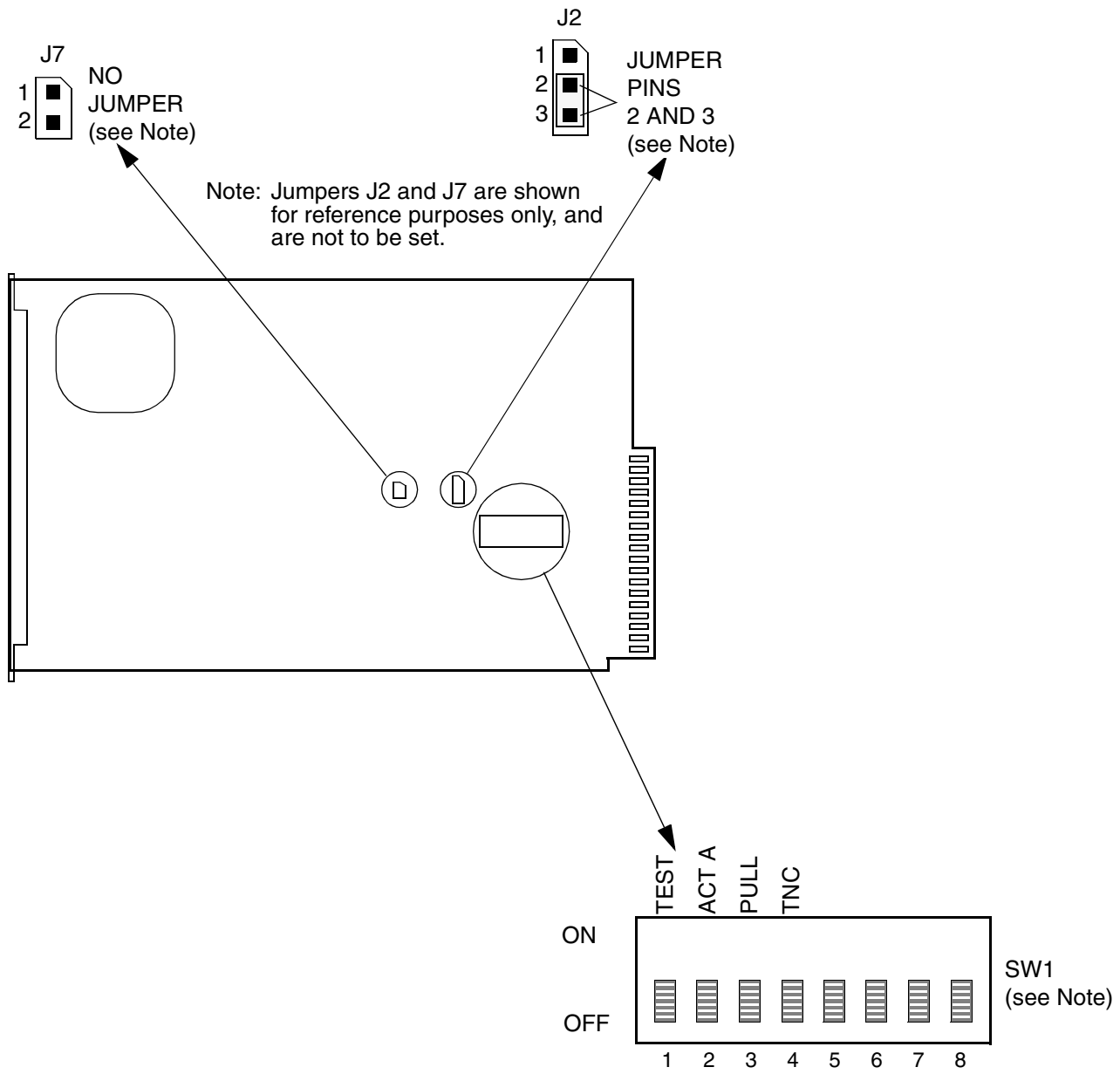
SW1 Switch Settings

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 other than 3 and 5 **must** be set to the OFF position.
- If the clock input reference source to the DCD-519 HD 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 holdover 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 (SW3) on the shelf backplane must be set to the same mode, either MAJOR or MINOR alarm, in Holdover mode (p/n 090-40019-03 always reports a major alarm in Holdover mode).
- Loss of all input references causes the card to go into Holdover mode.

Figure 13. ST3E Card Switch



Note: All switches and jumpers are shown in the factory-set position, and are not to be changed. The switches and jumpers are shown for reference purposes only.

Figure 14. TNC Card Switch

Chart 12. ST3E Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of two 090-40019-03 (ST3E -03) cards. If the installation is one ST2E or TNC-E and one ST3E or TNC, use the procedure in Chart 13 or Chart 14.</p> <p>Notes:</p> <ol style="list-style-type: none"> ST3E -01 cards cause major and minor alarms according to the HOLDOVER ALARM switch on the shelf backplane and SW1 on the card. ST3E -03 cards cannot cause a minor alarm. Resistance cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets or if an MIS card is installed in the shelf. The HOLDOVER and RTN status terminal set is connected to -48 V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW3) operation. Therefore, resistance cannot be measured across this terminal set. <p>Test Equipment: Digital volt/ohm meter</p>
1	On the rear of the master shelf, set the ST3/ST2 switch (SW1) to the ST3 position and the HOLD-OVER ALARM switch (SW3) to MAJ (Figure 1).
2	On the ST3E card, set switch SW1 to conform to the requirements for this installation.
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>Requirement: 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>Requirement: On both ST3E cards, the FREE RUN lamps stop flashing and go off, and the REF A or B lamp lights, depending on which clock input (A or B) card is active.</p> <p>Note: If an ST3E card does not recognize an input reference signal, the ST3E stays in the free run mode 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>Requirement: 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>Requirement: 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; the LOCKED lamps relight within 5 minutes.</p>

Chart 12. 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>Requirement: 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; the LOCKED lamps relight within 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 the 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>Requirement: The 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 within 5 minutes.</p>																																
11	<p>Reinsert the 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>Requirement: No change on the lamps.</p>																																
12	<p>Remove both clock input cards. Observe the lamps on the MIS and both ST3E cards.</p> <p>Requirement: The MAJOR lamp lights on the MIS card. On both ST3E cards, the REF and LOCKED lamps go off, and the HOLD OV lamp lights.</p>																																
13	<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 1). Set the multimeter to resistance scale for MAJOR AUD, MAJOR VIS, and MAJSI terminal sets; set to volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="224 1318 1414 1577"> <thead> <tr> <th>Type</th> <th>Test Point</th> <th>Test Point</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td><10 Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	Type	Test Point	Test Point	Results	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω	SHELF STATUS	MAJSI	MAJSR	<10 Ω	CLOCK STATUS A	RTN	HOLDOVER	<0.1 V	CLOCK STATUS A	RTN	LOCK	<0.1 V	CLOCK STATUS B	RTN	HOLDOVER	<0.1 V	CLOCK STATUS B	RTN	LOCK	<0.1 V
Type	Test Point	Test Point	Results																														
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω																														
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω																														
SHELF STATUS	MAJSI	MAJSR	<10 Ω																														
CLOCK STATUS A	RTN	HOLDOVER	<0.1 V																														
CLOCK STATUS A	RTN	LOCK	<0.1 V																														
CLOCK STATUS B	RTN	HOLDOVER	<0.1 V																														
CLOCK STATUS B	RTN	LOCK	<0.1 V																														
14	<p>Reinsert both clock input cards. Approximately 8 seconds to 40 seconds (for ACI or CI cards), 1 minute (for DCIM cards), or 3 minutes to 5 minutes (for MRC cards) after the FAIL lamps go off, observe the lamps on the MIS and both ST3E cards.</p> <p>Requirement: 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 MIS card are off.</p>																																

Chart 12. ST3E Card Test (Contd)

STEP	PROCEDURE																																
15	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, and MAJS terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="272 472 1307 724"> <thead> <tr> <th><u>Type</u></th> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td>Infinite Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω	SHELF STATUS	MAJSI	MAJSR	Infinite Ω	CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS A	RTN	LOCK	-42 V to -56 V	CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS B	RTN	LOCK	-42 V to -56 V
<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>																														
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω																														
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω																														
SHELF STATUS	MAJSI	MAJSR	Infinite Ω																														
CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V																														
CLOCK STATUS A	RTN	LOCK	-42 V to -56 V																														
CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V																														
CLOCK STATUS B	RTN	LOCK	-42 V to -56 V																														
16	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>																																
17	<p>This procedure is completed. Indicate completion of the ST3E Card Test on the Test Sign-off form.</p>																																

Chart 13. ST2E or TNC-E with ST3E or TNC Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of one ST2E or TNC-E and one quartz-based clock card (ST3E -01 or TNC card). If this combination is not used, skip this chart.</p> <p>090-40019-01 (ST3E -01) cards determine major and minor alarms according to the HOLDOVER ALARM switch on the shelf backplane. 090-40019-03 (ST3E -03) cards cannot cause a minor alarm. Perform the procedure in Chart 14 if using ST3E -03 cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> When Issue A or B of the ST2E card is installed, use only the LPR as an input reference clock. Issue D of the ST2E may use an LPR or network input reference clock. Replace an Issue C of the ST2E card with Issue D. Resistance cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets or if an MIS card is installed in the shelf. The HOLDOVER and RTN status terminal set is connected to -48 V and battery return through relay windings for the hold-over MAJOR/MINOR option switch (SW3) operation. Therefore, resistance cannot be measured across this terminal set. When Issue A of the TNC-E card is installed, use only the LPR as an input reference clock. Issue B of the TNC-E cannot be installed in the same shelf as a quartz clock card. Issue C or later of the TNC-E may use either the DCD-LPR or a network source as a reference input. Replace an Issue B of the TNC-E with Issue C or later TNC-E card. <p>Test Equipment: Digital volt/ohm meter</p>
1	On the rear of the master shelf, set the ST3/ST2 switch (SW1) to the ST3 position and the HOLDOVER ALARM switch (SW3) to MAJ (Figure 1).
2	On the ST3E card, set section 5 of SW1 to the ON position and all other sections OFF (Figure 13); on the TNC card, set all sections of SW1 to the OFF position (Figure 14).
3	On the ST2E or TNC-E card, set SW1, section 2 to the ON position and all other sections OFF (Figure 12).
4	In the master shelf, insert the ST2E or TNC-E card into the ST A slot.
5	In the master shelf, insert the ST3E or TNC card into the ST B slot.
6	<p>During the 30 minute (approximately) oscillator stabilization period (60 minutes for an ST2E or TNC-E), observe the HOLDOVER lamp and the FREE RUN lamp.</p> <p>Requirement: The HOLDOVER and FREE RUN lamps flash green during holdover.</p>

Chart 13. ST2E or TNC-E with ST3E or TNC Card Test (Contd)

STEP	PROCEDURE
7	<p>After the 30 minute oscillator stabilization period (60 minutes for an ST2E or TNC-E), observe the HOLDOVER and SRC A lamps, and the FREE RUN and REF B lamps.</p> <p>Requirement: After the stabilization period for both cards, the HOLDOVER and FREE RUN lamps stop flashing and go off. The SRC A and REF B lamps light, indicating the clock card in slot ST A is receiving an input reference from the clock input card in CI A, and the clock card in slot ST B is receiving an input reference from the clock input card in CI B.</p> <p>Note: If a clock card does not recognize an input reference signal, the clock card free-runs and the HOLDOVER or FREE RUN lamp lights without flashing.</p>
8	<p>Approximately 5 minutes (up to 20 minutes for worst-case signal conditions) after the end of the oscillator stabilization period, observe the LKD, LOCKED, and ACTIVE lamps.</p> <p>Requirement: On both clock cards, the LKD, LOCKED, and ACTIVE lamps light green.</p>
9	<p>Remove the clock input A card.</p> <p>Requirement: SRC ACT or SRC ACTIVE lamp on the clock input B card remains lit. On clock card A, the SRC A lamp goes off and the SRC B lamp lights. On clock card B, the REF lamps do not change (REF B is still on). The LOCKED lamp on one or both clock cards may go off while the clock converges on the new reference. If so, the LOCKED lamp relights within 5 minutes.</p>
10	<p>Reinsert the clock input A card. When the FAIL lamp goes off on the clock input A card, observe the lamps.</p> <p>Requirement: After approximately 8 seconds to 40 seconds for the ACI or CI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards, the SRC ACT or SRC ACTIVE lamp on clock input card A lights. On clock card A, the SRC A lamp lights, and the SRC B lamp goes off. On clock card B, the REF lamps do not change (REF B is still on). The LOCKED lamp on one or both clock cards may go off while the clock converges on the new reference. If so, the LOCKED lamp relights within 5 minutes.</p>
11	<p>Remove the clock input B card.</p> <p>Requirement: The SRC ACT or SRC ACTIVE lamp on the clock input A card remains lit. On clock card A, the SRC lamps do not change (SRC A is still on). On clock card B, the REF A lamp lights and the REF B lamp goes off. The LKD or LOCKED lamps may go off while the clock converges on the new reference. If so, the lamp relights within 5 minutes.</p>
12	<p>Reinsert the clock input B card. When the FAIL lamp goes off on the clock input B card, observe the lamps.</p> <p>Requirement: After approximately 8 seconds to 40 seconds for ACI/CI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards, the SRC ACT or SRC ACTIVE lamp on the clock input card A lights. On clock card A, the SRC lamps do not change (SRC A is still on). On clock card B, the REF A lamp goes off and the REF A lamp lights. The LOCKED lamp on one or both clock cards may go off while the clock converges on the new reference. If so, the LOCKED lamp relights within 5 minutes.</p>

Chart 13. ST2E or TNC-E with ST3E or TNC Card Test (Contd)

STEP	PROCEDURE																																															
13	<p>Remove both clock input cards. Observe the lamps on the MIS and both clock cards.</p> <p>Requirement: On the MIS card, the MINOR lamp lights. On the clock cards, the SRC, LKD, REF, and LOCKED lamps go off, and the HOLDOVER and HOLD OV lamps light red.</p>																																															
14	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, MAJSI, MINOR AUD, MINOR VIS, and MINSI terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="212 621 1422 968"> <thead> <tr> <th>Type</th> <th>Test Point</th> <th>Test Point</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD NO</td> <td>MINOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS NO</td> <td>MINOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td><10 Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>				Type	Test Point	Test Point	Results	OFFICE ALARM	MINOR AUD NO	MINOR AUD C	<10 Ω	OFFICE ALARM	MINOR VIS NO	MINOR VIS C	<10 Ω	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω	SHELF STATUS	MINSI	MINSR	<10 Ω	SHELF STATUS	MAJSI	MAJSR	<10 Ω	CLOCK STATUS A	RTN	HOLDOVER	<0.1 V	CLOCK STATUS A	RTN	LOCK	<0.1 V	CLOCK STATUS B	RTN	HOLDOVER	<0.1 V	CLOCK STATUS B	RTN	LOCK	<0.1 V
Type	Test Point	Test Point	Results																																													
OFFICE ALARM	MINOR AUD NO	MINOR AUD C	<10 Ω																																													
OFFICE ALARM	MINOR VIS NO	MINOR VIS C	<10 Ω																																													
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω																																													
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω																																													
SHELF STATUS	MINSI	MINSR	<10 Ω																																													
SHELF STATUS	MAJSI	MAJSR	<10 Ω																																													
CLOCK STATUS A	RTN	HOLDOVER	<0.1 V																																													
CLOCK STATUS A	RTN	LOCK	<0.1 V																																													
CLOCK STATUS B	RTN	HOLDOVER	<0.1 V																																													
CLOCK STATUS B	RTN	LOCK	<0.1 V																																													
15	<p>Reinsert both clock input cards. After the FAIL lamps go off, observe the lamps on the MIS and both clock cards after approximately 5 minutes.</p> <p>Requirement: The SRC A lamp on clock card A lights and the REF B lamp on clock card B lights. On both clock input cards, the SRC ACT/SRC ACTIVE lamp lights. On each clock card, the LOCKED and ACTIVE lamps are lit, and the HOLD OV lamp is off. The MAJOR and MINOR lamps on the MIS card are off.</p>																																															
16	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, MAJSI, MINOR AUD, MINOR VIS, and MINSI terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="212 1461 1422 1808"> <thead> <tr> <th>Type</th> <th>Test Point</th> <th>Test Point</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD NO</td> <td>MINOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS NO</td> <td>MINOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td>Infinite Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>				Type	Test Point	Test Point	Results	OFFICE ALARM	MINOR AUD NO	MINOR AUD C	Infinite Ω	OFFICE ALARM	MINOR VIS NO	MINOR VIS C	Infinite Ω	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω	SHELF STATUS	MINSI	MINSR	Infinite Ω	SHELF STATUS	MAJSI	MAJSR	Infinite Ω	CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS A	RTN	LOCK	-42 V to -56 V	CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS B	RTN	LOCK	-42 V to -56 V
Type	Test Point	Test Point	Results																																													
OFFICE ALARM	MINOR AUD NO	MINOR AUD C	Infinite Ω																																													
OFFICE ALARM	MINOR VIS NO	MINOR VIS C	Infinite Ω																																													
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω																																													
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω																																													
SHELF STATUS	MINSI	MINSR	Infinite Ω																																													
SHELF STATUS	MAJSI	MAJSR	Infinite Ω																																													
CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V																																													
CLOCK STATUS A	RTN	LOCK	-42 V to -56 V																																													
CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V																																													
CLOCK STATUS B	RTN	LOCK	-42 V to -56 V																																													

Chart 13. ST2E or TNC-E with ST3E or TNC Card Test (Contd)

STEP	PROCEDURE
17	On the ST3E cards, set the appropriate switch and section to cause a minor alarm in Holdover mode per Figure 13.
18	On the shelf backplane, set the HOLDOVER ALARM switch SW3 to MIN.
19	<p>Remove both clock input cards. Observe the lamps on the MIS and both clock cards.</p> <p>Requirement: On the MIS card, the MINOR lamp lights. On the clock cards, the SRC, LKD, REF, and LOCKED lamps go off, and the HOLDOVER and HOLD OV lamps light red.</p>
20	<p>Reinsert both clock input cards. After the FAIL lamps go off, observe the lamps on the clock input cards, clock cards, and MIS card after about 5 minutes.</p> <p>Requirement: On the clock input cards, the SRC ACT/SRC ACTIVE lamp is lit. On clock card A, the SRC A and LKD lamps are lit. On clock card B, the REF B and LOCKED lamps are lit. The HOLDOVER (clock card A) and HOLD OV (clock card B) lamps are off. On the MIS card, the MINOR lamp is off.</p>
21	<p>If the Holdover mode is to generate a minor alarm, continue to the next step. Remove the ST3E card, set the appropriate switch to MAJOR and reinsert the card. On the shelf backplane, set the HOLDOVER ALARM switch (SW3) to MAJ.</p> <p>Note: The switch on the ST3E card and SW3 on the shelf backplane <i>must be set</i> for the same mode, either MAJOR or MINOR alarm.</p>
22	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
23	This procedure is completed. Indicate completion of the ST3E or TNC with ST2E or TNC-E Card Test on the Test Sign-off form.

Chart 14. ST2E or TNC-E with ST3E Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of one ST2E or TNC-E and one 090-40019-03 (ST3E -03) clock card. If this combination is not used, skip this chart.</p> <p>ST3E -03 cards cannot cause a minor alarm. Perform the procedure in Chart 13 if using ST3E -01 or TNC cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> When Issue A or B of the ST2E card is installed, use only the LPR as an input reference clock. Issue D of the ST2E may use an LPR or network input reference clock. Replace an Issue C of the ST2E card with Issue D. Resistance cannot be measured across terminal sets if office alarm system and remote telemetry equipment are connected to the terminal sets or if an MIS card is installed in the shelf. The HOLDOVER and RTN status terminal set is connected to -48 V and battery return through relay windings for the holdover MAJOR/MINOR option switch (SW3) operation. Therefore, resistance cannot be measured across this terminal set. <p>Test Equipment: Digital volt/ohm meter</p>
1	On the rear of the master shelf, set the ST3/ST2 switch (SW1) to the ST3 position and the HOLD-OVER ALARM switch (SW3) to MAJ (Figure 1).
2	On the ST3E card, set the appropriate switch and section to cause a major alarm in Holdover mode per Figure 13.
3	On the ST2E or TNC-E card, set SW1, section 2 to the ON (up) position (Figure 12).
4	In the master shelf, insert the ST2E or TNC-E card into the ST A slot.
5	In the master shelf, insert the ST3E card into the ST B slot.
6	<p>During the 30 minute (approximately) oscillator stabilization period (60 minutes for an ST2E or TNC-E), observe the HOLDOVER lamp and the FREE RUN lamp.</p> <p>Requirement: The HOLDOVER and FREE RUN lamps flash green during holdover.</p>
7	<p>After the 30 minute oscillator stabilization period (60 minutes for an ST2E or TNC-E), observe the HOLDOVER and SRC A lamps, and the FREE RUN and REF B lamps.</p> <p>Requirement: After the stabilization period for both cards, the HOLDOVER and FREE RUN lamps stop flashing and go off. The SRC A and REF B lamps light, indicating the clock card in slot ST A is receiving an input reference from the clock input card in CI A, and the clock card in slot ST B is receiving an input reference from the clock input card in CI B.</p> <p>Note: If a clock card does not recognize an input reference signal, the clock card free-runs and the HOLDOVER or FREE RUN lamp lights without flashing.</p>

Chart 14. ST2E or TNC-E with ST3E Card Test (Contd)

STEP	PROCEDURE
8	<p>Approximately 5 minutes (up to 20 minutes for worst-case signal conditions) after the end of the oscillator stabilization period, observe the LKD, LOCKED, and ACTIVE lamps.</p> <p>Requirement: On both clock cards, the LKD, LOCKED, and ACTIVE lamps light green.</p>
9	<p>Remove the clock input A card.</p> <p>Requirement: SRC ACT or SRC ACTIVE lamp on the clock input B card remains lit. On clock card A, the SRC A lamp goes off and the SRC B lamp lights. On clock card B, the REF lamps do not change (REF B is still on). The LOCKED lamp on one or both clock cards may go off while the clock converges on the new reference. If so, the LOCKED lamp relights within 5 minutes.</p>
10	<p>Reinsert the clock input A card. When the FAIL lamp goes off on the clock input A card, observe the lamps.</p> <p>Requirement: After approximately 8 seconds to 40 seconds for ACI/CI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards, the SRC ACT or SRC ACTIVE lamp on clock input card A lights. On clock card A, the SRC A lamp lights, and the SRC B lamp goes off. On clock card B, the REF lamps do not change (REF B is still on). The LOCKED lamp on one or both clock cards may go off while the clock converges on the new reference. If so, the LOCKED lamp relights within 5 minutes.</p>
11	<p>Remove the clock input B card.</p> <p>Requirement: SRC ACT or SRC ACTIVE lamp on the clock input A card remains lit. On clock card A, the SRC lamps do not change (SRC A is still on). On clock card B, the REF A lamp lights and the REF B lamp goes off. The LKD or LOCKED lamps may go off while the clock converges on the new reference. If so, the lamp relights within 5 minutes.</p>
12	<p>Reinsert the clock input B card. When the FAIL lamp goes off on the clock input B card, observe the lamps.</p> <p>Requirement: After approximately 8 seconds to 40 seconds for ACI/CI cards, 1 minute for DCIM cards, or 3 minutes to 5 minutes for MRC cards, the SRC ACT or SRC ACTIVE lamp on clock input card A lights. On clock card A, the SRC lamps do not change (SRC A is still on). On clock card B, the REF A lamp goes off and the REF A lamp lights. The LOCKED lamp on one or both clock cards may go off while the clock converges on the new reference. If so, the LOCKED lamp relights within 5 minutes.</p>

Chart 14. ST2E or TNC-E with ST3E Card Test (Contd)

STEP	PROCEDURE																																												
13	<p>Remove both clock input cards. Observe the lamps on the MIS and both clock cards.</p> <p>Requirement: On the MIS card, the MINOR lamp lights. On the clock cards, the SRC, LKD, REF, and LOCKED lamps go off, and the HOLDOVER and HOLD OV lamps light red.</p>																																												
14	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, MAJSI, MINOR AUD, MINOR VIS, and MINSI terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="224 619 1218 976"> <thead> <tr> <th><u>Type</u></th> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD NO</td> <td>MINOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS NO</td> <td>MINOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td><10 Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td><10 Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td><10 Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td><0.1 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td><0.1 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	OFFICE ALARM	MINOR AUD NO	MINOR AUD C	<10 Ω	OFFICE ALARM	MINOR VIS NO	MINOR VIS C	<10 Ω	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω	SHELF STATUS	MINSI	MINSR	<10 Ω	SHELF STATUS	MAJSI	MAJSR	<10 Ω	CLOCK STATUS A	RTN	HOLDOVER	<0.1 V	CLOCK STATUS A	RTN	LOCK	<0.1 V	CLOCK STATUS B	RTN	HOLDOVER	<0.1 V	CLOCK STATUS B	RTN	LOCK	<0.1 V
<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>																																										
OFFICE ALARM	MINOR AUD NO	MINOR AUD C	<10 Ω																																										
OFFICE ALARM	MINOR VIS NO	MINOR VIS C	<10 Ω																																										
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	<10 Ω																																										
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	<10 Ω																																										
SHELF STATUS	MINSI	MINSR	<10 Ω																																										
SHELF STATUS	MAJSI	MAJSR	<10 Ω																																										
CLOCK STATUS A	RTN	HOLDOVER	<0.1 V																																										
CLOCK STATUS A	RTN	LOCK	<0.1 V																																										
CLOCK STATUS B	RTN	HOLDOVER	<0.1 V																																										
CLOCK STATUS B	RTN	LOCK	<0.1 V																																										
15	<p>Reinsert both clock input cards. After the FAIL lamps go off, observe the lamps on the MIS and both clock cards after approximately 5 minutes.</p> <p>Requirement: The SRC A lamp on clock card A lights. The REF B lamp on clock card B lights. On both clock input cards, the SRC ACT/SRC ACTIVE lamp lights. On each clock card, the LOCKED and ACTIVE lamps are lit, and the HOLD OV lamp is off. The MAJOR and MINOR lamps on the MIS card are off.</p>																																												

Chart 14. ST2E or TNC-E with ST3E Card Test (Contd)

STEP	PROCEDURE																																												
16	<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 1). Set the multimeter to the resistance scale for MAJOR AUD, MAJOR VIS, MAJSI, MINOR AUD, MINOR VIS, and MINSI terminal sets; set to the volts dc scale for Clock Status A and B HOLDOVER and LOCK terminal sets.</p> <table border="1" data-bbox="272 470 1305 821"> <thead> <tr> <th><u>Type</u></th> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Results</u></th> </tr> </thead> <tbody> <tr> <td>OFFICE ALARM</td> <td>MINOR AUD NO</td> <td>MINOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MINOR VIS NO</td> <td>MINOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR AUD NO</td> <td>MAJOR AUD C</td> <td>Infinite Ω</td> </tr> <tr> <td>OFFICE ALARM</td> <td>MAJOR VIS NO</td> <td>MAJOR VIS C</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MINSI</td> <td>MINSR</td> <td>Infinite Ω</td> </tr> <tr> <td>SHELF STATUS</td> <td>MAJSI</td> <td>MAJSR</td> <td>Infinite Ω</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS A</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>HOLDOVER</td> <td>-42 V to -56 V</td> </tr> <tr> <td>CLOCK STATUS B</td> <td>RTN</td> <td>LOCK</td> <td>-42 V to -56 V</td> </tr> </tbody> </table> <p>Requirement: The multimeter indicates the readings shown in the Results column.</p>	<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>	OFFICE ALARM	MINOR AUD NO	MINOR AUD C	Infinite Ω	OFFICE ALARM	MINOR VIS NO	MINOR VIS C	Infinite Ω	OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω	OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω	SHELF STATUS	MINSI	MINSR	Infinite Ω	SHELF STATUS	MAJSI	MAJSR	Infinite Ω	CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS A	RTN	LOCK	-42 V to -56 V	CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V	CLOCK STATUS B	RTN	LOCK	-42 V to -56 V
<u>Type</u>	<u>Test Point</u>	<u>Test Point</u>	<u>Results</u>																																										
OFFICE ALARM	MINOR AUD NO	MINOR AUD C	Infinite Ω																																										
OFFICE ALARM	MINOR VIS NO	MINOR VIS C	Infinite Ω																																										
OFFICE ALARM	MAJOR AUD NO	MAJOR AUD C	Infinite Ω																																										
OFFICE ALARM	MAJOR VIS NO	MAJOR VIS C	Infinite Ω																																										
SHELF STATUS	MINSI	MINSR	Infinite Ω																																										
SHELF STATUS	MAJSI	MAJSR	Infinite Ω																																										
CLOCK STATUS A	RTN	HOLDOVER	-42 V to -56 V																																										
CLOCK STATUS A	RTN	LOCK	-42 V to -56 V																																										
CLOCK STATUS B	RTN	HOLDOVER	-42 V to -56 V																																										
CLOCK STATUS B	RTN	LOCK	-42 V to -56 V																																										
17	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>																																												
18	<p>This procedure is completed. Indicate completion of the ST3E or TNC with ST2E or TNC-E Card Test on the Test Sign-off form, then proceed to the next chart.</p>																																												

Table G. Wire-Wrap Output Connections

WIRE-WRAP LEADS (Note 1):		TOCA, TOEA, TOGA, TOTA, TOTA-5, TOTA-M, TOTL		TOLA (RS-422) (Note 2)		TOLA (RS-423) (Note 3)		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-	1 2 —	D1 D2 —	N/A	N/A
2	T R S	2	T R S	N/A	N/A	1 2 —	C1 C2 —	N/A	N/A
3	T R S	3	T R S	2	D+ D-	3 4 —	D3 D4 —	2 (Note 4)	T S —
4	T R S	4	T R S	N/A	N/A	3 4 —	C3 C4 —	N/A	N/A
5	T R S	5	T R S	3	D+ D-	5 6 —	D5 D6 —	N/A	N/A
6	T R S	6	T R S	N/A	N/A	5 6 —	C5 C6 —	N/A	N/A
7	T R S	7	T R S	4	D+ D-	7 8 —	D7 D8 —	N/A	N/A
8	T R S	8	T R S	N/A	N/A	7 8 —	C7 C8 —	1 (Note 4)	T S —
9	T R S	9	T R S	5	D+ D-	9 10 —	D9 D10 —	N/A	N/A
10	T R S	10	T R S	N/A	N/A	— 9 and 10 —	TP1 C9 and C10 —	N/A	N/A

Legend: T=Tip R=Ring C=Digital Ground S=Shield Ground (Note 2) D+=Data, +422 D- =Data, -422 D=Data, 423

1. 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. Use 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.
2. 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.
3. For TOLA RS-423 operation, two outputs are derived from each RS-422 driver. One output across T (Dn) and T (Cn) leads, and the other output is across R (D-) and R (Cn) leads (e.g., D2 and C2 are output 2, D1 and C1 are output 1).
4. When using TOAA, connect the shield lead of the coax cable to the Ring (R) pin of the wire-wrap module.
5. 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 H. DB9 Output Connections

DB9 CONNECTOR		TOCA, TOEA, TOGA, TOTA, TOTA-5, TOTA-M		TOLA (RS-422)		TOLA (RS-423)		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	— — —	9 and 10 — —	C9, C10 — —	N/A	N/A
	4 3 1	2	T R S		D+ D- S	9 10 —	D9 D10 —	N/A	N/A
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	7 8 —	D7 D8 —	N/A	N/A
J4	9 5 1	5	T R S	3	— — —	5 6 —	C5 C6 —	N/A	N/A
	4 3 1	6	T R S		D+ D- S	5 6 —	D5 D6 —	N/A	N/A
J5	9 5 1	7	T R S	2	— — —	3 4 —	C3 C4 —	N/A	N/A
	4 3 1	8	T R S		D+ D- S	3 4 —	D3 D4 —	1	T S —
J6	9 5 1	9	T R S	1	— — —	1 2 —	C1 C2 —	N/A	N/A
	4 3 1	10	T R S		D+ D- S	1 2 —	D1 D2 —	N/A	N/A

Legend: T=Tip R=Ring C=Digital Ground S=Shield Ground (Note) D+=Data, +422 D-=Data, -422 D=Data, 423
 Note: 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 I. Wire-Wrap Output Connections (RS-232)
for TOLA-03 Only**

WIRE-WRAP LEADS		TIMING PORT	LEAD
OUTPUT	PIN		
1	T R S	1	CLOCK GND —
2	T R S	—	—
3	T R S	2	CLOCK GND —
4	T R S	—	—
5	T R S	3	CLOCK GND —
6	T R S	1	CLOCK GND —

**Table I. Wire-Wrap Output Connections (RS-232)
for TOLA-03 Only (Contd)**

WIRE-WRAP LEADS		TIMING PORT	LEAD
OUTPUT	PIN		
7	T R S	—	—
8	T R S	2	CLOCK GND —
9	T R S	—	—
10	T R S	3	TEST GND —

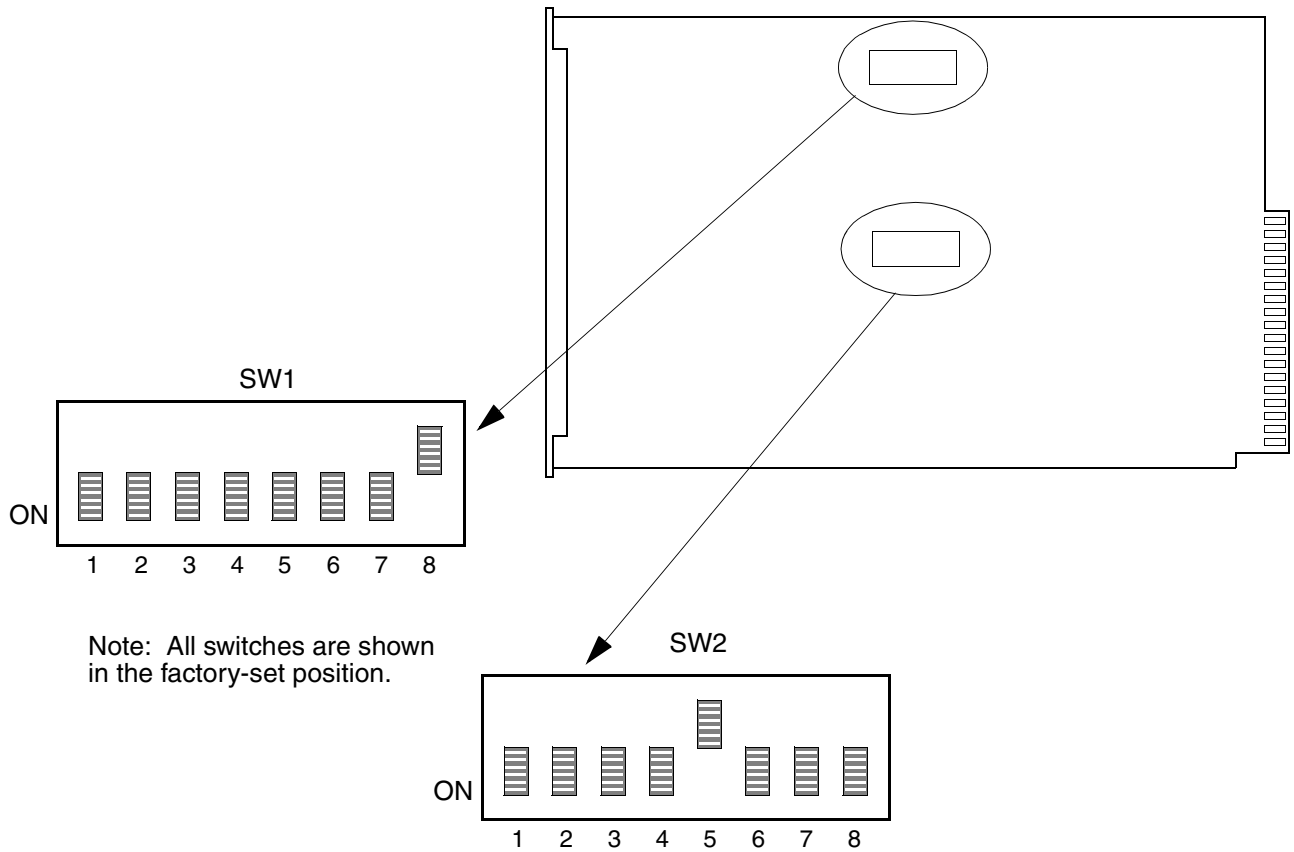
Note: When connecting the TOLA-03 output ports to NEs for external timing reference, the Tip (T) terminal is the clock lead, and the Ring (R) terminal is the ground lead of the interface panel. The Shield (S) terminal is not used. The output ports are on T and R terminal sets 1, 3, 5, 7, and 9.

Chart 15. EA10, EA20, EA10M, or EA20M Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of an EA10, EA20, EA10M, or EA20M card.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Where information is common to the EA10, EA20, EA10M, and EA20M cards, these cards are collectively referred to as EA cards. 2. Depending upon the card option settings, the EA card may output digital or analog waveforms on any of its outputs. 3. When installing a redundant pair of EA cards, both cards must have the same part number, and both cards must be configured identically to ensure optimum output switching protection. 4. Install one card of a redundant pair of EA cards in an odd-numbered slot, and the other card in the even-numbered slot immediately to the right. 5. When installing a redundant pair of EA10 or EA10M cards, be sure a double-wide output module on the appropriate connectors of the output panel has been installed according to the Installation section of this manual. 6. When installing a redundant pair of EA20 or EA20M cards, install two single-wide output modules on the appropriate connectors of the output panel, according to the Installation section of this manual. 7. The timing outputs must be disconnected during this test. 8. Because the EA card may be set as part of a redundant pair or as a stand-alone unit, the pulse amplitude may vary slightly when cards are initially installed and coming into service. Depending on the type of test set used (i.e., HP 377722A, Digital Telecom Analyzer), in some cases, the test set may indicate a false loss of signal (LOS), or framing errors, etc. <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	<p>Set section 8 of SW1 on each EA card to the OFF position for the purposes of this procedure, and set the other sections of SW1 and SW2 to conform to the requirements for this installation according to the Installation Job Specifications (Figure 15 and Table J).</p>
2	<p>Insert all EA cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> • The installed card performs a lamp test lasting up to 20 seconds. • The FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock input or clock card is active, replace the EA card.) • The INP A, INP B, ST A, and ST B lamps light green, indicating the EA cards are receiving reference signals from the active clock input cards and clock cards. (If the INP and ST lamps associated with active cards do not light, retest the clock input cards and the clock cards.) • The option lamps (CCS, CAS, and CRC4) light according to the options selected in Step 1. • The ACTV lamp lights green, indicating the card is providing outputs.

Chart 15. EA10, EA20, EA10M, or EA20M Card Test (Contd)

STEP	PROCEDURE
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope. Table C lists the oscilloscope settings. Figure 16 shows the digital waveform and Figure 17 shows the analog waveform for the EA card.</p> <p>Requirement: The output waveforms must be as shown in Figure 16 and Figure 17.</p>
4	If no redundant pair of cards are installed in the system, go to Step 7. Remove the left card from each redundant pair and repeat Step 3 at the output of each redundant card pair.
5	Replace the left card in each redundant pair. Remove the right card from each redundant pair and repeat Step 3 at the output of each redundant pair.
6	Replace the right card in each redundant pair.
7	If section 8 of SW1 is set to conform to this installation, skip this step. Remove the EA cards, set section 8 of SW1 to the ON position, and replace the cards.
8	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
9	This procedure is completed. Indicate completion of the EA10, EA20, EA10M, or EA20M Card Test on the Test Sign-off form.



Notes:

1. Refer to Table J for SW1 and SW2 switch settings.
2. Jumpers (not shown) must be left as set by the factory (J2 is closed. J3, J4, and J5 are open.)

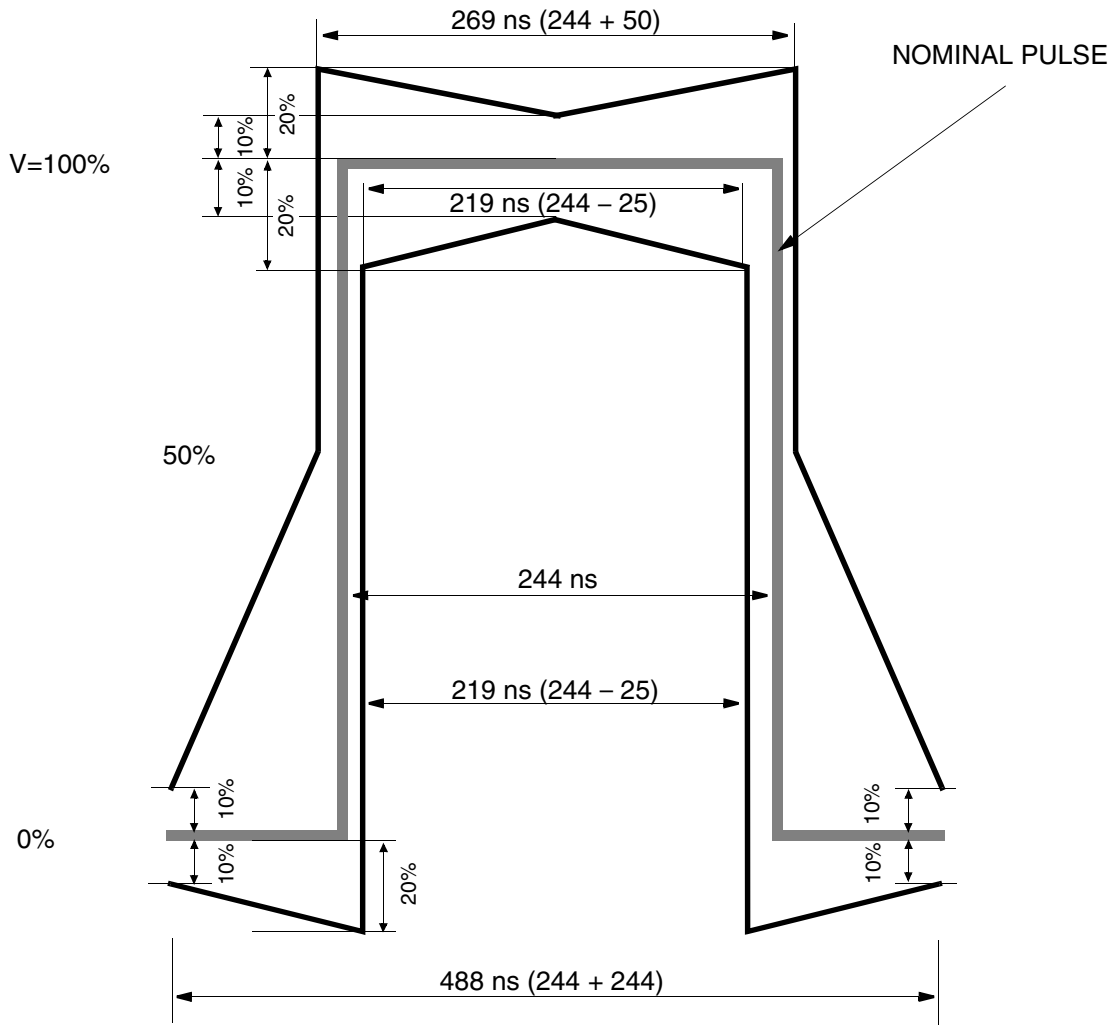
Figure 15. EA10, EA20, EA10M, and EA20M Card Switches

Table J. EA10, EA20, EA10M, and EA20M Switch Settings

SECTION	POSITION	MEANING	FACTORY SETTING
SW1 SETTINGS			
Note: If set for E1 output, only one framing format per card is permitted.			
1	OFF	CAS framing	—
	ON	CCS framing	X
2	OFF	CRC-4 Multiframe disabled	—
	ON	CRC-4 Multiframe enabled	X
3	OFF	MINOR alarm initiated upon PORT ALM	X
	ON	MAJOR alarm initiated upon PORT ALM	—
4	OFF	All outputs are squelched upon card failure	X
	ON	Caution: If any port on the card is set for analog output, set SW1 section 4 to the OFF position. AIS is sent on all ports upon card failure	—
5	OFF	Card set for 1+1 outputs (the outputs of both cards of the pair are enabled) (section 5 of SW2 must be set to OFF)	X
	ON	Card set for 1:1 operation (the outputs of one card of the pair are enabled) (section 5 of SW2 must be set to OFF)	—
6	OFF	For factory use only; must be set to OFF	X
7	OFF	Does not revert back to input signal when it becomes available	X
	ON	Reverts back to input signal when it becomes available Caution: Use of revertive switching may result in phase offsets between cards.	—
8	OFF	Upon power-up, the outputs are enabled, and the card operates using switch settings (if configured properly). Configuration can be changed by TL1 commands.	X
	ON	Upon power-up, the outputs are disabled. If replacing a card, the switch settings on the new card will be overridden by the MIS card. Configuration can be changed by TL1 commands.	—
SW2 SETTINGS			
1	OFF	Output ports 1 through 5 designated for Analog signal	—
	ON	Output ports 1 through 5 designated for E1 signal	X
2	OFF	Output ports 6 through 10 designated for Analog signal	—
	ON	Output ports 6 through 10 designated for E1 signal	X
3 (Note)	OFF	(EA20 and EA20M only) Output ports 11 through 15 designated for Analog signal	—
	ON	(EA20 and EA20M only) Output ports 11 through 15 designated for E1 signal	X

Table J. EA10, EA20, EA10M, and EA20M Switch Settings (Contd)

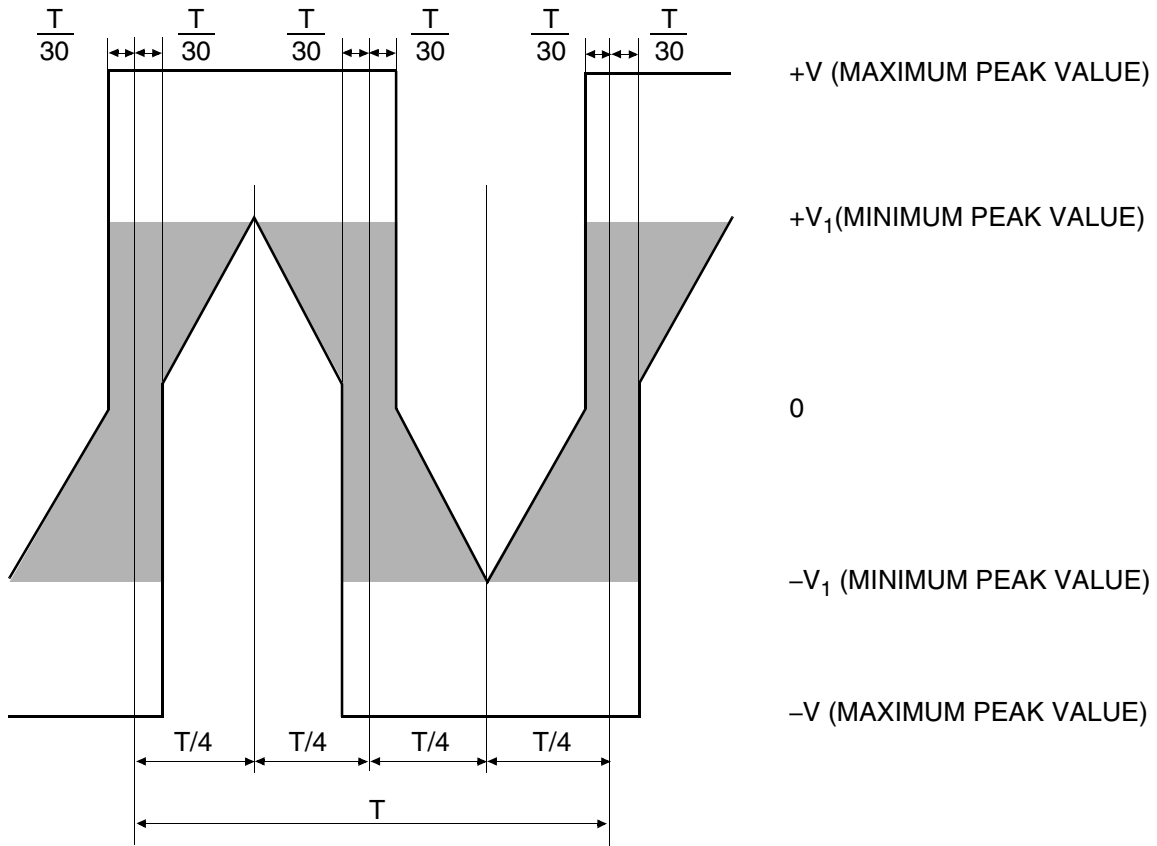
SECTION	POSITION	MEANING	FACTORY SETTING
4 (Note)	OFF	(EA20 and EA20M only) Output ports 16 through 20 designated for Analog signal	—
	ON	(EA20 and EA20M only) Output ports 16 through 20 designated for E1 signal	X
5	OFF	Card set for redundant-pair operation (according to section 5 of SW1)	X
	ON	Card set for stand-alone operation	—
6 through 8	ON	Reserved; must be set to ON	X
Note: For EA10 and EA10M cards, set sections 3 and 4 to ON.			



Output Impedance & Levels

Specification	Unbalanced	Balanced
Test Load Impedance	75 Ω resistive	120 Ω resistive
Nominal Peak Voltage of a Mark (Pulse)	2.37 V	3 V
Nominal Peak Voltage of a Space (No Pulse)	0 V ±0.237 V	0 V ±0.3 V
Nominal Pulse Width	244 ns	244 ns

Figure 16. EA10, EA20, EA10M, EA20M, TOEA, TO-EA, TO-EAN, and TO-EA5 Card Digital Output Waveform



Area in which signal should be monotonic

$T = 488 \text{ ns}$ (approximately) (period of a 2.048 MHz signal)

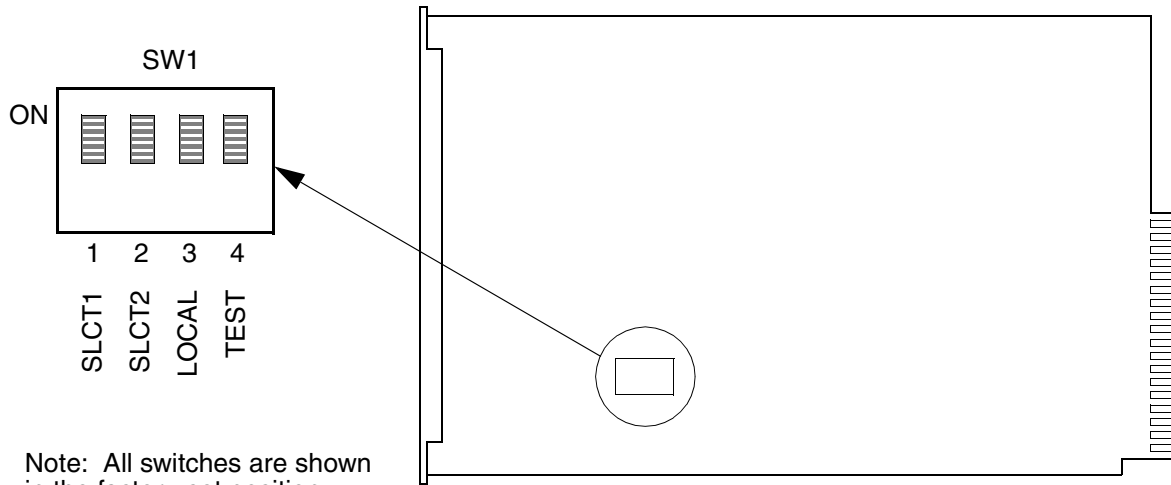
Output Impedance & Levels

Specification	Unbalanced	Balanced
Test Load Impedance	75 Ω resistive	120 Ω resistive
Maximum Peak Voltage	1.5 V	1.9 V
Minimum Peak Voltage	0.75 V	1.0 V

Figure 17. EA10, EA20, EA10M, EA20M, TO-EA, TO-EAN, TO-EA5, and TOGA Card Analog Output Waveform

Chart 16. TOAA, TOLA, or TOTL Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of a TOAA, TOLA, or TOTL card.</p> <p>Note: The timing outputs must not be connected during this test.</p> <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	Set the option switches on each TO card to conform to the requirements for this installation according to the Installation Job Specifications (Figures 18 through 20).
2	<p>Insert all TO cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> • On the TO cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) • The ST and INPUT lamps light green (indicating the cards are receiving reference signals). (If the ST and INPUT lamps do not light, retest the clock input cards and the clock cards.) • On each 090-40022-01 or -02 TOAA card, a 2048, 1000, 512, or 64 KHZ lamp on the front panel is lit according to the switch settings. • On each TOLA card, a 3, 2, 1, or 0 GROUP lamp on the front panel is lit according to the switch settings. • On each TOTL card, a D4 or ESF lamp on the front panel is lit according to the switch settings. <p>Note: 090-40022-05 and 090-40028-10 TOAA/C cards do not have front-panel lamps to indicate frequency.</p>
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each card output at the output panel with a dual-trace 100 MHz oscilloscope:</p> <ul style="list-style-type: none"> • Table C lists the oscilloscope settings. Figure 21, Figure 22, and Figure 23 show the output waveform for each card. • Table I lists the output signals for the TOLA (090-45023-03) card. <p>Requirement: The output waveforms must be as shown in the waveform diagrams.</p>
4	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
5	This procedure is completed. Indicate completion of the TOAA, TOLA, and TOTL Card Test on the Test Sign-off form.

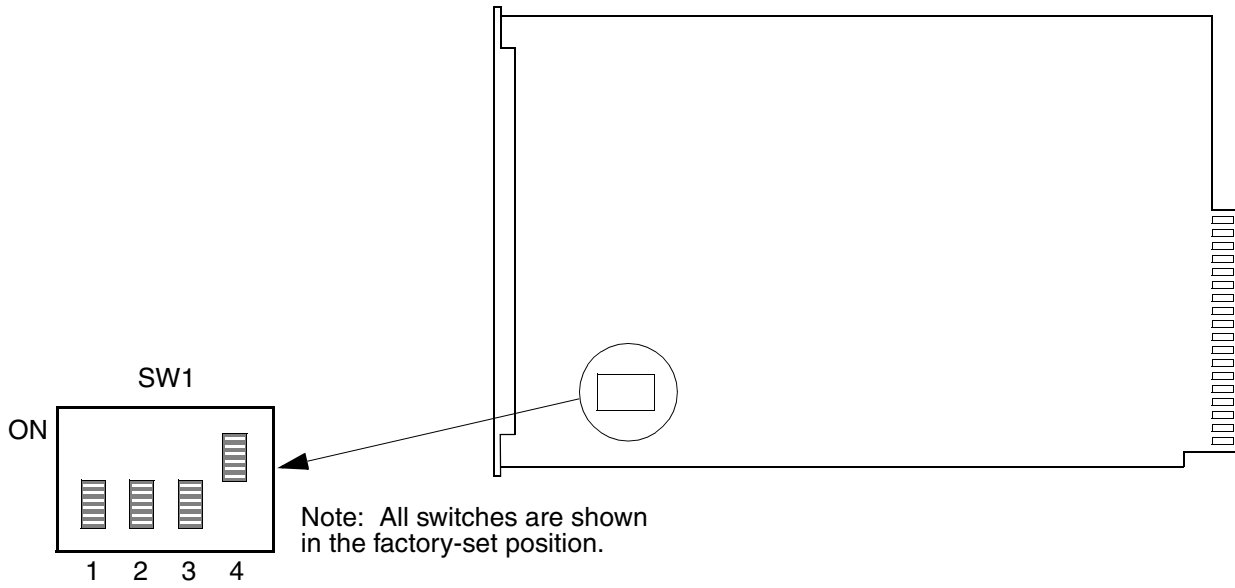


Note: A switch on the front panel of the 090-40028-10 card selects output frequencies of 1.0 MHz, 5.0 MHz, and 10.0 MHz. Do not change any other switch on this card.

SW1 Settings

1	2	3	4	Meaning			Factory Setting
				-01 and -02	-03	-05 and -15	
ON	ON	—	—	64 kHz	8 kHz	5 MHz	X
ON	OFF	—	—	512 kHz	512 kHz	Not allowed	—
OFF	ON	—	—	1.0 MHz	1.0 MHz	Not allowed	—
OFF	OFF	—	—	2.048 MHz	2.048 MHz	Not allowed	—
—	—	ON	—	Not used	Not used	Not used	X
—	—	OFF	—	Not used	Not used	Not used	—
—	—	—	ON	Normal	Normal	Normal	X
—	—	—	OFF	Not allowed	Not allowed	Not allowed	—

Figure 18. TOAA Card Switch



SW1 Settings

1	2	3	4	Meaning	Factory Setting
ON	ON	—	—	Data rate set to Group 0	—
ON	OFF	—	—	Data rate set to Group 1	—
OFF	ON	—	—	Data rate set to Group 2	—
OFF	OFF	—	—	Data rate set to Group 3	X
—	—	ON	—	Not used	—
—	—	OFF	—		X
—	—	—	ON	Normal	X
—	—	—	OFF	Not used	—

Note: Refer to Table K for the output frequencies of each group.

Figure 19. TOLA Card Switch

Table K. TOLA Card Output Frequencies

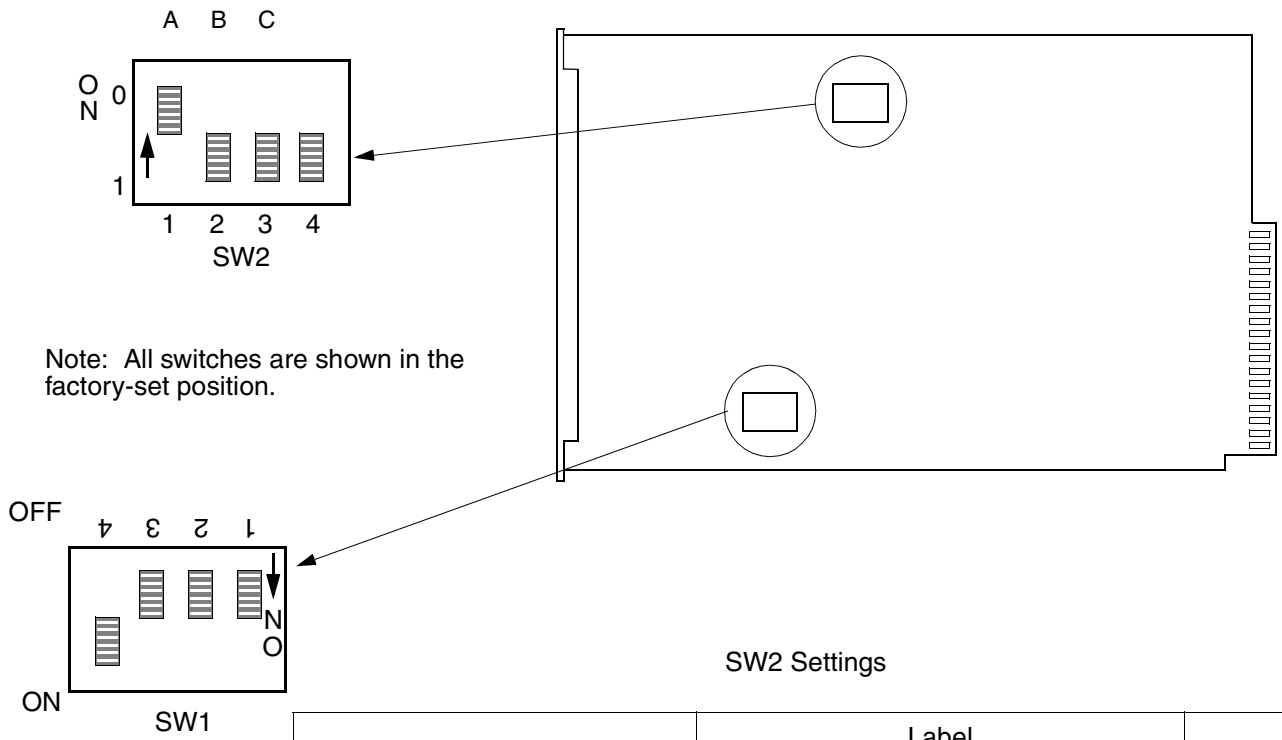
GROUP	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5
TOLA -01 CARD					
0	1.544 Mb/s	1.544 Mb/s	64 kb/s	8 kb/s	4 kb/s
1	1.544 Mb/s	1.544 Mb/s	2.048 Mb/s	512 kb/s	256 kb/s
2	1.544 Mb/s	1.544 Mb/s	1.536 Mb/s	768 kb/s	384 kb/s
3	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s
TOLA -02 CARD					
0	8 kb/s	8 kb/s	8 kb/s	8 kb/s	8 kb/s
1	1.544 Mb/s	1.544 Mb/s	2.048 Mb/s	512 kb/s	256 kb/s
2	1.544 Mb/s	1.544 Mb/s	1.536 Mb/s	768 kb/s	384 kb/s
3	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s
TOLA -03 CARD					
0	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s
1	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s
2	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s
3	56 kb/s	56 kb/s	56 kb/s	56 kb/s	56 kb/s
TOLA -04 CARD					
For all groups and all ports, the output is 2.048 Mb/s					
TOLA -05 CARD					
0	1.544 Mb/s	64 kb/s	128 kb/s	192 kb/s	1.024 Mb/s
1	1.544 Mb/s	64 kb/s	128 kb/s	192 kb/s	1.024 Mb/s
2	1.544 Mb/s	64 kb/s	128 kb/s	192 kb/s	1.024 Mb/s
3	1.544 Mb/s	64 kb/s	128 kb/s	192 kb/s	1.024 Mb/s
TOLA-06 CARD					
0	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s
1	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s
2	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s
3	56 kb/s	56 kb/s	56 kb/s	56 kb/s	56 kb/s
TOLA -07 CARD					
0	2048 kb/s	2048 kb/s	2048 kb/s	2048 kb/s	2048 kb/s
1	1024 kb/s	1024 kb/s	1024 kb/s	1024 kb/s	1024 kb/s
2	512 kb/s	512 kb/s	512 kb/s	512 kb/s	512 kb/s
3	256 kb/s	256 kb/s	256 kb/s	256 kb/s	256 kb/s
Notes:					
1. Outputs for the -01, -02, -04, -05, -06, and -07 are RS-422 or TTL. Outputs for the -03 card are RS-232 only.					
2. When using TTL outputs (each half of the RS-422 signal is used separately) through a 10-output I/O module, the output frequencies of outputs 1 and 2 are the same as listed for OUT 1, outputs 3 and 4 are the same as listed for OUT 2, outputs 5 and 6 are the same as listed for OUT 3, outputs 7 and 8 are the same as listed for OUT 4, and outputs 9 and 10 are the same as listed for OUT 5.					

Table L. TOLA Card Output Frequencies (From DB9 Connector)

GROUP	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5
TOLA -01 CARD					
0	1.544 Mb/s	1.544 Mb/s	64 kb/s	8 kb/s	4 kb/s
1	1.544 Mb/s	1.544 Mb/s	2.048 Mb/s	512 kb/s	256 kb/s
2	1.544 Mb/s	1.544 Mb/s	1.536 Mb/s	768 kb/s	384 kb/s
3	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s
TOLA -02 CARD					
0	8 kb/s	8 kb/s	8 kb/s	8 kb/s	8 kb/s
1	1.544 Mb/s	1.544 Mb/s	2.048 Mb/s	512 kb/s	256 kb/s
2	1.544 Mb/s	1.544 Mb/s	1.536 Mb/s	768 kb/s	384 kb/s
3	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s	1.544 Mb/s
TOLA -03 CARD					
0	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s
1	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s
2	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s
3	56 kb/s	56 kb/s	56 kb/s	56 kb/s	56 kb/s
TOLA -04 CARD					
For all groups and all ports, the output is 2.048 Mb/s					
TOLA -05 CARD					
0	1.024 Mb/s	192 kb/s	128 kb/s	64 kb/s	1.024 Mb/s
1	1.024 Mb/s	192 kb/s	128 kb/s	64 kb/s	1.024 Mb/s
2	1.024 Mb/s	192 kb/s	128 kb/s	64 kb/s	1.024 Mb/s
3	1.024 Mb/s	192 kb/s	128 kb/s	64 kb/s	1.024 Mb/s
TOLA -06 CARD					
0	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s	4.8 kb/s
1	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s	9.6 kb/s
2	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s	19.2 kb/s
3	56 kb/s	56 kb/s	56 kb/s	56 kb/s	56 kb/s
TOLA -07 CARD					
0	2048 kb/s	2048 kb/s	2048 kb/s	2048 kb/s	2048 kb/s
1	1024 kb/s	1024 kb/s	1024 kb/s	1024 kb/s	1024 kb/s
2	512 kb/s	512 kb/s	512 kb/s	512 kb/s	512 kb/s
3	256 kb/s	256 kb/s	256 kb/s	256 kb/s	256 kb/s

Notes:

1. Outputs for the -01, -02, -04, -05, -06, and -07 are RS-422 or TTL. Outputs for the -03 card are RS-232 only.
2. When using TTL outputs (each half of the RS-422 signal is used separately) through a 10-output I/O module, the output frequencies of outputs 1 and 2 are the same as listed for OUT 1, outputs 3 and 4 are the same as listed for OUT 2, outputs 5 and 6 are the same as listed for OUT 3, outputs 7 and 8 are the same as listed for OUT 4, and outputs 9 and 10 are the same as listed for OUT 5.



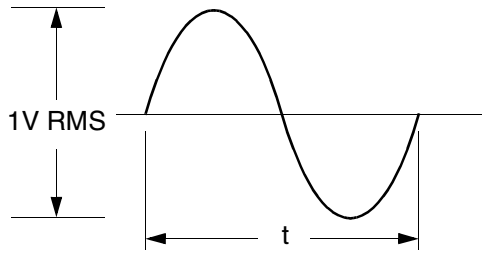
SW2 Settings

Meaning	Label (Section)				Factory Setting
	A (1)	B (2)	C (3)	(Not Labeled) (4)	
0 m - 40 m (0 ft - 133 ft)	0	1	1	1	X
40 m - 80 m (133 ft - 266 ft)	1	0	0	1	—
80 m - 120 m (266 ft - 399 ft)	1	0	1	1	—
120 m - 160 m (399 ft - 533 ft)	1	1	0	1	—
160 m - 200 m (533 ft - 655 ft)	1	1	1	1	—

SW1 Settings

Meaning	Label (Section)				Factory Setting
	D4 (4)	ESF (3)	LOCAL (2)	TEST (1)	
D4 framing	ON	OFF	OFF	OFF	X
ESF framing	OFF	ON	OFF	OFF	—

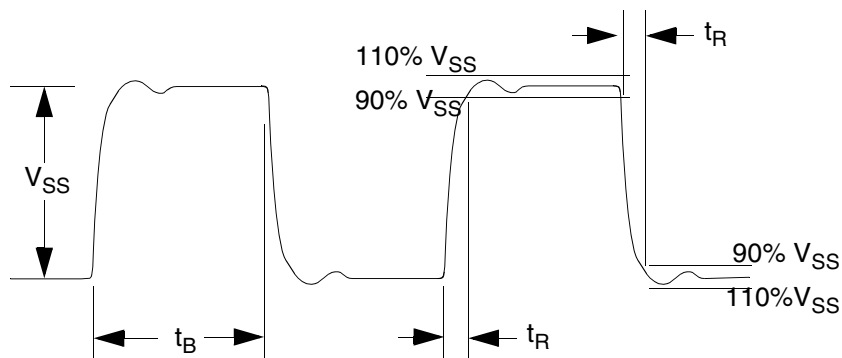
Figure 20. TOTL Card Switches



$t = 125 \mu\text{s}$ for 8 kHz $t = 0.48828 \mu\text{s}$ for 2.048 MHz
 $t = 15.625 \mu\text{s}$ for 64 kHz $t = 0.2 \mu\text{s}$ for 5.0 MHz
 $t = 1.9531 \mu\text{s}$ for 512 kHz $t = 0.1 \mu\text{s}$ for 10 MHz
 $t = 1.0 \mu\text{s}$ for 1.0 MHz

Impedance: 75Ω (50Ω for 090-40022-02)
 (All values are nominal)

Figure 21. TOAA Card Output Waveform



t_B = Bit time duration (8 kb/s to 1.544 Mb/s)

t_R $\leq t_B/10$

V_{SS} = Difference in steady-state voltages:

2 V to 6 V pp for RS-422 (balanced) into 100Ω

Greater than 3 V for RS-423 (unbalanced) into 450Ω

Greater than +3 V from GND and greater than -3 V from GND for RS-232 into $3 \text{ k}\Omega$ to $7 \text{ k}\Omega$

Bit Duration

Data Rate	t_B	t_R
4 kb/s	$125 \mu\text{s}$	$12.5 \mu\text{s}$
4.8 kb/s	$104.1 \mu\text{s}$	$10.41 \mu\text{s}$
8 kb/s	$62.5 \mu\text{s}$	$6.25 \mu\text{s}$
9.6 kb/s	$52 \mu\text{s}$	$5.2 \mu\text{s}$
19.2 kb/s	$26 \mu\text{s}$	$2.6 \mu\text{s}$
56 kb/s	$8.9 \mu\text{s}$	890 ns
64 kb/s	$7.8 \mu\text{s}$	780 ns

Bit Duration

Data Rate	t_B	t_R
256 kb/s	$1.95 \mu\text{s}$	195 ns
384 kb/s	$1.3 \mu\text{s}$	130 ns
512 kb/s	977 ns	97.7 ns
768 kb/s	651 ns	65.1 ns
1.536 Mb/s	326 ns	32.6 ns
1.544 Mb/s	324 ns	32.4 ns
2.048 Mb/s	244 ns	24.4 ns

Figure 22. TOLA Card Output Waveform

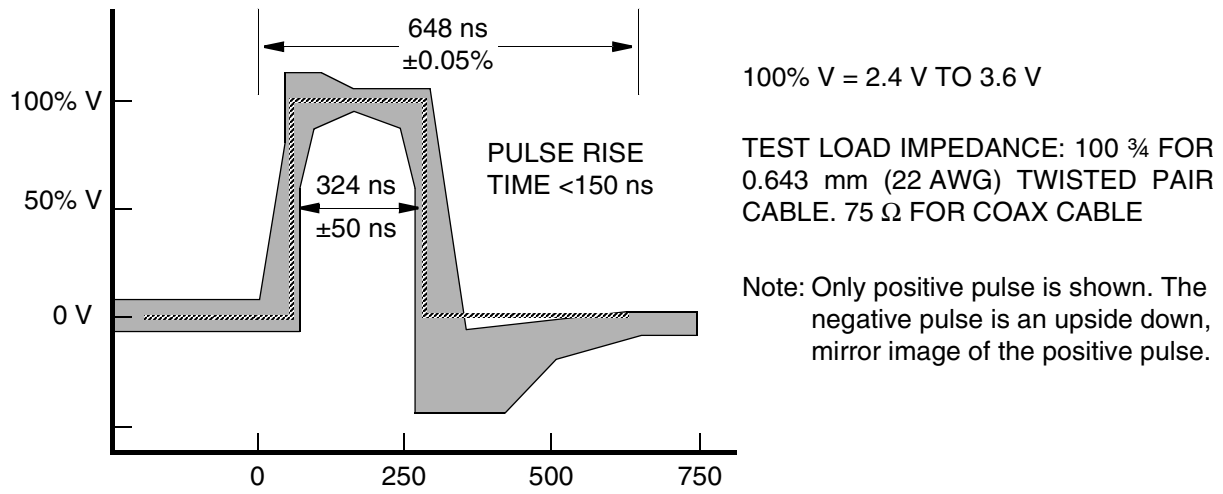
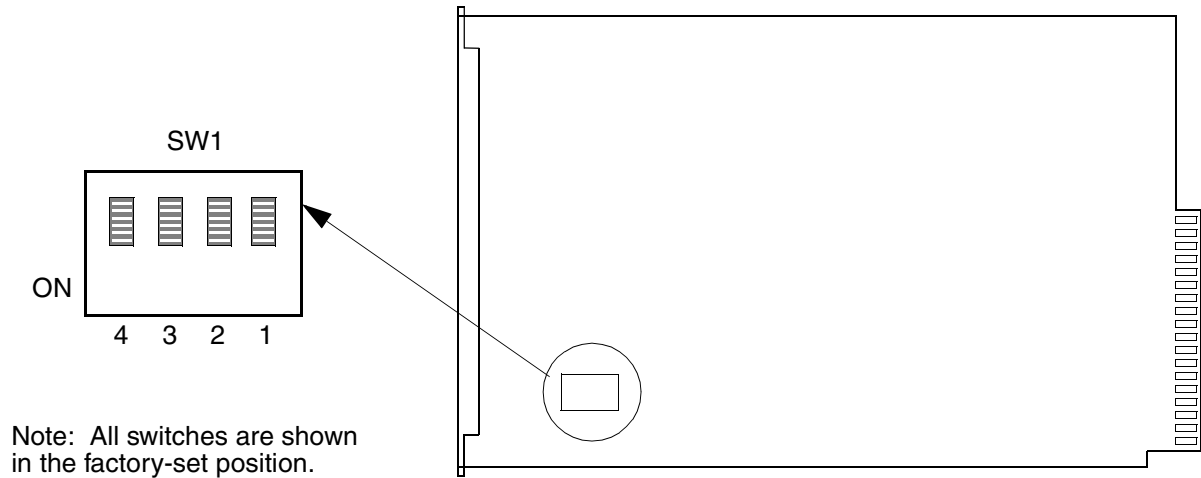


Figure 23. TOTA, TOTA-5, TOTA-M, TOTL Card Output Waveform

Chart 17. TOCA, TOEA, or TOTA Card Test

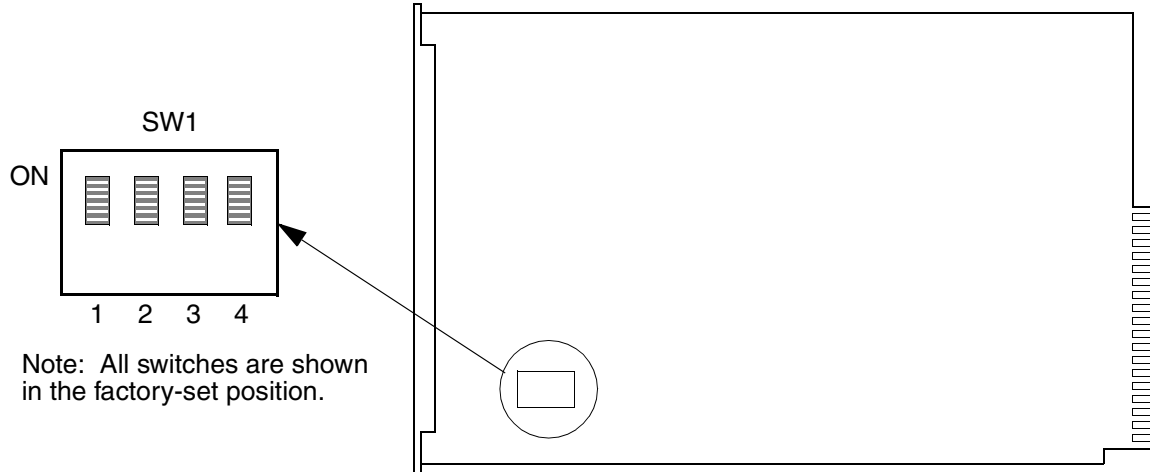
STEP	PROCEDURE
	<p>Use this procedure to verify the operation of TOCA, TOEA, or TOTA cards.</p> <p>Note: The timing outputs must be disconnected during this test.</p> <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	<p>Set the option switches on each TO card to conform to the requirements for this installation according to the Installation Job Specifications (Figures 24 through Figure 26).</p>
2	<p>Insert all TO cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> • On the TO cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) • The INPUT and ST lamps light green (indicating the cards are receiving reference signals). (If the INPUT and ST lamps do not light, retest the clock input cards and the clock cards.)
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope. Table C lists the oscilloscope settings.</p> <p>Requirement: The output waveforms must be as shown in Figures 16, 23, and 27.</p>
4	<p>Insert a disabling pin into each of the disabling pin jacks on the front panel of the card, one at a time.</p> <p>Requirement: The output of the port associated with the disabling pin jack is inhibited.</p>
5	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
6	<p>This procedure is completed. Indicate completion of the TOCA, TOEA, or TOTA Card Test on the Test Sign-off form.</p>



SW1 Settings

4	3	2	1	Meaning	Factory Setting
OFF	OFF	—	—	0 m to 457 m (0 ft to 1500 ft)	X
ON	OFF	—	—	458 m to 610 m (1501 ft to 2000 ft)	—
OFF	ON	—	—	610 m to 762 m (2001 ft to 2500 ft)	—
ON	ON	—	—	762 m to 914 m (2501 ft to 3000 ft)	—
—	—	ON	—	PORT ALM lamp lit when disabling pin inserted in jack	—
—	—	OFF	—	PORT ALM lamp NOT lit when disabling pin inserted in jack	X
—	—	—	ON	Not allowed	—
—	—	—	OFF	Normal	X

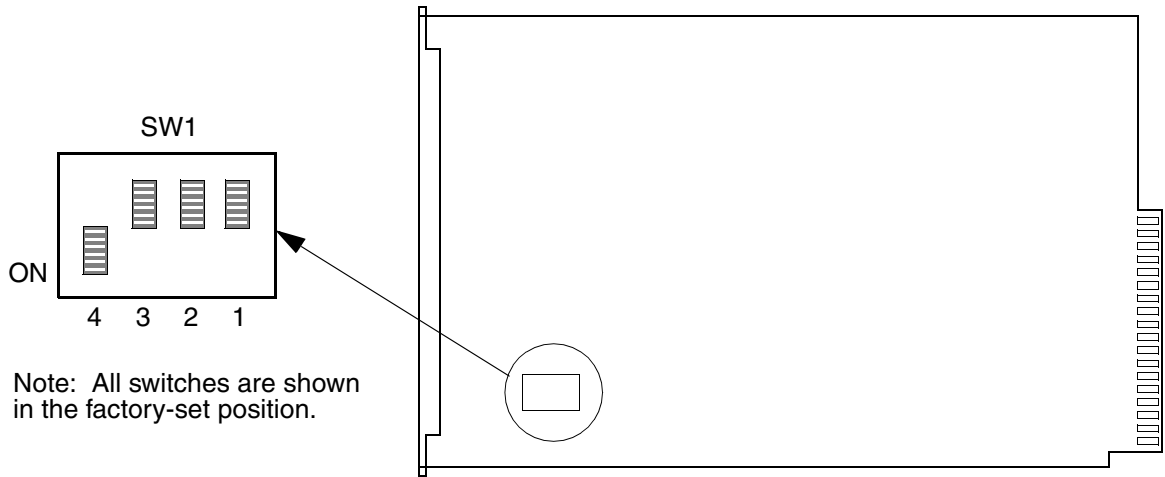
Figure 24. TOCA Card Switch



SW1 Settings

SWITCH	POSITION	Meaning	Factory Setting
1	ON	CRC-4 Multiframe enable	X
	OFF	CRC-4 Multiframe disable	—
2	ON	CCS-Common Channel Signaling	X
	OFF	CAS-Channel Associated Signaling	—
3	ON	Not used	X
	OFF	Not used	—
4	ON	Normal	X
	OFF	Not allowed	—

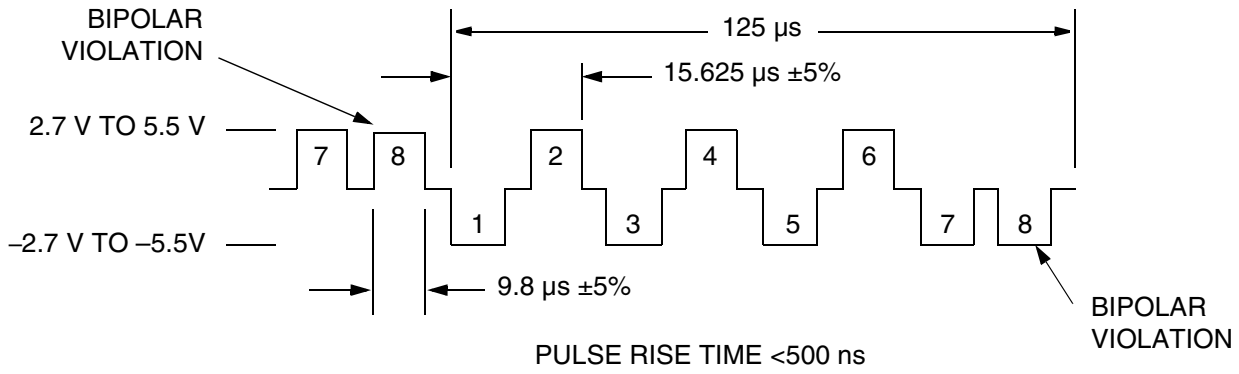
Figure 25. TOEA Card Switch



SW1 Settings

4	3	2	1	Meaning	Factory Setting
OFF	OFF	—	—	Not allowed	—
ON	OFF	—	—	D4 framing	X
OFF	ON	—	—	ESF framing	—
ON	ON	—	—	Not allowed	—
—	—	ON	—	PORT ALM lamp lit when disabling pin inserted in jack	—
—	—	OFF	—	PORT ALM lamp NOT lit when disabling pin inserted in jack	X
—	—	—	ON	Not allowed	—
—	—	—	OFF	Normal	X

Figure 26. TOTA Card Switch



TEST LOAD IMPEDANCE: 133 Ω FOR 25.3 mils, 0.643 mm (22 AWG) TWISTED PAIR CABLE

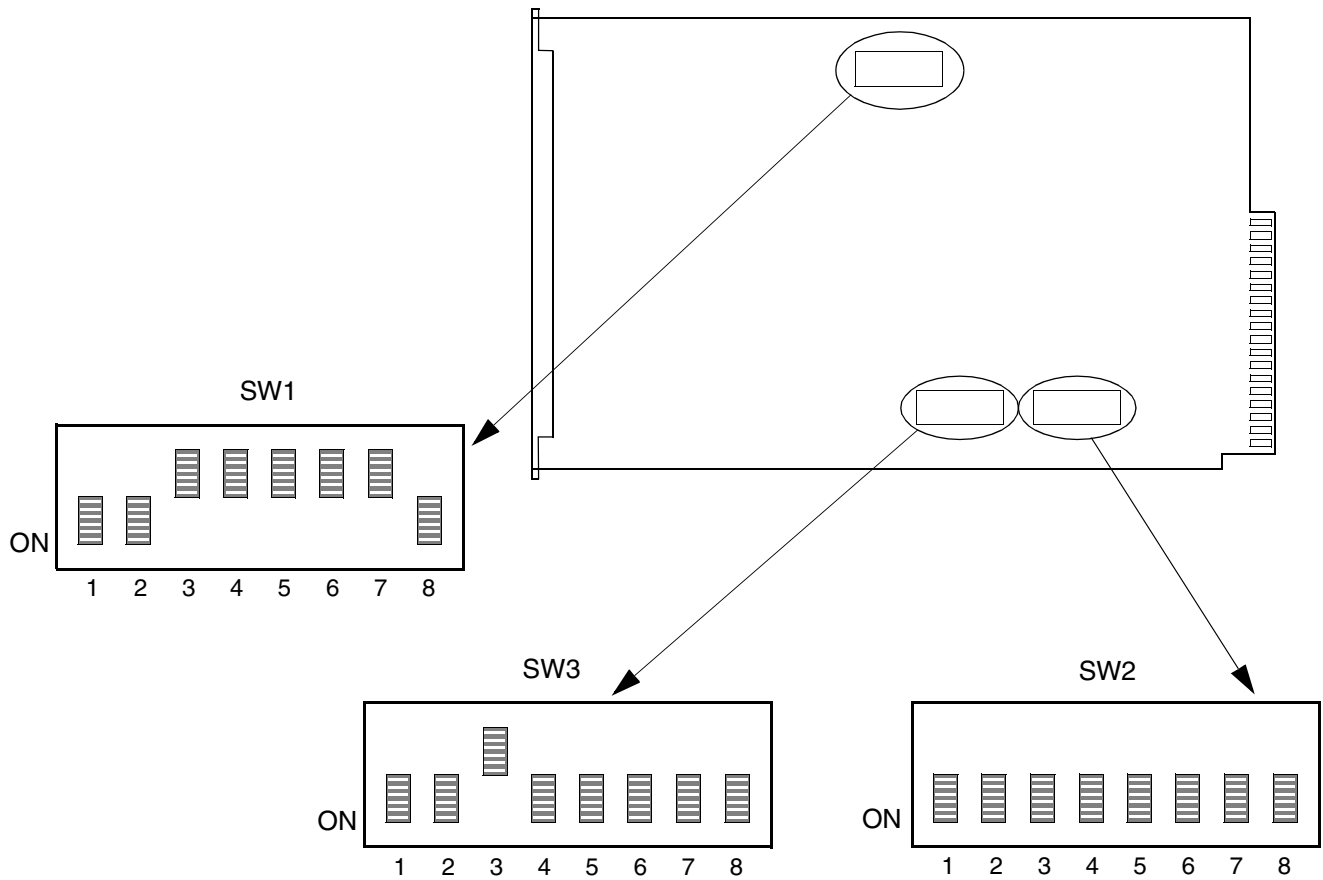
Figure 27. TOCA Card Output Waveform

Chart 18. TO-EA Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the TO-EA cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Depending upon the card option settings, the TO-EA may output digital or analog waveforms on any of its outputs. 2. When installing a 1+1 TO-EA card pair, both cards must have the same part number and S/W Rev letter, and both cards must be configured identically to ensure optimum output switching protection. 3. When installing a 1+1 TO-EA card pair, install a double-wide output module on the appropriate connectors of the output panel. 4. The timing outputs must be disconnected during this test. 5. Because the TO-EA card may be set as a 1+1 or stand-alone unit, the pulse amplitude may vary slightly when cards are initially installed and coming into service. Depending on the type of test set used (i.e., HP 377722A, Digital Telecom Analyzer), in some cases, the test set may indicate a false loss of signal (LOS), or framing errors, etc. 6. Insertion of a disabling pin in a single port on a card of a 1+1 pair can cause the amplitude to be reduced from nominal. The result may be marginal with the nominal pulse mask, but well within the specification for signal reception by all office NEs. <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	<p>Set SW1, SW2, and SW3 on each TO-EA card to conform to the requirements for this installation according to the Installation Job Specifications (Figure 28).</p>
2	<p>Insert all TO-EA cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> • On the TO-EA cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) • The INPUT and ST lamps light green (indicating the cards are receiving reference signals). (If the INPUT and ST lamps do not light, retest the clock input cards and the clock cards.)

Chart 18. TO-EA Card Test (Contd)

STEP	PROCEDURE
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope. Table C lists the oscilloscope settings.</p> <p>Requirement: The output waveforms must be as shown in Figure 16 and in Figure 17.</p>
4	<p>If no 1+1 output card pairs are installed in the system, go to Step 8. Otherwise, remove the left card from each 1+1 output card pair and repeat Step 3 at the output of each 1+1 output card pair.</p>
5	<p>Replace the left card in each 1+1 output card pair. Remove the right card from each 1+1 output card pair and repeat Step 3 at the output of each 1+1 output card pair.</p>
6	<p>Replace the right card in each 1+1 output card pair.</p>
7	<p>Insert a disabling pin into each of the disabling pin jacks on the front panel of the card, one at a time.</p> <p>Requirement: The output of the port associated with the disabling pin jack is inhibited.</p>
8	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
9	<p>This procedure is completed. Indicate completion of the TO-EA Card Test on the Test Sign-off form.</p>



Note: All switches are shown in the factory-set position.

Note: Refer to Table M for SW1, SW2, and SW3 switch settings.

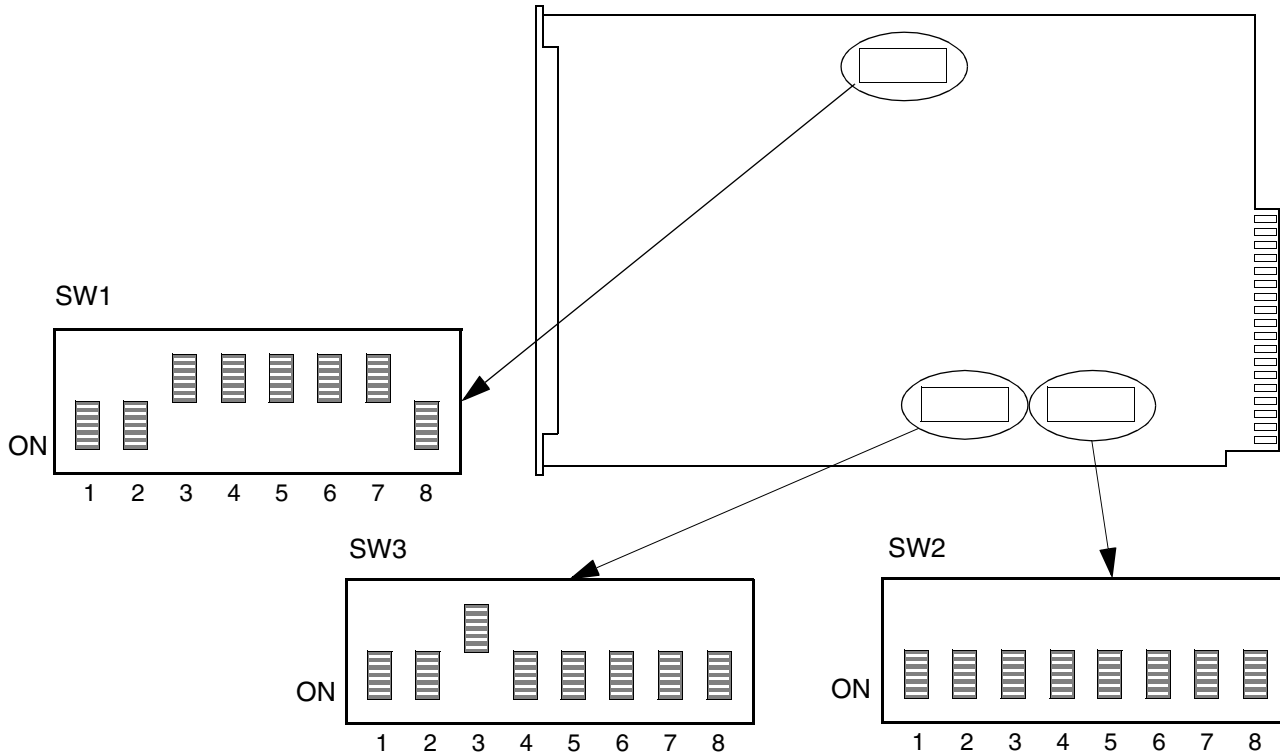
Figure 28. TO-EA Card Switch

Table M. TO-EA Switch Settings

SECTION	POSITION	MEANING	FACTORY SETTING
SW1 SETTINGS			
Note: If set for E1 output, only one framing format per card is permitted.			
1	OFF	CAS framing	—
	ON	CCS framing	X
2	OFF	CRC-4 Multiframe disabled	—
	ON	CRC-4 Multiframe enabled	X
3	OFF	MINOR alarm initiated upon PORT ALM	X
	ON	MAJOR alarm initiated upon PORT ALM	—
4	OFF	Squelches outputs on a per port basis during MINOR alarm	X
	ON	Sends AIS on a per port basis during MINOR alarm	—
5 and 6	OFF	For factory use only; must be set to OFF	X
7	OFF	Reverts back to input signal when it becomes available Caution: Use of revertive switching may result in phase offsets between cards.	X
	ON	Does not revert back to input signal when it becomes available	—
8	ON	Reserved; must be set to ON	X
Sections 1 through 8 on SW2 correspond to output ports 1 through 8; sections 1 and 2 on SW3 correspond to output ports 9 and 10. Ports can be designated for any combination of E1 and/or analog outputs			
SW2 SETTINGS			
1 through 8	ON	Output port designated for E1 signal	X
	OFF	Output port designated for Analog signal	—
SW3 SETTINGS			
Sections 1 and 2 correspond to output ports 9 and 10.			
1	OFF	Output port 9 designated for Analog signal	—
	ON	Output port 9 designated for E1 signal	X
2	OFF	Output port 10 designated for Analog signal	—
	ON	Output port 10 designated for E1 signal	X
3	OFF	Card set for 1+1 operation	X
	ON	Card set for stand-alone operation	—
4 through 8	ON	Reserved; must be set to ON	X

Chart 19. TO-EAN Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the TO-EAN cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> Depending upon the card option settings, the TO-EAN may output digital or analog waveforms on any consecutively numbered group of outputs. The timing outputs must be disconnected during this test. The pulse amplitude may vary slightly when cards are initially installed and coming into service. Depending on the type of test set used (i.e., HP 377722A, Digital Telecom Analyzer), in some cases, the test set may indicate a false loss of signal (LOS), or framing errors, etc. <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	<p>Set section 8 of SW1 on each TO-EAN card to the OFF position for the purposes of this procedure, and set the other sections of SW1, SW2, and SW3 on each TO-EAN card to conform to the requirements for this installation according to the local company Installation Job Specifications. Refer to Figure 29 for option settings.</p>
2	<p>Insert all TO-EAN cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirement:</p> <ul style="list-style-type: none"> On the TO-EAN cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) The INPUT and ST lamps light green (indicating the cards are receiving reference signals). (If the INPUT and ST lamps do not light, retest the clock input cards and the clock cards.)
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure. Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope.</p> <ul style="list-style-type: none"> Table C lists the oscilloscope settings. Table G lists the output signal pins when using a wire-wrap module. <p>Requirement: The output waveforms must be as shown in Figure 16 and in Figure 17.</p>
4	<p>If an SAI card is installed in the shelf, skip this step. Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
5	<p>This procedure is complete. Indicate completion of the TO-EAN Card Test on the Test Sign-off form.</p>



Note: All switches are shown in the factory-set position.

Notes:

1. Refer to Table M for SW1, SW2, and SW3 switch settings.
2. Sections 1 through 8 on SW2 correspond to output ports 1 through 8; sections 1 and 2 on SW3 correspond to output ports 9 and 10. The 20 allowable configurations of analog (A) and E1 ports are in the list below.

Config-uration	Output Port Number									
	1	2	3	4	5	6	7	8	9	10
1	A	A	A	A	A	A	A	A	A	A
2	E1	A	A	A	A	A	A	A	A	A
3	E1	E1	A	A	A	A	A	A	A	A
4	E1	E1	E1	A	A	A	A	A	A	A
5	E1	E1	E1	E1	A	A	A	A	A	A
6	E1	E1	E1	E1	E1	A	A	A	A	A
7	E1	E1	E1	E1	E1	E1	A	A	A	A
8	E1	E1	E1	E1	E1	E1	E1	A	A	A
9	E1	E1	E1	E1	E1	E1	E1	E1	A	A
10	E1	E1	E1	E1	E1	E1	E1	E1	E1	A

Config-uration	Output Port Number									
	1	2	3	4	5	6	7	8	9	10
11	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1
12	A	E1	E1	E1	E1	E1	E1	E1	E1	E1
13	A	A	E1	E1	E1	E1	E1	E1	E1	E1
14	A	A	A	E1	E1	E1	E1	E1	E1	E1
15	A	A	A	A	E1	E1	E1	E1	E1	E1
16	A	A	A	A	A	E1	E1	E1	E1	E1
17	A	A	A	A	A	A	E1	E1	E1	E1
18	A	A	A	A	A	A	A	E1	E1	E1
19	A	A	A	A	A	A	A	A	E1	E1
20	A	A	A	A	A	A	A	A	A	E1

Figure 29. TO-EAN Card Switch

Table N. TO-EAN Switch Settings

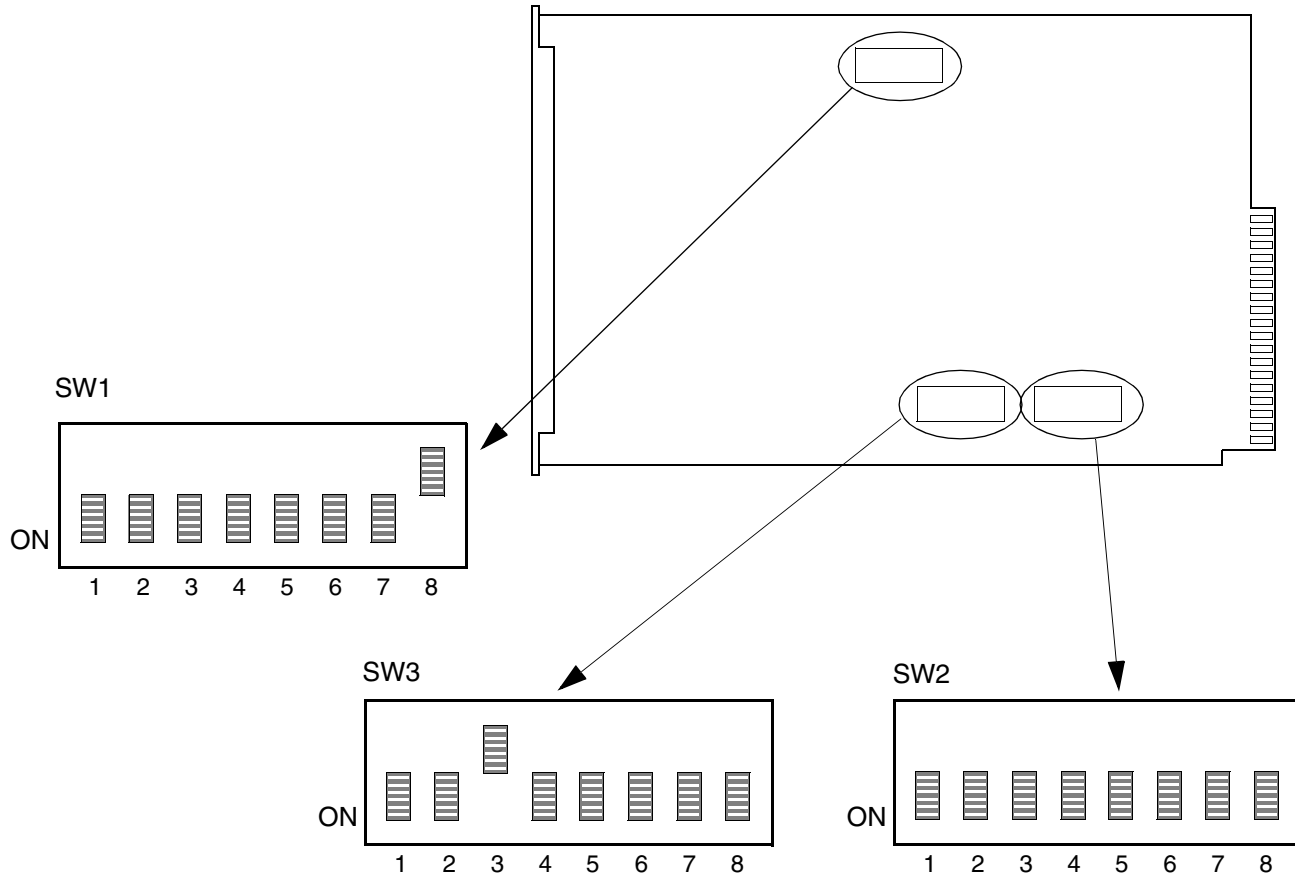
SECTION	POSITION	MEANING	FACTORY SETTING
SW1 SETTINGS			
<i>Note:</i> Note: If set for E1 output, only one framing format per card is permitted.			
1	OFF	CAS framing	—
	ON	CCS framing	X
2	OFF	CRC-4 Multiframe disabled	—
	ON	CRC-4 Multiframe enabled	X
3	OFF	MINOR alarm initiated upon PORT ALM	X
	ON	MAJOR alarm initiated upon PORT ALM	—
4	OFF	Squelches outputs on a per port basis during MINOR alarm	X
	ON	Sends AIS on a per port basis during MINOR alarm	—
5 and 6	OFF	For factory use only; must be set to OFF	X
7	OFF	Reverts back to input signal when it becomes available	X
	ON	Caution: Use of revertive switching may result in phase offsets between cards. Does not revert back to input signal when it becomes available	—
8	OFF	Upon power-up, the outputs are enabled, and the card operates using switch settings (if configured properly). Configuration can be changed by TL1 commands.	—
	ON	Upon power-up, the outputs are disabled. If replacing a card, the switch settings on the new card will be overridden by the MIS card. Configuration can be changed by TL1 commands.	X
Sections 1 through 8 on SW2 correspond to output ports 1 through 8; sections 1 and 2 on SW3 correspond to output ports 9 and 10. Consecutively numbered ports starting with port 1 or ending with port 10 can be configured as E1 or analog outputs; for example, E1 at ports 1 through 4, and analog at ports 5 through 10.			
SW2 SETTINGS			
1 through 8	OFF	Output port designated for Analog signal	—
	ON	Output port designated for E1 signal	X
SW3 SETTINGS			
Sections 1 and 2 correspond to output ports 9 and 10.			
1	OFF	Output port 9 designated for Analog signal	—
	ON	Output port 9 designated for E1 signal	X
2	OFF	Output port 10 designated for Analog signal	—
	ON	Output port 10 designated for E1 signal	X
3 through 8	ON	Reserved; must be set to ON	X

Chart 20. TO-EA5 Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the TO-EA5 cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> Depending upon the card option settings, the TO-EA5 may output digital or analog waveforms on any of its outputs. When installing a redundant pair of TO-EA5 cards, both cards must have the same part number and S/W Rev letter, and both cards must be configured identically to ensure optimum output switching protection. Install one card of a redundant pair of TO-EA5 cards in an odd-numbered slot, and the other card in the even-numbered slot immediately to the right. When installing a redundant pair of TO-EA5 cards, install a double-wide output module on the appropriate connectors of the output panel. The timing outputs must be disconnected during this test. Because the TO-EA5 card may be set as a redundant pair or stand-alone unit, the pulse amplitude may vary slightly when cards are initially installed and coming into service. Depending on the type of test set used (i.e., HP 377722A, Digital Telecom Analyzer), in some cases, the test set may indicate a false loss of signal (LOS), or framing errors, etc. Inserting a disabling pin in a single port on a card of a redundant pair can cause the amplitude to be reduced from nominal. The result may be marginal with the nominal pulse mask, but well within the specification for signal reception by all office NEs. <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	<p>Set section 8 of SW1 on each TO-EA5 card to the OFF position for the purposes of this procedure, and set the other sections of SW1, SW2, and SW3 on each TO-EA5 card to conform to the requirements for this installation according to the Installation Job Specifications (Figure 30).</p>
2	<p>Insert all TO cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> On the TO cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) The INPUT and ST lamps light green (indicating the cards are receiving reference signals). (If the INPUT and ST lamps do not light, retest the clock input cards and the clock cards.) The option lamps (CCS or CAS and D4 or ESF) light according to the options selected in Step 1.
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope. Table C lists the oscilloscope settings.</p> <p>Requirement: The output waveforms must be as shown in Figure 16 and Figure 17.</p>
4	<p>If no redundant output card pairs are installed in the system, go to Step 7. Remove the left card from each redundant output card pair and repeat Step 3 at the output of each redundant output card pair.</p>

Chart 20. TO-EA5 Card Test (Contd)

STEP	PROCEDURE
5	Replace the left card in each redundant output card pair. Remove the right card from each redundant output card pair and repeat Step 3 at the output of each redundant output card pair.
6	Replace the right card in each redundant output card pair.
7	Insert a disabling pin into each of the disabling pin jacks on the front panel of the card, one at a time. Requirement: The output of the port associated with the disabling pin jack is inhibited.
8	If section 8 of SW1 is set to conform to this installation, skip this step. Remove the TO-EA5 cards, set section 8 of SW1 to the ON position, and replace the cards.
9	Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf. Requirement: The response indicates the command was completed successfully.
10	This procedure is completed. Indicate completion of the TO-EA5 Card Test on the Test Sign-off form.



Note: All switches are shown in the factory-set position.

Notes:

1. Refer to Table M for SW1, SW2, and SW3 switch settings.
2. Sections 1 through 8 on SW2 correspond to output ports 1 through 8; sections 1 and 2 on SW3 correspond to output ports 9 and 10; section 3 sets the card operation mode (1+1 or stand-alone). Ports can be designated for any combination of E1 and/or analog outputs.

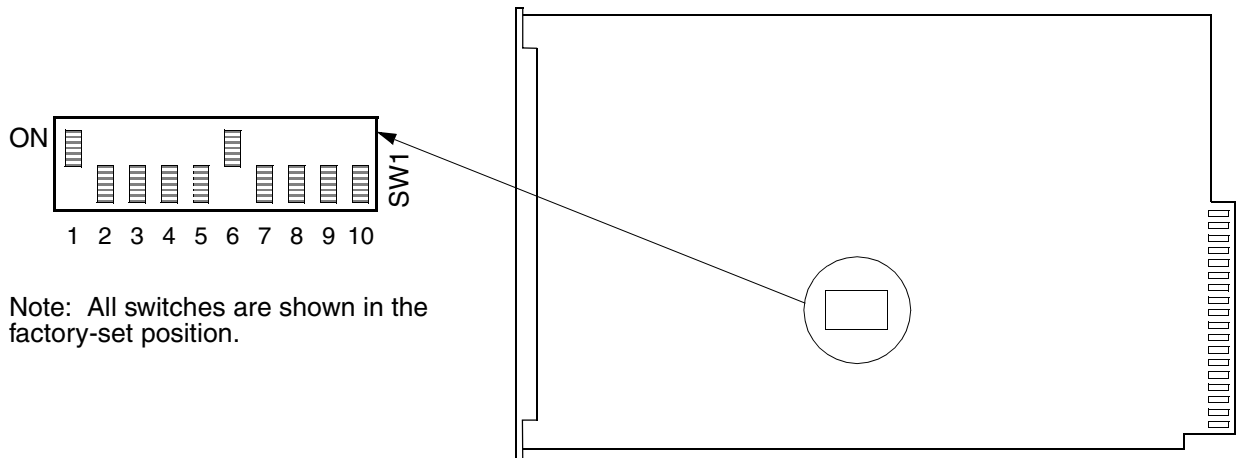
Figure 30. TO-EA5 Card Switches

Table O. TO-EA5 Switch Settings

SECTION	POSITION	MEANING	FACTORY SETTING
SW1 SETTINGS			
Note: If set for E1 output, only one framing format per card is permitted.			
1	OFF	CAS framing	—
	ON	CCS framing	X
2	OFF	CRC-4 Multiframe disabled	—
	ON	CRC-4 Multiframe enabled	X
3	OFF	MINOR alarm initiated upon PORT ALM	X
	ON	MAJOR alarm initiated upon PORT ALM	—
4	OFF	Squelches outputs on a per port basis during MINOR alarm	X
	ON	Sends AIS on a per port basis during MINOR alarm	—
5 and 6	OFF	For factory use only; must be set to OFF	X
7	OFF	Reverts back to input signal when it becomes available	X
	ON	Caution: Use of revertive switching may result in phase offsets between cards. Does not revert back to input signal when it becomes available	—
8	OFF	Upon power-up, the outputs are enabled, and the card operates using switch settings (if configured properly). Configuration can be changed by TL1 commands.	—
	ON	Upon power-up, the outputs are disabled. If replacing a card, the switch settings on the new card will be overridden by the MIS card. Configuration can be changed by TL1 commands.	X
Sections 1 through 8 on SW2 correspond to output ports 1 through 8; sections 1 and 2 on SW3 correspond to output ports 9 and 10. Ports can be designated for any combination of E1 and/or analog outputs			
SW2 SETTINGS			
1 through 8	OFF	Output port designated for Analog signal	—
	ON	Output port designated for E1 signal	X
SW3 SETTINGS			
Sections 1 and 2 correspond to output ports 9 and 10.			
1	OFF	Output port 9 designated for Analog signal	—
	ON	Output port 9 designated for E1 signal	X
2	OFF	Output port 10 designated for Analog signal	—
	ON	Output port 10 designated for E1 signal	X
3	OFF	Card set for 1+1 operation	X
	ON	TO-EA5 card set for stand-alone operation	—
4 through 8	ON	Reserved; must be set to ON	X

Chart 21. TOTA-5 or TOTA-M Card Test

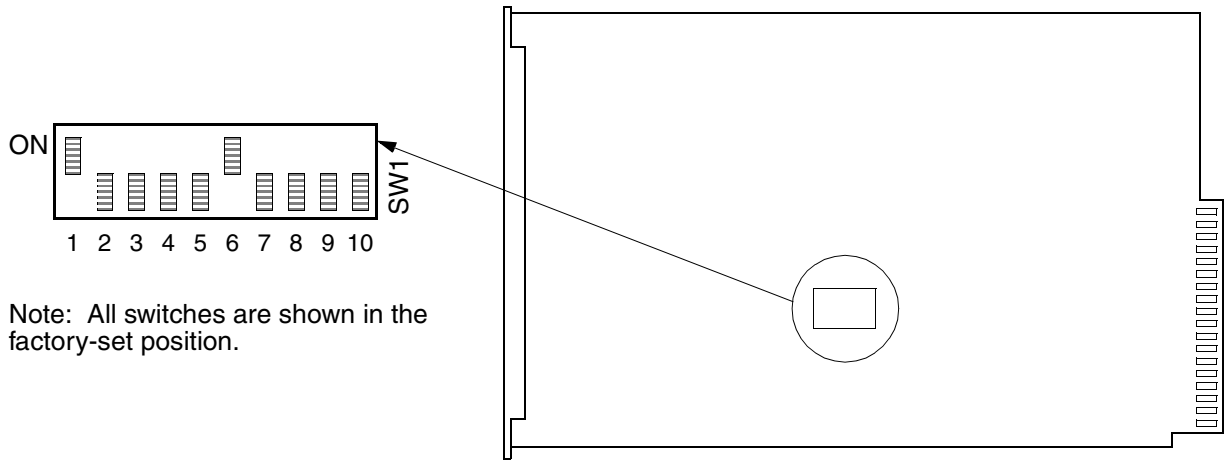
STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the TOTA-5 and TOTA-M cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. The timing outputs must be disconnected during this test. 2. Do not install a TOTA-M card in the same shelf as a TOTA-5 card. <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	<p>Be sure section 8 of SW1 on each TOTA-5 or TOTA-M card is set to the OFF position for the purposes of this procedure, and set the other sections of SW1 to conform to the requirements for this installation according to the Installation Job Specifications (Figure 31 and Figure 32).</p>
2	<p>Insert all TO cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> • On the TO cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) • The INPUT and ST lamps light green (indicating the cards are receiving reference signals). (If the INPUT and ST lamps do not light, retest the clock input cards and the clock cards.) • The option lamps (CCS or CAS and D4 or ESF) are lit according to the options selected in Step 1.
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope. Table C lists the oscilloscope settings.</p> <p>Requirement: The output waveforms must be as shown in Figure 23.</p>
4	<p>If section 8 of SW1 is set to conform to this installation, skip this step. Remove the TOTA-5 or TOTA-M cards, set section 8 of SW1 to the ON position, and replace the cards.</p>
5	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
6	<p>This procedure is completed. Indicate completion of the TOTA-5 or TOTA-M Card Test on the Test Sign-off form.</p>



SW1 Settings

Section	Position	Meaning	Factory Setting
1	ON	D4 framing (Section 2 must be OFF)	X
	OFF	ESF framing (Section 2 must be ON)	—
2	ON	ESF framing (Section 1 must be OFF)	—
	OFF	D4 framing (Section 1 must be ON)	X
3	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X
4	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X
5	ON	Disables all 10 outputs during MAJOR alarm	—
	OFF	Sends AIS on all 10 outputs during MAJOR alarm	X
6	ON	Reverts back to clock card signal when it becomes available	X
	OFF	Does not revert back to clock card signal when it becomes available	—
7	ON	MAJOR alarm initiated upon PORT ALM	
	OFF	MINOR alarm initiated upon PORT ALM	X
8	ON	Upon power-up, the outputs are enabled. Card is configured according to the switch settings. Configuration can be changed by TL1 commands.	—
	OFF	Upon power-up, the outputs are disabled. Card is configured and operated solely by TL1 commands. If replacing a card, the switch settings on the new card will be overridden by the MIS card.	X
9	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X
10	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X

Figure 31. TOTA-5 Card Switch



SW1 Settings

Section	Position	Meaning	Factory Setting
1	ON	D4 framing (Section 2 must be OFF)	X
	OFF	ESF framing (Section 2 must be ON)	—
2	ON	ESF framing (Section 1 must be OFF)	—
	OFF	D4 framing (Section 1 must be ON)	X
3	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X
4	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X
5	ON	Disables all 10 outputs when a card failure is detected	—
	OFF	Sends AIS on all 10 outputs when a card failure is detected	X
6	ON	Reverts back to clock card reference signal when it becomes available	X
	OFF	Does not revert back to clock card reference signal when it becomes available	—
7	ON	MAJOR alarm initiated upon PORT ALM	—
	OFF	MINOR alarm initiated upon PORT ALM	X
8	ON	Upon power-up, the outputs are enabled. Card is configured according to the switch settings. Configuration can be changed by TL1 commands.	—
	OFF	Upon power-up, the outputs are disabled. Card is configured and operated solely by TL1 commands. If replacing a card, the switch settings on the new card will be overridden by the MIS card.	X
9	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X
10	ON	Not allowed; used for testing purposes only	—
	OFF	Normal operation	X

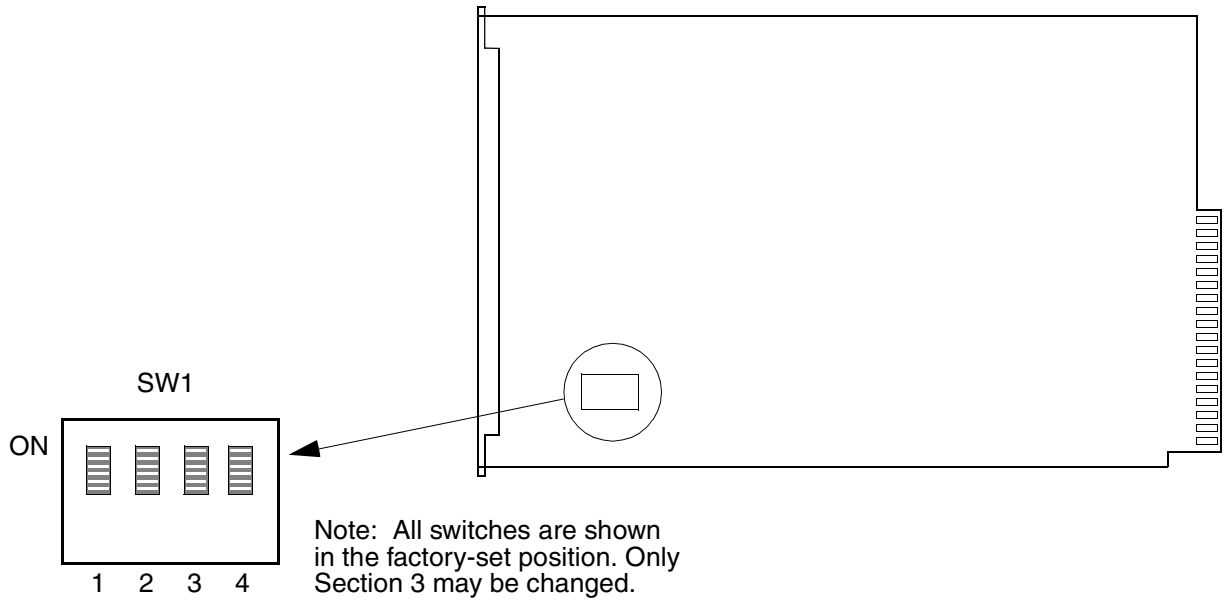
Figure 32. TOTA-M Card Switch

Chart 22. TOGA Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the TOGA cards.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. The timing outputs must be disconnected during this test. 2. Because the TOGA card may be set as a 1+1 or stand-alone unit, the pulse amplitude may vary slightly when cards are initially installed and coming into service. Depending on the type of test set used (i.e., HP 377722A, Digital Telecom Analyzer), in some cases, the test set may indicate a false loss of signal (LOS), or framing errors, etc. 3. Insertion of a disabling pin in a single port on a card of a 1+1 pair can cause the amplitude to be reduced from nominal. The result may be marginal with the nominal pulse mask, but well within the specification for signal reception by all office NEs. <p>Test Equipment: Dual-trace 100 MHz oscilloscope (refer to Table C for typical oscilloscope settings)</p>
1	Set SW1 on each TOGA card to conform to the requirements for this installation according to the Installation Job Specifications (Figure 33).
2	<p>Insert all TOGA cards in the TO slots specified by the local company Installation Job Specifications in all installed master and expansion shelves in the system.</p> <p>Requirements:</p> <ul style="list-style-type: none"> • On the TOGA cards just installed, the FAIL and PORT ALM lamps are off. (If the FAIL lamp lights when a clock or clock input card is active, replace the TO card.) • The INPUT and ST lamps light green (indicating the cards are receiving reference signals). (If the INPUT and ST lamps do not light, retest the clock input cards and the clock cards.)
3	<p>Note: The oscilloscope procedure for this step requires that the probes be terminated with the Test Load Impedance given on the waveform figure.</p> <p>Check each output of the cards just installed in the TO slots at the output panel, using a dual-trace 100 MHz oscilloscope. Table C lists the oscilloscope settings.</p> <p>Requirement: The output waveform must be as shown in Figure 17.</p>
4	If no 1+1 output card pairs are installed in the system, go to Step 8. Remove the left card from each 1+1 output card pair and repeat Step 3 at the output of each 1+1 output card pair.
5	Replace the left card in each 1+1 output card pair. Remove the right card from each 1+1 output card pair and repeat Step 3 at the output of each 1+1 output card pair.
6	Replace the right card in each 1+1 output card pair.
7	<p>Insert a disabling pin into each of the disabling pin jacks on the front panel of the card, one at a time.</p> <p>Requirement: The output of the port associated with the disabling pin jack is inhibited.</p> <p>Note: Inserting a disabling pin in a single port on a card of a 1+1 pair (power-combined redundant card pair) can cause the amplitude to be reduced from nominal. The result may be marginal with the nominal pulse mask, but well within the specification for signal reception by all office NEs.</p>

Chart 22. TOGA Card Test (Contd)

STEP	PROCEDURE
8	Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf. Requirement: The response indicates the command was completed successfully.
9	This procedure is completed. Indicate completion of the TOGA Card Test on the Test Sign-off form.



SW1 Settings

Section	Position	Meaning	Factory Setting
1	ON	Not used	X
	OFF	Not used	—
2	ON	Not used	X
	OFF	Not used	—
3	ON	When a disabling pin is inserted in jack, a PORT ALM lamp does not light	X
	OFF	When a disabling pin is inserted in jack, PORT ALM lamp lights	—
4	ON	Normal	X
	OFF	Not allowed	—

Figure 33. TOGA Card Switch

Chart 23. SCIU or ESCIU Card Test

STEP	PROCEDURE
	<p>Use this procedure to verify the operation of the SCIU and ESCIU cards.</p> <p>Note: If jack sets are not connected to the module, clip the BERTS to the Network Element (NE) ends of the cables connected to the SCIU or ESCIU wire-wrap module.</p> <p>Test Equipment: A DS1 Bit Error Rate Test Set (BERTS) for SCIU cards or an E1 BERTS for the ESCIU cards. This procedure assumes that standard level access jack sets (i.e., DSX-1) were cabled to the SCIU or ESCIU wire-wrap module.</p>
1	Set up the BERTS transmit signal to match the framing format and line coding of the traffic-carrying system that the SCIU or ESCIU card will be inserted.
2	<p>Set the option switches on each SCIU card per the following (refer to Figure 34):</p> <ul style="list-style-type: none"> • SW1, sections 1 to 6 and 8 to 10 to OFF, and section 7 to ON. • SW3, sections 1 to 5 for the cable length from the I/O module to the DSX for A direction of transmission and section 6 to 10 for the B direction. • SW4, sections 1 and 2 to ON, and sections 3 and 4 to OFF. • SW4, sections 1 and 2 to ON, and sections 3 and 4 to OFF. <p>Set the option switches on each ESCIU card as per the following (refer to Figure 35):</p> <ul style="list-style-type: none"> • SW1, sections 1 and 2 to ON, and sections 3 and 4 to OFF. • SW2, section 7 to ON, and sections 1 to 6 and 8 to 10 to OFF.
3	<p>Connect the 0 dB DSX (3 V b-p) transmit signal from the BERTS to the SCIU or ESCIU jack set (Table R) EAST A IN jack with a patch cord. Connect another patch cord from the SCIU or ESCIU 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>Requirement: No DS1 or E1 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>Requirement: No DS1 or E1 parameters are exceeded (no errors) on the BERTS receiver.</p>
5	After the test, leave the BERTS patch cords connected.
6	<p>Insert an SCIU or ESCIU card in the first TO slot, and check its lamp status.</p> <p>Requirement: On the card just installed, the FAIL lamp lights and then goes off, the SYNC and DS1B/E1B lamps light green, and the DS1A/E1A lamp lights red. On the MIS card, the MAJOR lamp is lit red to indicate that the DS1A/E1A receive signal is not present.</p> <p>Note: 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 and 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 23. SCIU or ESCIU 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>Remove the ESCIU card and change SW2, section 7 to OFF, and section 8 to ON. Reinsert the card.</p> <p>Requirement: The MINOR lamp on the MIS card is lit (MAJOR lamp goes off on the MIS card 6 s to 10 s after the SCIU or ESCIU card is removed).</p>
8	<p>Start the BERTS test and observe the receiver for 5 minutes.</p> <p>Requirement: No DS1 or E1 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>Requirement: No DS1 or E1 parameters are exceeded, except slips on the BERTS receiver. On the SCIU or ESCIU card, the DS1B/E1B lamp is lit red, the DS1A/E1A lamp is lit green, the bit slip lamps (0, 64, and 128 on SCIU card; 0, 128, and 192 on ESCIU card) alternately light and then go off, and the SLIP and HI SLIP lamps are lit red. The MAJOR and MINOR lamps on the MIS 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>Remove the ESCIU card and change SW2, section 8 to OFF, and section 9 to ON. Reinsert the card.</p> <p>Requirement: The MAJOR lamp is lit on the MIS card to indicate DS1B/E1B receive signal is not present. DS1B/E1B lamp is lit red on the SCIU or ESCIU 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>Remove the ESCIU card and change SW2, section 9 to OFF, and section 10 to ON. Reinsert the card.</p> <p>Requirement: The MINOR lamp is lit on the MIS card. DS1B/E1B lamp is lit red on the SCIU or ESCIU card (MAJOR lamp goes off on the MIS card 6 s to 10 s after the SCIU or ESCIU 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>Remove the ESCIU card and change SW2, section 10 to OFF, and section 3 to ON. Reinsert the card.</p> <p>Requirement: Initially, the MAJOR and MINOR lamps are off on the MIS card. When the SLIP lamp on the SCIU or ESCIU card lights red (may take several minutes), the MAJOR lamp lights on the MIS card (MINOR lamp goes off on the MIS card 6 s to 10 s after the SCIU or ESCIU card is removed).</p>

Chart 23. SCIU or ESCIU Card Test (Contd)

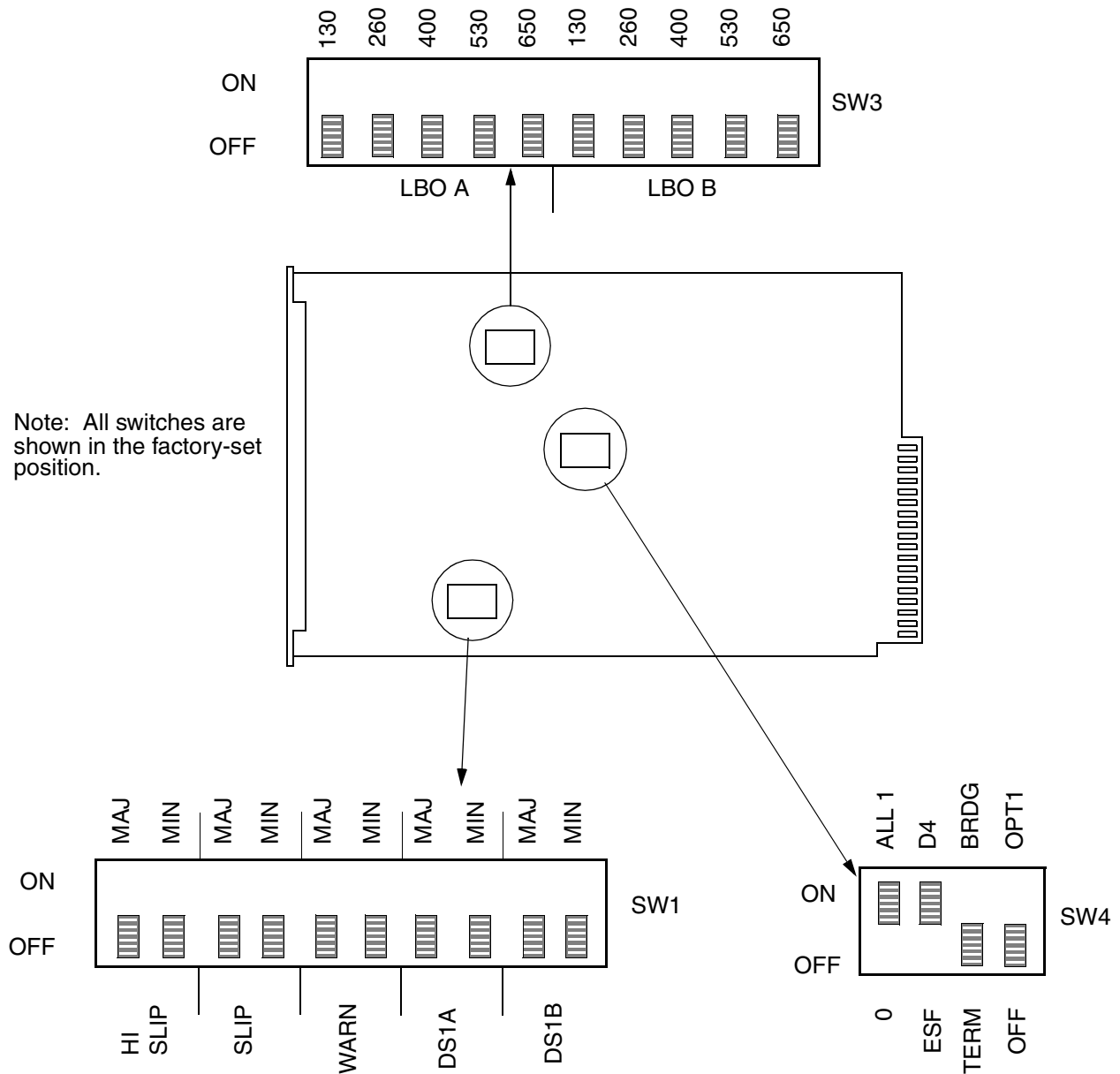
STEP	PROCEDURE
13	<p>Remove the SCIU card and change SW1, section 3 to OFF, and section 4 to ON. Reinsert the card.</p> <p>Remove the ESCIU card and change SW2, section 3 to OFF, and section 4 to ON. Reinsert the card.</p> <p>Requirement: When the SLIP lamp on the SCIU or ESCIU card lights red (may take several minutes), the MINOR lamp lights on the MIS card (MAJOR lamp goes off on the MIS card 6 s to 10 s after the SCIU or ESCIU card is removed).</p>
14	<p>Remove the SCIU card and change SW1, section 4 to OFF, and section 1 to ON. Reinsert the card.</p> <p>Remove the ESCIU card and change SW2, section 4 to OFF, and section 1 to ON. Reinsert the card.</p> <p>Requirement: First, the SLIP lamp on the SCIU or ESCIU card lights red after several minutes (the MAJOR and MINOR lamps on the MIS card are off). Then after several more minutes, the HI SLIP lamp on the SCIU or ESCIU card lights red, and the MAJOR lamp on the MIS card lights (the MINOR lamp goes off on the MIS card 6 seconds to 10 seconds after the SCIU or ESCIU 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>Remove the ESCIU card and change SW2, section 1 to OFF, and section 2 to ON. Reinsert the card.</p> <p>Requirement: After several minutes when the HI SLIP lamp on the SCIU or ESCIU card lights red, the MINOR lamp on the MIS card lights (the MAJOR lamp goes off on the MIS card 6 s to 10 s after the SCIU or ESCIU 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>Remove the ESCIU card and change SW2, section 2 to OFF. Reinsert the card and wait for the SLIP and HI SLIP lamps to light (may take several minutes).</p> <p>Requirement: The MAJOR and MINOR lamps on the MIS 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>Requirement: No DS1 or E1 parameters are exceeded (no errors) on the BERTS receiver.</p>
18	<p>At the SCIU or ESCIU card, press the RESET pushbutton on the front panel.</p> <p>Requirement: The SLIP and HI SLIP lamps go off. If the 64 or 128 (SCIU), or the 128 or 192 (ESCIU) bit slip lamps were lit, they will remain lit.</p>
19	<p>If the 64 or 128 (SCIU), or the 128 or 192 (ESCIU) bit slip lamps are lit, remove and reinsert the SCIU or ESCIU card.</p> <p>Requirement: The SLIP, HI SLIP, and all bit slip lamps are off and remain off for 5 minutes.</p>

Chart 23. SCIU or ESCIU Card Test (Contd)

STEP	PROCEDURE
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>Remove ESCIU card and set switch SW1, 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>Requirement: BERTS receiver sees same signal format as transmitted from the BERTS and no parameters are exceeded (no errors).</p>
21	<p>Remove the transmit patch cord from the BERTS.</p> <p>Requirement: The BERTS receives a framed all-ones signal.</p>
22	<p>Reinsert the BERTS transmit patch cord.</p> <p>Requirement: 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>Requirement: BERTS receives a framed all-ones signal.</p>
24	<p>Restore framing from BERTS transmitter.</p> <p>Requirement: 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>Remove ESCIU card and set switch SW1, 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>Requirement: BERTS receiver sees same signal format as transmitted for the BERTS and no parameters are exceeded (no errors).</p>
26	<p>Remove the transmit patch cord from the BERTS.</p> <p>Requirement: BERTS receives a loss-of-signal (LOS).</p>
27	<p>Reinsert the BERTS transmit patch cord.</p> <p>Requirement: BERTS receiver sees the BERTS transmit signal.</p>
28	<p>Send OOF condition from the BERTS.</p> <p>Requirement: BERTS receiver sees OOF.</p>
29	<p>Reinsert BERTS transmit patch cord.</p> <p>Requirement: BERTS receiver sees the BERTS transmit signal.</p>

Chart 23. SCIU or ESCIU Card Test (Contd)

STEP	PROCEDURE
30	<p>On the SCIU or ESCIU card, insert a disabling pin (provided) in the BYPASS jack on the front panel. Restart the BERTS test.</p> <p>Requirement: On the SCIU or ESCIU card, the BYPASS lamp is lit red. On a 5 minute BERTS test, no DS1 or E1 parameters are exceeded (no errors). On the SCIU or ESCIU 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>Requirement: No DS1 or E1 parameters are exceeded on the BERTS receiver. On the SCIU or ESCIU card, the SLIP, HI SLIP, and bit slip lamps are off.</p>
32	<p>Remove the disabling pin from the BYPASS jack on the SCIU or ESCIU card.</p> <p>Requirement: The BYPASS lamp goes off.</p>
33	<p>Remove the BERTS patch cords from the SCIU or ESCIU access jacks.</p>
34	<p>Remove the SCIU card and set SW1, SW3, and SW4 to conform to the requirements for this installation according to Installation Job Specifications (Figure 34, Table P, Table Q, and Table R). Reinsert the card in the shelf.</p> <p>Remove the ESCIU card and set SW1 and SW2 to conform to the requirements for this installation according to Installation Job Specifications (Figure 35, Table S, and Table T). Reinsert the card in the shelf. The ESCIU card does not have option switch settings for LBO.</p> <p>Note: SW1 (sections 5 and 6) WARN alarm option on the SCIU card, and SW2 (sections 5 and 6) on the ESCIU card, must always be set to OFF. The WARN alarm is associated with the 128-bit slip lamp (SCIU) and the 192-bit slip lamp (ESCIU) on the front panel of the SCIU or ESCIU 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 or ESCIU card to be installed in all shelves.</p>
36	<p>Use the INIT-REG command for every MRC card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
37	<p>This procedure is completed. Indicate completion of the SCIU or ESCIU Card Test on the Test Sign-off form.</p>



Notes:

1. See Table P 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 34. SCIU Card Switches

Table P. SCIU Option Settings

SECTION	SETTING	RESULT
SWITCH SW1		
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 (Factory setting)
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 (Factory setting)
SLIP MIN	OFF	
WARN MAJ	ON	Major alarm
WARN MIN	OFF	
WARN MAJ	OFF	Minor alarm
WARN MIN	ON	
WARN MAJ	OFF	No alarm (Factory setting)
WARN MIN	OFF	
DS1A MAJ	ON	Major alarm
DS1A MIN	OFF	
DS1A MAJ	OFF	Minor alarm
DS1A MIN	ON	
DS1A MAJ	OFF	No alarm (Factory setting)
DS1A MIN	OFF	
DS1B MAJ	ON	Major alarm
DS1B MIN	OFF	
DS1B MAJ	OFF	Minor alarm
DS1B MIN	ON	
Note: 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.		

Table P. SCIU Option Settings (Contd)

SECTION	SETTING	RESULT
SWITCH SW1 (Contd)		
DS1B MAJ	OFF	No alarm (Factory setting)
DS1B MIN	OFF	
SWITCH SW3 (Note 1)		
LBO A - 130	OFF	0 m to 40 m (0 ft - 130 ft)
LBO A - 260	OFF	40 m to 80 m (130 ft - 260 ft)
LBO A - 400	OFF	80 m to 120 m (260 ft - 400 ft)
LBO A - 530	OFF	120 m to 160 m (400 ft - 530 ft)
LBO A - 650	OFF	160 m to 200 m (530 ft - 650 ft)
LBO B - 130	OFF	0 m to 40 m (0 ft - 130 ft)
LBO B - 260	OFF	40 m to 80 m (130 ft - 260 ft)
LBO B - 400	OFF	80 m to 120 m (260 ft - 400 ft)
LBO B - 530	OFF	120 m to 160 m (400 ft - 530 ft)
LBO B - 650	OFF	160 m to 200 m (530 ft - 650 ft)
Note 1: 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. Note 2: Factory settings for SW1 and SW3 are OFF.		
SWITCH SW4		
0 / ALL 1	See Table Q	
ESF / D4	ON	D4 (SF) Framing
	OFF	ESF Framing
TERM / BRDG	ON	Bridging mode
	OFF	Terminated mode
OFF / OPT1	See Table Q	

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

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

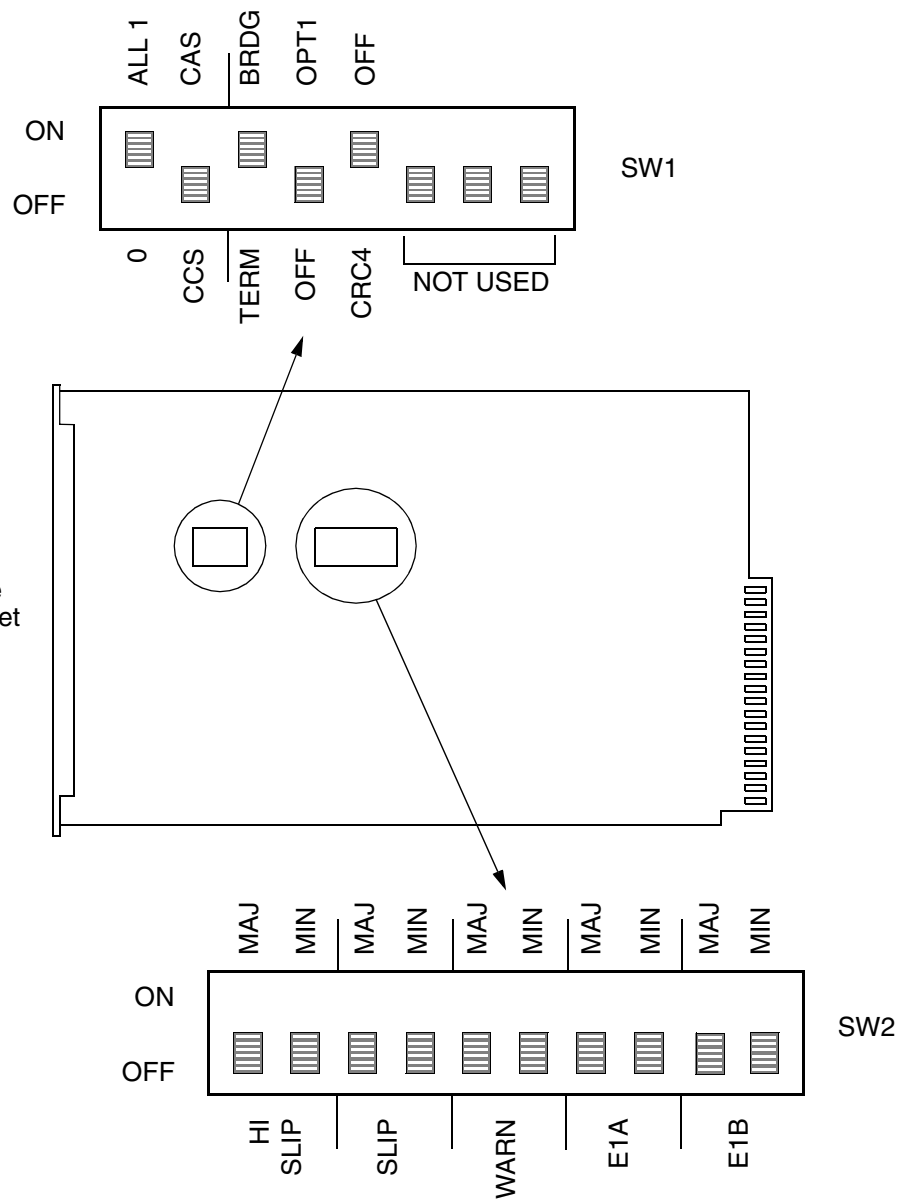
Note: Factory settings for SW4: Section 1 (0/ALL 1) and section 2 (ESF/D4) are ON; section 3 (TERM/BRDG) and section 4 (OFF/OPT 1) are OFF.

Table R. SCIU or ESCIU Wire-Wrap Connections

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	DS1/E1 B FAIL	SI RTN
3	T R S	WARNING	SI RTN	8	T R S	DS1/E1 A 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 R=Ring C=Digital Ground S=Shield Ground* D+=Data, +422 D- =Data, -422 D=Data, 423

* 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.



Notes:

1. See Table S for the ESCIU card option switch settings.
2. Factory settings for SW1: 0 / ALL 1, TERM/BRDGD, and CRC4 are ON; CCS/CAS, OFF/OPT 1, and the three switches not used are set to OFF.
3. Factory settings for SW2: All are set to OFF.
4. On SW1, MAJ and MIN switch positions for each alarm (HI SLIP, SLIP, E1A, and E1B) are mutually exclusive – one ON and the other OFF – or both OFF for NO ALARM for that condition.

Figure 35. ESCIU Card Switches

Table S. ESCIU Option Settings

SECTION	SETTING	RESULT
SWITCH SW1		
0 / ALL 1	See Table T (Factory set to ON)	
CCS/ CAS	ON	CAS Framing
	OFF	CCS Framing (Factory setting)
TERM / BRDG	ON	Bridging mode (Factory setting)
	OFF	Terminated mode
OFF OPT1	See Table T (Factory set to OFF)	
CRC4	ON	CRC Disabled (Factory setting)
	OFF	CRC Enabled
6	Not allowed (Factory set to OFF)	
7		
8		
SWITCH SW2		
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 (Factory setting)
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 (Factory setting)
SLIP MIN	OFF	

Table S. ESCIU Option Settings (Contd)

SECTION	SETTING	RESULT
SWITCH SW2 (Contd)		
WARN MAJ	ON	Major alarm
WARN MIN	OFF	
WARN MAJ	OFF	Minor alarm
WARN MIN	ON	
WARN MAJ	OFF	No alarm (Factory setting)
WARN MIN	OFF	
E1A MAJ	ON	Major alarm
E1A MIN	OFF	
E1A MAJ	OFF	Minor alarm
E1A MIN	ON	
E1A MAJ	OFF	No alarm (Factory setting)
E1A MIN	OFF	
E1B MAJ	ON	Major alarm
E1B MIN	OFF	
E1B MAJ	OFF	Minor alarm
E1B MIN	ON	
E1B MAJ	OFF	No alarm (Factory setting)
E1B MIN	OFF	
<p>Note: 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.</p>		

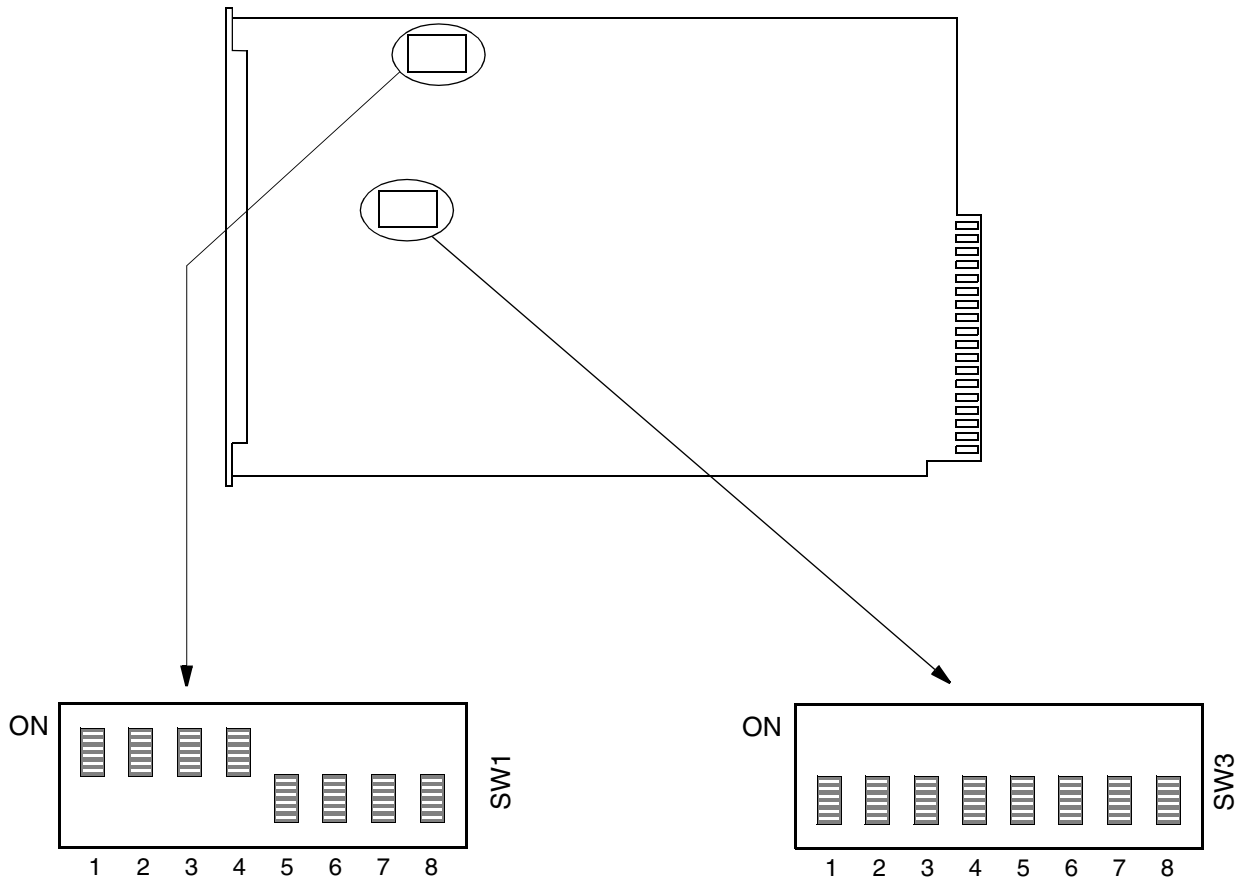
Table T. ESCIU SW1 0/ALL 1 and OFF/OPT1 Section Settings

SECTION	LABEL	SETTING	RESULT	
			INPUT LOS	INPUT OOF
1	0 / ALL 1	OFF	LOS output	LOS output
4	OFF / OPT1	OFF		
1	0 / ALL 1	OFF	LOS output	Received signal output
4	OFF / OPT1	ON		
1	0 / ALL 1	ON	Framed all-ones output (Factory setting)	Framed all-ones output (Factory setting)
4	OFF / OPT1	OFF		
1	0 / ALL 1	ON	Framed all-ones output	Received signal output
4	OFF / OPT1	ON		

Note: Factory settings for SW4: Section 1 (0/ALL 1) and section 2 (ESF/D4) are ON; section 3 (TERM/BRDG) and section 4 (OFF/OPT 1) are OFF.

Chart 24. PSM Card Test

STEP	PROCEDURE
	<p>Use this procedure to test PSM cards. Communications must have been established with a computer terminal per Chart 3 before starting this procedure.</p> <p>Test Equipment: Optional: E1 and T1 test set, or BERTS</p>
1	<p>On the PSM card, set all sections of switch SW1 to the ON position (Figure 36).</p>
2	<p>Set switch SW3 (Figure 36) to accept the framing for all inputs.</p>
3	<p>Insert the PSM card into the appropriate shelf slot and wait 2 minutes.</p> <p>Note: During the 2 minutes after insertion, the PSM card performs a lamp test.</p> <p>Requirement: After the signals have been qualified, the FAIL lamp is off. The REF lamps are lit red for the enabled (but not yet connected) inputs. The TOL lamps are off. The ST and INP lamps are lit green.</p>
4	<p>Repeat Steps 1 through 3 for each remaining PSM card to be installed in the system.</p>
5	<p>Temporarily connect one known good timing signal with framing (ST3 or better quality, 0 db signal strength) to PSM port 1 at the interface module and wait 2 minutes.</p> <p>Note: Timing signals that are assumed to be good are those from an E1 or T1 test set, such as a BERTS. Another source of timing signals assumed to be good is an E1 or T1 output from a DCD Shelf that is equipped with a reference input, two clock input cards, two clock cards, and an appropriate timing output card, all of which have been tested.</p> <p>Note: All four PSM card inputs are to be tested. The cables must be disconnected and reconnected during this procedure.</p> <p>Requirement: REF lamp 1 is lit green.</p>
6	<p>Repeat Step 5 with the other the PSM input ports.</p>
7	<p>Remove all temporary input timing signals connected in the previous steps.</p>
8	<p>Set the option switches on each PSM card to conform to the requirements for this installation according to the Installation Job Specifications</p>
9	<p>Repeat Steps 1 through 8 for each remaining PSM card to be installed in the system.</p>
10	<p>Use the INIT-REG command for every MRC and PSM card in the shelf. This initializes all registers on the shelf.</p> <p>Requirement: The response indicates the command was completed successfully.</p>
11	<p>This procedure is completed. Indicate completion of the PSM Card Test on the Test Sign-off form.</p>



Note: All switches are shown in the factory-set position.

Note: Refer to Table U or Table V for SW1 switch settings, and Table W or Table X for SW3 switch settings.

Figure 36. PSM Card Switches

Table U. PSM-T and PSM-E Card Switch SW1 Settings

SECTION	POSITION	MEANING	FACTORY SETTING
1	ON	Input 1 enabled	X
	OFF	Input 1 disabled	—
2	ON	Input 2 enabled	X
	OFF	Input 2 disabled	—
3	ON	Input 3 enabled	X
	OFF	Input 3 disabled	—
4	ON	Input 4 enabled	X
	OFF	Input 4 disabled	—
Note: Sections 5, 6, 7, and 8 are not used.			

Table V. PSM-EA Card Switch SW1 Settings

SECTION	POSITION	MEANING	FACTORY SETTING
1	ON	Input 1 enabled	X
	OFF	Input 1 disabled	—
2	ON	Input 2 enabled	X
	OFF	Input 2 disabled	—
3	ON	Input 3 enabled	X
	OFF	Input 3 disabled	—
4	ON	Input 4 enabled	X
	OFF	Input 4 disabled	—
5	ON	Analog signal	—
	OFF	E1 signal	X
6	ON	Analog signal	—
	OFF	E1 signal	X
7	ON	Analog signal	—
	OFF	E1 signal	X
8	ON	Analog signal	—
	OFF	E1 signal	X

Table W. PSM-T Card Switch SW3 Settings

SECTION/SETTING	MEANING	FACTORY SETTING
1 = ON, 2 = ON	Autoframing on input 1 enabled	—
1 = ON, 2 = OFF	ESF framing on input 1 enabled	—
1 = OFF, 2 = ON	D4 framing on input 1 enabled	—
1 = OFF, 2 = OFF	Autoframing on input 1 enabled	X
3 = ON, 4 = ON	Autoframing on input 2 enabled	—
3 = ON, 4 = OFF	ESF framing on input 2 enabled	—
3 = OFF, 4 = ON	D4 framing on input 2 enabled	—
3 = OFF, 4 = OFF	Autoframing on input 2 enabled	X
5 = ON, 6 = ON	Autoframing on input 3 enabled	—
5 = ON, 6 = OFF	ESF framing on input 3 enabled	—
5 = OFF, 6 = ON	D4 framing on input 3 enabled	—
5 = OFF, 6 = OFF	Autoframing on input 3 enabled	X
7 = ON, 8 = ON	Autoframing on input 4 enabled	—
7 = ON, 8 = OFF	ESF framing on input 4 enabled	—
7 = OFF, 8 = ON	D4 framing on input 4 enabled	—
7 = OFF, 8 = OFF	Autoframing on input 4 enabled	X

Table X. PSM-E and PSM-EA Card Switch SW3 Settings

SECTION	POSITION	MEANING	FACTORY SETTING
1	ON	CAS multiframing on input 1 enabled	—
	OFF	CCS multiframing on input 1 enabled	X
2	ON	CRC4 multiframing on input 1 enabled	—
	OFF	CRC4 multiframing on input 1 disabled	X
3	ON	CAS multiframing on input 2 enabled	—
	OFF	CCS multiframing on input 2 enabled	X
4	ON	CRC4 multiframing on input 2 enabled	—
	OFF	CRC4 multiframing on input 2 disabled	X
5	ON	CAS multiframing on input 3 enabled	—
	OFF	CCS multiframing on input 3 enabled	X
6	ON	CRC4 multiframing on input 3 enabled	—
	OFF	CRC4 multiframing on input 3 disabled	X
7	ON	CAS multiframing on input 4 enabled	—
	OFF	CCS multiframing on input 4 enabled	X
8	ON	CRC4 multiframing on input 4 enabled	—
	OFF	CRC4 multiframing on input 4 disabled	X

Chart 25. MIS Card System Management Setup

STEP	PROCEDURE
	<p>Use this procedure to set up the card databases for a shelf that contains a 090-45018-05 MIS card as installed and tested in Chart 3. The DCD-519 HD System uses this information for system management.</p> <p>Note: See the TL1 User's Guide for instructions about commands indicated in this procedure.</p>
1	<p>If SW1 on the MIS card conforms to the requirements for this installation, skip this step. Remove the MIS card, set the sections on SW1 to the required positions, and replace the MIS card.</p> <p>Requirement: On the MIS card (after the lamp test), the FAIL lamp is off, the MAJOR lamp is off, and the MINOR lamp flashes for up to 3 minutes before turning off.</p>
2	<p>If section 4 of SW1 is in the down (off) position, skip this step. Use the ACT-USER command to log on to the MIS card.</p> <p>Requirement: The user is logged on.</p>
3	<p>Use the INIT-SYS command with the appropriate <ph> value (see below and the TL1 User's Guide packaged with the appropriate software).</p> <p>If <ph> is 3:</p> <ul style="list-style-type: none"> • Deletes all card information from the database • Retains all security information as previously entered, including the users and passwords • Retains the source ID (SID) as previously entered • Retains all communication parameters as previously entered <p>If <ph> is 9:</p> <ul style="list-style-type: none"> • Deletes all card information from the database • Resets all security information to the factory settings • Resets the source ID (SID) to the factory settings, including only one user named "super" with a password of "sparky" • Resets all communication parameters to factory settings <p>Requirement: After up to 5 minutes, the response includes COMPLD.</p>
4	<p>Caution: Use the following command to transfer information in the direction indicated. Transferring configuration information to cards that are in service may interrupt service.</p> <p>Use the COPY-MEM command from the shelf to the MIS card to gather configuration information from the standard cards in the DCD-519 HD Shelf, and any GTI cards in an associated DCD-LPR Shelf.</p> <p>Requirement: The response includes COMPLD.</p>

Chart 25. MIS Card System Management Setup (Contd)

STEP	PROCEDURE
5	Use the INIT-REG command for every MRC and PSM card in the shelf. This initializes all registers on the shelf. Requirement: The response includes COMPLD.
6	Refer to the Operations section of the TL1 User's Guide for the steps to put the equipment into service and into the database.
7	If section 4 of SW1 is in the down (off) position, skip this step. Use the CANC-USER command to log off of the MIS card. Requirement: The user is logged off.
8	This procedure is completed. Indicate completion of the MIS Card System Management Setup on the Test Sign-off form.

Table Y. Test Sign-off

CHART #	TEST	COMPLETED
The test and acceptance procedures listed in this document are recommended guidelines. The Test Sign-off form is for customer use only. Use 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, and file locally, as per local company manual.		
1	Power Test	
2	Amplitude Verification Test	
3	MIS Card Test	
4	MRC Card Test	
5	ACI Card Test	
6	CI-EA Card Test	
7	CI Card Test	
8	DCIM-EA or DCIM-T Card Test	
9	ST2E or TNC-E Card Test	
10	ST2 Card Test	
11	ST3E or TNC Card Test	
12	ST3E Card Test	
13	ST2E or TNC-E with ST3E or TNC Card Test	
14	ST2E or TNC-E with ST3E Card Test	
15	EA10, EA20, EA10M or EA20M Card Test	
16	TOAA, TOLA, and TOTL Card Test	
17	TOCA, TOEA, and TOTA Card Test	
18	TO-EA Card Test	
19	TO-EAN Card Test	
20	TO-EA5 Card Test	
22	TOGA Card Test	

Table Y. Test Sign-off (Contd)

CHART #	TEST	COMPLETED
21	TOTA-5 or TOTA-M Card Test	
23	SCIU or ESCIU Card Test	
24	PSM Card Test	
25	MIS Card System Management Setup	
<p>DCD-519 HD Test and Acceptance completed by: _____</p> <p>Date: _____</p> <p>Comments:</p>		