DIGITAL CLOCK DISTRIBUTOR

519 HIGH DENSITY

MAINTENANCE

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1. GENERAL

1.01 This manual provides maintenance procedures for the Digital Clock Distributor 519 High Density (DCD-519 HD) System.

1.02 This section was reissued to add information to Figure 15. Changes and additions are marked by change bars.

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 acronyms are used in this document:

ACO	alarm cutoff
DCD	Digital Clock Distributor
LOS	loss of signal
MTIE	maximum time interval error
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 MRC-EA, MRC-EA^{V5}, MRC-T, and the MRC-T^{V5} cards, these cards are collectively referred to as MRC cards.
3. 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.
4. Where information is common to the TNC-E, TNC, ST2E, ST2, and ST3E cards, these cards are collectively referred to as clock cards.
5. Where information is common to the TNC-E, ST2, and ST2E cards, these cards are collectively referred to as rubidium clock cards.
6. Where information is common to the TNC and ST3E cards, these cards are collectively referred to as quartz clock cards.
7. Where information is common to the MCA-5 and MCA-5M cards, these cards are collectively referred to as MCA cards.
8. "Interface panel" is used when referring to either the I/O panel or the output panel.
9. 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 are interchangeable.

2. PREVENTIVE MAINTENANCE

2.01 The DCD-519 HD System is a self-sustaining system and does not require any preventive maintenance.

3. TROUBLESHOOTING

A. Troubleshooting Considerations

3.01 Most alarm conditions in the DCD-519 HD System are not out-of service or service-affecting conditions. The system is designed with redundant power, reference inputs, clock input cards, stratum clock cards, and output card protection switching.

3.02 The only true out-of-service condition is when ALL power is lost to a shelf, or ALL reference inputs AND both DCD clock cards fail. In most cases, these two conditions are caused by operating errors from hasty attempts at troubleshooting alarm conditions before proper alarms analysis is performed.

3.03 Before taking any action on the system, such as removing cards, first consider the following guidelines for troubleshooting the DCD System:

1. **DO** write down any alarm and normal lamp conditions in the shelf. These will help you to determine where to look for the cause of the condition.

2. **DO** determine if any network elements (NE) being timed from the DCD System are in alarm, or reporting slips.

3. **DO** use the DCD System manual and available job aids to assist you.

4. **DO** take your time. An operating error can affect ALL network elements in the office.

5. **DO** contact your supervisor, technical support and/or Symmetricom if you are not sure what to do.

6. **DO NOT** remove a clock card from the shelf, unless you are certain it is the cause of the condition. This is especially true if the clock card(s) is (are) in the Holdover mode (its HOLD OV/ HOLDOVER lamp is lit, or its HOLD OV/HOLDOVER and INP TOL lamps are lit). Removal of both clock cards in this condition will cause <u>total loss of all outputs</u> from the shelf and/or system.

7. **DO NOT** touch the shelf until you have analyzed the condition and know the possible result of any planned corrective actions.

8. **DO NOT PANIC!** Both major and minor alarms in the shelf require immediate attention. But, very few alarms in the DCD System are service affecting. IMPROPER corrective actions could be service affecting.

9. **DO NOT** touch the shelf until you have been properly grounded.

3.04 Always follow proper electrostatic discharge (ESD) precautions when handling DCD Shelf cards. This includes, but is not limited to:

- Wearing a properly grounded and tested wrist strap when handling cards.

- Storing DCD cards only in antistatic packaging provided by the factory.

B. Interpreting System Alarms, Lamps and Trouble Isolation

3.05 The DCD-519 HD System MIS card always generates contact closures indicating the severity of abnormal conditions as follows:

- CRITICAL alarm indicates total loss of ALL timing outputs from the shelf

- MAJOR alarm (both Office Alarm and Shelf Status contact closures are activated) indicates a card failure that is possibly service affecting

- MINOR alarm (both Office Alarm and Shelf Status contact closures are activated) indicating abnormal conditions that are not service affecting

3.06 Shelf Status PRTA (port alarm), CLKL (clock loss), BATTALM (battery alarm), and Clock Status A and B indicators are activated to assist in trouble isolation and repair.

3.07 When a system alarm is generated, the office audible alarm is activated. Press the alarm cutoff (ACO) pushbutton on the MIS card, in the DCD Shelf with the alarm, to silence the office audible alarm. The ACO does not deactivate the office visual alarm or any remote alarms. The ACO automatically resets when the alarm condition is cleared or when another type of alarm is generated. For example, if the ACO pushbutton was previously pressed for a MINOR alarm, and a new MAJOR alarm is generated, the ACO will reset (the ACO lamp goes off) and the office audible alarm will sound again.

3.08 When troubleshooting, write down all abnormal and normal lamp conditions for the shelf with the alarm lamp lit on its MIS card. This will assist in analyzing and isolating the cause of the condition. DO NOT start removing or replacing cards to attempt to clear alarms because it could lead to crashing the office timing system.

3.09 Use Table A to determine which table to reference for a particular card. When isolating clock card and clock input card faults, refer to Tables B and D. When the condition has been identified, the corrective action is listed in Tables C and E. Use Figure 1 to assist in locating shelf backplane switches, terminals and connectors. Use Figure 2 through Figure 30 to assist in interpreting the shelf and card lamp indications.

3.10 When isolating faults at the shelf, the ABNORMAL CARD LAMPS columns in Tables B and D identify fault conditions. When identifying faults from a remote location, the ACTIVATED OFFICE ALARMS AND SHELF STATUS and ACTIVATED CLOCK STATUS A and B columns in Tables B and D identify fault conditions.

3.11 The numbers in the CONDITION TYPE # column in Tables B and D match the numbers in the CONDITION TYPE # column in Tables C and E, where corrective actions are listed to correct the fault.

3.12 Tables F, G, and H are self-explanatory.

3.13 If the fault is determined to be a defective card, perform the appropriate card replacement procedure in this manual.

Table A. Troubleshooting Tables

CLOCK TYPE	GO TO
INPUT CARD OR CLOCK CARD PROBLEMS	
ST2, ST2E, or TNC-E	Table B
ST3E or TNC	Table D
MISCELLANEOUS PROBLEMS	
Miscellaneous	Table F
TOTA-5 or TOTA-M	Table G
EA10, EA20, EA10M, or EA20M	Table H

Table B. Input and ST2E, ST2, or TNC-E Alarm Conditions

MIS LAMPS	ABNORMAL CARD LAMPS	ACTIVATED OFFICE ALARMS AND SHELF STATUS	ACTIVATED CLOCK STATUS A AND B	CONDITION TYPE # (NOTE 1)
Notes: 1. Refer to Table C for the corrective action to take for each condition type. 2. For MRC or DCIM cards, all REF lights are red.				
None lit	ST2 A and/or ST2 B = Only FREE RUN and ACTIVE lit ST2E/TNC-E A and/or ST2E/ TNC-E B = Only HOLDOVER (green) and ACTIVE (green) lit	None	ST A = LOCK and FREERUN **and/or** ST B = LOCK and FREERUN	1
None lit	ST2 A and/or ST2 B = LOCKED off ST2E/TNC-E A and/or ST2E/ TNC-E B = LKD off	None	ST A = LOCK **and/or** ST B = LOCK	2
CRITICAL (MIS only), MAJOR, and MINOR lit (Note 2)	Input cards A and B = FAIL or REF lit, frequency/bit rate lamp off, SRC FL lit (ACI only) ST2 A and B = FREE RUN flashing ST2E/TNC-E A and B = HOLDOVER flashing green ALL TO cards = FAIL lit, ST and INPUT off. Option lamps are all off or all on MCA = 10 PORT ALM lit	Audible and Visual = CRITICAL, MAJOR, and MINOR Shelf Status = CRTSI, MAJSI, MINSI, and CLKL	ST A = LOCK and FREERUN on and off (flashing) **and/or** ST B = LOCK and FREERUN on and off (flashing)	3
MINOR lit	ST2 A and B = INP TOL and HOLD OV lit, LOCKED off ST2E/TNC-E A and B = INP TOL, HOLDOVER (red), and ACTIVE and LKD (green) lit	Audible and Visual = MINOR Shelf Status = MINSI (HOLDOVER ALARM switch SW3 on backplane set to MIN)	ST A = INPTOL, HOLDOVER, and LOCK **and** ST B = INPTOL, HOLDOVER, and LOCK	4
MINOR lit	ST2 A or B = INP TOL and HOLD OV lit, possibly LOCKED off ST2E/TNC-E A or B = INP TOL, HOLDOVER (red), and ACTIVE (green) lit, possibly LKD off	Audible and Visual = MINOR Shelf Status = MINSI (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN)	ST A = INPTOL, HOLDOVER, and possibly LOCK **or** ST B = INPTOL, HOLDOVER, and possibly LOCK	4
MINOR lit	ST2 A and B = INP UNLKD and LOCKED lit	Audible and Visual = MINOR Shelf Status = MINSI (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN)	ST A = UNLOCK **and** ST B = UNLOCK	5

Table B. Input and ST2E, ST2, or TNC-E Alarm Conditions (Contd)

MIS LAMPS	ABNORMAL CARD LAMPS	ACTIVATED OFFICE ALARMS AND SHELF STATUS	ACTIVATED CLOCK STATUS A AND B	CONDITION TYPE # (NOTE 1)
MINOR lit	ST2 A or B = INP UNLKD lit. LOCKED lit or off	Audible and Visual = MINOR Shelf Status = MINSI (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN)	ST A = UNLOCK and possibly LOCK **or** ST B = UNLOCK and possibly LOCK	6
MINOR lit	ST2E/TNC-E A and/or B = DRIFT lit. SRC A and/or B flashing green	Audible and Visual = MINOR Shelf Status = MINSI (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN)	ST A = UNLOCK **and/or** ST B = UNLOCK	7
MINOR lit (Note 2)	Input cards A and B = FAIL or REF lit, frequency/bit rate lamp off, SRC FL lit (ACI only) ST2 A and B = HOLD OV lit, LOCKED and REF A and B off ST2E/TNC-E A and B = HOLDOVER (red) and ACTIVE (green) lit, LKD and SRC A and B off	Audible and Visual = MINOR Shelf Status = MINSI and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MIN)	ST A = LOCK and HOLDOVER **and** ST B = LOCK and HOLDOVER	8
MINOR lit (Note 2)	Input cards A or B= FAIL or REF lit, frequency/bit rate lamp on or off, SRC FL lit (ACI only) ST2 A = REF B lit if input card A FAIL or REF lamp lit, possibly LOCKED off. ST2 B = REF A lit if input card B FAIL or REF lamp lit, possibly LOCKED off. ST2E/TNC-E A = SRC B lit if input card A FAIL or REF lamp lit, possibly LKD off. ST2E/TNC-E B = SRC A lit if input card B FAIL or REF lamp lit, possibly LKD off.	Audible and Visual = MINOR Shelf Status = MINSI and CLKL	ST A = possibly LOCK **or** ST B = possibly LOCK	9

Table B. Input and ST2E, ST2, or TNC-E Alarm Conditions (Contd)

MIS LAMPS	ABNORMAL CARD LAMPS	ACTIVATED OFFICE ALARMS AND SHELF STATUS	ACTIVATED CLOCK STATUS A AND B	CONDITION TYPE # (NOTE 1)
MINOR periodi-cally lights, then goes off	Input card A and/or B = FAIL periodically goes on and off. First occurrence, the SRC ACT/SRC ACTIVE on FAIL card goes off and lights on the other card. ST2/ST2E/TNC-E A and/or B = First occurrence, REF/SRC A and/or B change to the other REF/SRC lamp and possibly LOCKED/LKD off	Audible and Visual = Periodic MINOR Shelf Status = Periodic MINSI and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN)	ST A = First occurrence LOCK **and/or** ST B = First occurrence LOCK	10
MAJOR lit	ST2 A or B = FAIL lit. LOCKED and possibly REF A and B off ST2E/TNC-E A or B = FAIL lit. LKD and possibly SRC A and B off, OSC lit red	Audible and Visual = MAJOR Shelf Status = MAJSI	ST A = LOCK **or** ST B = LOCK	11
MAJOR and MINOR lit	ST2 A and B = INP TOL and HOLD OV lit, LOCKED off ST2E/TNC-E A and B = INP TOL HOLDOVER (red), and ACTIVE (green) lit, LKD off	Audible and Visual = MAJOR and MINOR Shelf Status = MAJSI MINSI, and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MAJ)	ST A = INPTOL, HOLDOVER, and LOCK **and** ST B = INPTOL, HOLDOVER, and LOCK	4
MAJOR and MINOR lit (Note 2)	Input cards A and B = FAIL or REF lit, frequency/bit rate lamp off, SRC FL lit (ACI only) ST2 A and B = HOLD OV lit, LOCKED, REF A and B off ST2E/TNC-E A and B = HOLDOVER (red) and ACTIVE (green) lit, LKD and SRC A and B off	Audible and Visual = MAJOR and MINOR Shelf Status = MAJSI and MINSI (HOLDOVER ALARM switch SW3 on backplane set to MAJ)	ST A = LOCK and HOLDOVER **and** ST B = LOCK and HOLDOVER	8

Table C. Input and ST2E, ST2, or TNC-E Corrective Actions

CONDITION TYPE # (FROM TABLE B)	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
1	No input cards installed. Outputs are as accurate as the freerunning clock cards.	Install at least one input card (Charts 1 through 2).
2	In a 10 second to 5 minute period, the input reference has drifted out of spec. ST2/ST2E/TNC-E is trying to reconverge and lock to the input reference. If successful, its LOCKED/LKD lamp will light. If not, it will try to converge until its pull-in range is exceeded, which causes the INP TOL alarm and enters HOLD OVER mode (CONDITION TYPE #4). Does not affect outputs.	May have been a phase transient on input reference. Wait 5 minutes to 20 minutes to see if the ST2/ST2E/TNC-E card's LOCKED/LKD lamp lights. If not, isolate and repair input reference facility.
3	Input reference A and B failed and the ST2/ST2E/TNC-E A and B clock cards have recently (5 minutes to 60 minutes) been removed and then reseated. All outputs are squelched.	Check input reference connections at the shelf and source ends. Reconnect if required. Isolate and repair input reference facilities, if required.
		Wait for ST2/ST2E/TNC-E A and B to stabilize and come on-line.
4	The input reference for the ST2/ST2E/TNC-E with its INP TOL and HOLD OV/HOLDOVER lamps lit has excessive jitter, wander, or severe frequency offset (out of pull-in range of ST2/ST2E/TNC-E cards).	Fix input source facility for the ST2/ST2E/TNC-E with its INP TOL and HOLD OV/HOLDOVER lamps lit.
	For ST2 Issue E or later - Possibly a defective input card.	Replace the associated input card (Charts 1 through 2).
	For ST2 Issue D or prior - Possibly the ST2 card's output frequency is offset.	If the ST2 cards are Issue D or prior, upgrade the cards, one at a time, to Issue E or later (Chart 4). If condition returns, isolate and repair the input reference.

Table C. Input and ST2E, ST2, or TNC-E Corrective Actions (Contd)

CONDITION TYPE # (FROM TABLE B)	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
5	The two input reference signals have an out of spec frequency difference. Not a service affecting condition. One or both input references are not Stratum-1 quality. Condition is most likely caused by severe wander on the input reference. The condition may come and go over minutes, hours, or days, depending on frequency and amplitude of wander.	Remove one input reference and apply a single input reference to both DCD shelf input terminals. If access jacks are provided on inputs, patch from the primary reference MON jack (from line facility) to the DCD input IN jack. INP UNLKD lamps go off immediately. May light again when LOCKED/LKD lamp lights. • If INP UNLKD lamps remain off for more than 1 hour, isolate wander on the input reference and repair or select a new input reference. • If INP UNLKD lamps remain lit for more than 2 hours, replace ST2/ST2E/TNC-E cards, one at a time, and repeat tests (basically a trial and error operation).
	On the ST2 card, Issue D or prior, the output frequency may have shifted greater than inputs unlocked specs, but less than input tolerance specs.	If ST2 cards are Issue D or prior, upgrade the cards, one at a time, to Issue E or later (Chart 4). If condition returns, isolate and repair input reference.
6	Valid inputs unlocked condition occurs when both ST2 cards are locked to their input reference (LOCKED lamps are lit) and both cards' INP UNLKD lamps are lit. If only one ST2 card's INP UNLKD lamp is lit, the ST2 card is defective.	Replace the ST2 card (Chart 4).
7	Input reference A and/or B rate of frequency change, as compared to ST2E/TNC-E output, has exceeded the Drift specification. The green flashing SRC (A and/or B) lamp(s) indicates which input reference is drifting.	Isolate and repair the input reference (A and/or B) facility (the one associated with the green flashing SRC [A and/or B] lamp).
8	All A and B input sources have failed.	Check input reference connections at the shelf and source ends. Reconnect if required. Isolate and repair input reference facilities, if required.
	The input reference facility framing format rearranged from D4 to ESF, or vice versa, and the input card options were not changed to match it.	Change the option switch settings to match the current framing format of the input reference facilities.
	The input reference has been recently reassigned, and the signal amplitude is too high.	Wire a 100 Ω, 1/4 W resistor across T and R input terminals on the shelf backplane.
	Both input cards have failed.	Replace both input cards (Charts 1 through 2).

Table C. Input and ST2E, ST2, or TNC-E Corrective Actions (Contd)

CONDITION TYPE # (FROM TABLE B)	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
9	All input references for A or B have failed (frequency/bit rate lamp off) or has exceeded BPV, OOF, or excessive zeros parameters (frequency/bit rate lamp lit). Note: ST2/ST2E/TNC-E card's LOCKED/LKD lamp will be off if ST2/ST2E/TNC-E card is still converging on new input reference.	Check input reference connections at the shelf and source ends. Reconnect if required. Isolate and repair input reference A or B facility (one associated with the input card displaying a lit FAIL lamp).
	Input card A or B has failed. Note: ST2/ST2E/TNC-E card's LOCKED/LKD lamp will be off if ST2/ST2E/TNC-E card is still converging on new input reference.	Replace the input card with the FAIL lamp lit (Charts 1 through 2).
	The input reference facility framing format rearranged from D4 to ESF, or vice versa, and the input card options were not changed to match it.	Change the option switch settings to match the current framing format of the input reference facilities.
	The input reference has been recently reassigned, and the signal amplitude is too high.	Wire a 100 Ω, 1/4 W resistor across T and R input terminals on the shelf backplane.
10	Input reference facility (A and/or B) line coding rearranged from AMI to B8ZS and input card(s) option switches were not set to match the change. Input card BPV spec periodically exceeded.	Change input card(s) option switch settings from AMI to B8ZS.
11	ST2 /ST2E/TNC-E A or B card has failed.	Replace failed ST2/ST2E/TNC-E card (Chart 4 for ST2 cards or Chart 3 and Chart 5 for ST2E or TNC-E cards).

Table D. Input and TNC or ST3E Alarm Conditions

MIS LAMPS (NOTE 1)	ABNORMAL CARD LAMPS	ACTIVATED OFFICE ALARMS AND SHELF STATUS (NOTE1)	ACTIVATED CLOCK STATUS A AND B	CONDITION TYPE # (NOTE 2)
Notes: 1. If SW1 position 5 on either quartz clock card is set for MAJ, it will cause MAJOR and MINOR alarm conditions when its HOLD OV lamp is lit, regardless of the setting (MAJ or MIN) of the HOLDOVER ALARM switch SW3 on the backplane. Both quartz clock cards' SW1 switches and SW3 on the backplane must be set to MIN to cause only a MINOR alarm condition when the quartz clock card's HOLD OV lamp is lit. If both quartz clock cards are set to MIN, and backplane SW3 is set to MAJ, then both quartz clock cards' HOLD OV lamp must be lit to cause a MAJOR alarm condition. 2. Refer to Table E for the corrective action to take for each condition type. 3. For MRC or DCIM cards, all REF lights are red.				
None lit	Quartz clock A and/or quartz clock B = Only FREE RUN and ACTIVE lit	None	ST A = LOCK and FREERUN **and/or** ST B = LOCK and FREERUN	1
None lit	Quartz clock A and/or quartz clock B = LOCKED off	None	ST A = LOCK **and/or** ST B = LOCK	2
CRITICAL (MIS only), MAJOR, and MINOR lit (Note 3)	Input cards A and B = FAIL or REF lit, frequency/bit rate lamp off, SRC FL lit (ACI only) Quartz clock A and B = FREE RUN flashing, ACTIVE and LOCKED are off ALL TO cards = FAIL lit, ST, and INPUT off. Option lamps are all off or all on MCA = 10 PORT ALM lit	Audible and Visual = MAJOR, MINOR, and CRITICAL Shelf Status = MAJSI, MINSI, CRTSI, and CLKL	ST A = LOCK on, and FREERUN on and off (flashing) **and/or** ST B = LOCK on, and FREERUN on and off (flashing)	3
MINOR lit	Quartz clock A and B = INP TOL and HOLD OV lit, LOCKED off	Audible and Visual = MINOR Shelf Status = MINSI and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MIN and SW1, position 5 on each quartz clock set to MIN)	ST A = INPTOL, HOLDOVER, and LOCK **and** ST B = INPTOL, HOLDOVER, and LOCK	4
MINOR lit	Quartz clock A or B = INP TOL and HOLD OV lit, LOCKED off	Audible and Visual = MINOR Shelf Status = MINSI and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN and SW1, position 5 on each quartz clock set to MIN)	ST A = INPTOL, HOLDOVER, and LOCK **or** ST B = INPTOL, HOLDOVER, and LOCK	5

Table D. Input and TNC or ST3E Alarm Conditions (Contd)

MIS LAMPS (NOTE 1)	ABNORMAL CARD LAMPS	ACTIVATED OFFICE ALARMS AND SHELF STATUS (NOTE1)	ACTIVATED CLOCK STATUS A AND B	CONDITION TYPE # (NOTE 2)
MINOR lit (Note 3)	Input cards A and B = FAIL or REF lit, frequency/bit rate lamp off, SRC FL lit (ACI only) Quartz clock A and B = HOLD OV lit, LOCKED and REF A and B off	Audible and Visual = MINOR Shelf Status = MINSI and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MIN and SW1, position 5 on each quartz clock set to MIN)	ST A = LOCK and HOLDOVER **and** ST B = LOCK and HOLDOVER	6
MINOR lit (Note 3)	Input cards A or B= FAIL or REF lit, frequency/bit rate lamp on or off, SRC FL lit (ACI only) Quartz clock A and B = possibly LOCKED off	Audible and Visual = MINOR Shelf Status = MINSI and CLKL	ST A = possibly LOCK **and** ST B = possibly LOCK	7
MINOR periodi-cally lights, then goes off	Input card A and/or B = FAIL periodically goes on and off. First occurrence only the SRC ACT/SRC ACTIVE on FAIL card goes off and lights on the other card Quartz clock A and/or B = First occurrence, REF A and/or B change to the other REF lamp and possibly LOCKED off	Audible and Visual = Periodic MINOR Shelf Status = Periodic MINSI and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MAJ or MIN)	ST A = First occurrence LOCK **and/or** ST B = First occurrence LOCK	8
MAJOR lit	Quartz clock A or B = FAIL lit. LOCKED and possibly REF A and B off	Audible and Visual = MAJOR Shelf Status = MAJSI	ST A = LOCK **or** ST B = LOCK	9
MAJOR and MINOR lit	Quartz clock A and B = INP TOL and HOLD OV lit, LOCKED off	Audible and Visual = MAJOR and MINOR Shelf Status = MAJSI, MINSI, and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MAJ and SW1 position 5 on each quartz clock set to MAJ)	ST A = INPTOL, HOLDOVER, and LOCK **and** ST B = INPTOL, HOLDOVER, and LOCK	4
MAJOR and MINOR lit (Note 3)	Input cards A and B = FAIL or REF lit, frequency/bit rate lamp off, SRC FL lit (ACI only) Quartz clock A and B = HOLD OV lit, LOCKED and REF A and B off	Audible and Visual = MAJOR and MINOR Shelf Status = MAJSI, MINSI, and CLKL (HOLDOVER ALARM switch SW3 on backplane set to MAJ and SW1 position 5 on each quartz clock set to MAJ)	ST A = LOCK and HOLDOVER **and** ST B = LOCK and HOLDOVER	6

Table E. Input and TNC or ST3E Corrective Actions

CONDITION TYPE # (FROM TABLE D)	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
1	No input cards installed. Outputs are as accurate as the freerunning clock cards.	Install at least one input card (Charts 1 through 2).
2	In a 10 second to 5 minute period, the input reference has drifted out of spec. The quartz clock card is trying to reconverge and lock to the input reference. If successful, its LOCKED lamp will light. If not, it will try to converge until its pull-in range is exceeded, which causes the INP TOL alarm and enters HOLD OVER mode (CONDITION TYPE #4). Does not affect outputs.	May have been a phase transient on input reference. Wait 5 minutes to 20 minutes to see if the quartz clock card's LOCKED lamp lights. If not, isolate and repair input reference facility. If the quartz clock card has been installed for less than 6 hours, wait for the quartz clock card to fully converge on the input reference. During this period, the LOCKED lamp may go on and off several times.
3	Input reference A and B failed, and the quartz A and B clock cards have recently (5 minutes to 35 minutes) been removed and then reseated. All outputs are squelched.	Check input reference connections at the shelf and source ends. Reconnect if required. Isolate and repair input reference facilities, if required.
		Wait for quartz clock card A and B to stabilize and come online.

Table E. Input and TNC or ST3E Corrective Actions (Contd)

CONDITION TYPE # (FROM TABLE D)	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
4	The active input reference has excessive jitter, wander, or severe frequency offset (out of pull-in range of quartz clock cards). Does not affect outputs for several hours. Outputs are as accurate as clock in holdover mode.	Press the transfer (XFR) pushbutton on either input card to switch source (SRC) active to the other input card (SRC ACT/SRC ACTIVE lamp goes off on one input card and lights on the other). Then, observe the INP TOL and HOLDOVER lamps and perform one of the following: 1. If the INP TOL and HOLDOVER lamps on the quartz clock cards go off in approximately 2 minutes, isolate and repair input reference facility, and/or replace the previously active input card (Charts 1 through 2). 2. If the INP TOL and HOLDOVER lamps do not go off in approximately 2 minutes, isolate and repair both input reference facilities, and/or replace both input cards (Charts 1 through 2).
5	One of the quartz clock cards is not functioning properly. Outputs are off frequency if the quartz clock A is not functioning properly.	Trial and error; replace quartz clock cards one at a time (Chart 5). Hint: If network elements (NE) being timed from DCD outputs are not reporting slips, replace quartz clock B first. If NEs are reporting slips, replace quartz clock A first.
6	All A and B input references have failed.	Check input reference connections at the shelf and source ends. Reconnect if required. Isolate and repair input reference facilities, if required.
	The A and B input reference facility framing format rearranged from CAS to CCS, or vice versa, and the input card options were not changed to match it.	Change the option switch settings to match the current framing format of the input reference facilities.
	The input reference has been recently reassigned, and the signal amplitude is too high.	Wire a 100 Ω, 1/4 W resistor across T and R input terminals on the shelf backplane.
	Both input cards have failed.	Replace both input cards (Charts 1 through 2).

Table E. Input and TNC or ST3E Corrective Actions (Contd)

CONDITION TYPE # (FROM TABLE D)	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
7	Input reference A or B has failed (frequency/bit rate lamp off) or has exceeded BPV, OOF, or excessive zeros parameters (frequency/bit rate lamp lit). Note: Quartz clock card's LOCKED lamp will be off if the quartz clock card is still converging on new input reference.	Check input reference connections at the shelf and source ends. Reconnect if required. Isolate and repair input reference A or B facility (one associated with the input card displaying a lit FAIL lamp).
	Input card A or B has failed. Note: The quartz clock card's LOCKED lamp will be off if quartz clock card is still converging on new input reference.	Replace the input card with the FAIL lamp lit (Charts 1 through 2).
	The A or B input reference facility framing format rearranged from CCS to CAS, or vice versa, or from D4 to ESF, or vice versa, and the input card options were not changed to match it.	Change the option switch settings to match the current framing format of the input reference facilities.
	The A or B input reference has been recently reassigned, and the signal amplitude is too high.	Wire a 100 Ω, 1/4 W resistor across T and R input terminals on the shelf backplane.
8	Input reference facility (A and/or B) line coding rearranged from AMI to B8ZS and input card(s) option switches were not set to match the change. Input card BPV spec periodically exceeded.	Change input card(s) option switch settings from AMI to B8ZS.
9	Quartz clock A or B has failed. Outputs are not affected.	Replace failed quartz clock card (Chart 5

Table F. Shelf and Miscellaneous Conditions

MIS LAMPS	ABNORMAL SHELF AND CARD LAMPS	CONDITION AND PROBABLE CAUSE	CORRECTIVE ACTIONS
MINOR lit	Shelf fuse A or B lamp lit	Loss of Battery A or B to shelf. Does not affect outputs. Causes could be from operating error, blown fuse, or a component failure, e.g., isolation diode which shorts battery to battery return.	1. Determine cause of loss of battery and repair. 2. Replace blown fuses in battery distribution bays, miscellaneous fuse bays, and panels, and/or on DCD shelf.
MAJOR lit and/ or MINOR lit	FAIL lamp lit on any TO card, MIS card, or clock card	Card with FAIL lamp lit has failed, except for input card which causes a MINOR alarm when its FAIL lamp lights. Outputs are not affected if redundant card is installed.	Replace the card with the FAIL lamp lit (Charts 3 through 10).
MAJOR and MINOR lit	Shelf fuse A or B lamp lit	Loss of Battery A or B to shelf. Does not affect outputs. Causes could be from operating error, blown fuse, or a component failure, e.g., isolation diode which shorts battery to battery return.	1. Determine cause of loss of battery and repair. 2. Replace blown fuses in battery distribution bays, miscellaneous fuse bays, and panels, and/or on DCD shelf.
CRITICAL lit	All lamps on all cards except MIS are off	Loss of Battery A and B to shelf. All outputs are squelched. Causes could be from operating error, office battery source failure, blown fuses, or a component failure, e.g., isolation diode which shorts battery to battery return.	1. Determine cause of loss of battery and repair. 2. Restore office battery source. 3. Replace blown fuses in battery distribution bays, miscellaneous fuse bays, and panels, and/or on DCD Shelf.

Table G. TOTA-5 or TOTA-M Card Fault Isolation

MIS LAMPS	TOTA-5 or TOTA-M CARD LAMPS	FAULT CONDITION	CORRECTIVE ACTION
MINOR or MAJOR lit (Note)	PORT ALM is lit	• One or more of the timing outputs on the TOTA-5 or TOTA-M card has failed • The TOTA-5 or TOTA-M card has failed • A timing output has been externally shorted	1. Locate external shorts; if timing output has been externally shorted, remove the short. 2. If one or more of the timing outputs has failed, replace the faulty TOTA-5 or TOTA-M card (Chart 6).
MINOR lit	1 to 3 reference lamps (ST A, ST B, INP A, INP B) lamps are lit red	• One or more of the 4 kHz input reference signals has been disqualified • A clock or clock input card is not installed or has failed • The TOTA-5 or TOTA-M card has failed	1. Check that all clock and clock input cards are installed. 2. Check the clock and clock input cards for faults (Table B or Table D). 3. If all clock and clock input cards are installed and working properly, replace the faulty TOTA-5 or TOTA-M card (Chart 6).
MAJOR lit	FAIL lamp is lit	Hardware failure on the TOTA-5 or TOTA-M card	Replace the faulty TOTA-5 or TOTA-M card (Chart 6).
CRITICAL and MAJOR lit	ST A, ST B, INP A, INP B, and the FAIL lamp are lit red	• All clock or clock input cards are not installed or have failed • The TOTA-5 or TOTA-M card has failed	1. Check that all clock and clock input cards are installed. 2. Check the clock and clock input cards for faults (Table B or Table D). 3. If all clock and clock input cards are installed and working properly, replace the faulty TOTA-5 or TOTA-M card (Chart 6).
Note: TOTA-5 or TOTA-M cards can be configured to generate a minor or major alarm upon a PORT ALM condition, using the card switch or TL1 commands.			

Table H. EA10, EA20, EA10M, or EA20M Card Fault Isolation

MIS LAMPS	EA10 OR EA20 CARD LAMPS	FAULT CONDITION	CORRECTIVE ACTION
MINOR or MAJOR lit (Note)	PORT ALM on EA10, EA20, EA10M, or EA20M card is lit	One or more of the timing outputs on the EA10, EA20, EA10M, or EA20M card have failed	Replace the faulty EA10, EA20, EA10M, or EA20M card (Chart 6).
MINOR lit	1 to 3 reference lamps (ST A, ST B, INP A, and/or INP B) on the EA10, EA20, EA10M, or EA20M card are lit red	• One or more of the 4 kHz input reference signals have been disqualified • A clock or clock input card is not installed or has failed • The EA10, EA20, EA10M, or EA20M card has failed	1. Check that all clock and clock input cards are installed. 2. Check the clock and clock input cards for faults (Table B or Table D). 3. If all clock and clock input cards are installed and working properly, replace the faulty EA10, EA20, EA10M, or EA20M card (Chart 6).
MINOR lit	• ST A, ST B, INP A, INP B, CAS, CCS, CRC4 lamps on both cards in a redundant pair do not match • One card of a redundant pair is missing	One card of a redundant pair has been improperly provisioned or removed	Set both cards in the redundant pair with exactly the same values for all parameters and the same settings for all switch sections, whether or not those parameters and settings are currently in use.
MAJOR lit	FAIL lamp on EA10, EA20, EA10M, or EA20M card is lit, no other EA10, EA20, EA10M, or EA20M lamps are abnormal	The EA10, EA20, EA10M, or EA20M card has failed	Replace the faulty EA10, EA20, EA10M, or EA20M card (Chart 6).
CRITICAL and MAJOR lit	ST A, ST B, INP A, INP B, and the FAIL lamp on the EA10, EA20, EA10M, or EA20M card are lit red	• All clock or clock input cards are not installed or have failed • The EA10, EA20, EA10M, or EA20M card has failed	1. Check that all clock and clock input cards are installed. 2. Check the clock and clock input cards for faults (Table B or Table D). 3. If all clock and clock input cards are installed and working properly, replace the faulty EA10, EA20, EA10M, or EA20M card (Chart 6).
Note: The EA10, EA20, EA10M, or EA20M card can be configured to generate a minor or major alarm upon a PORT ALM condition, using the card switch or TL1 commands.			

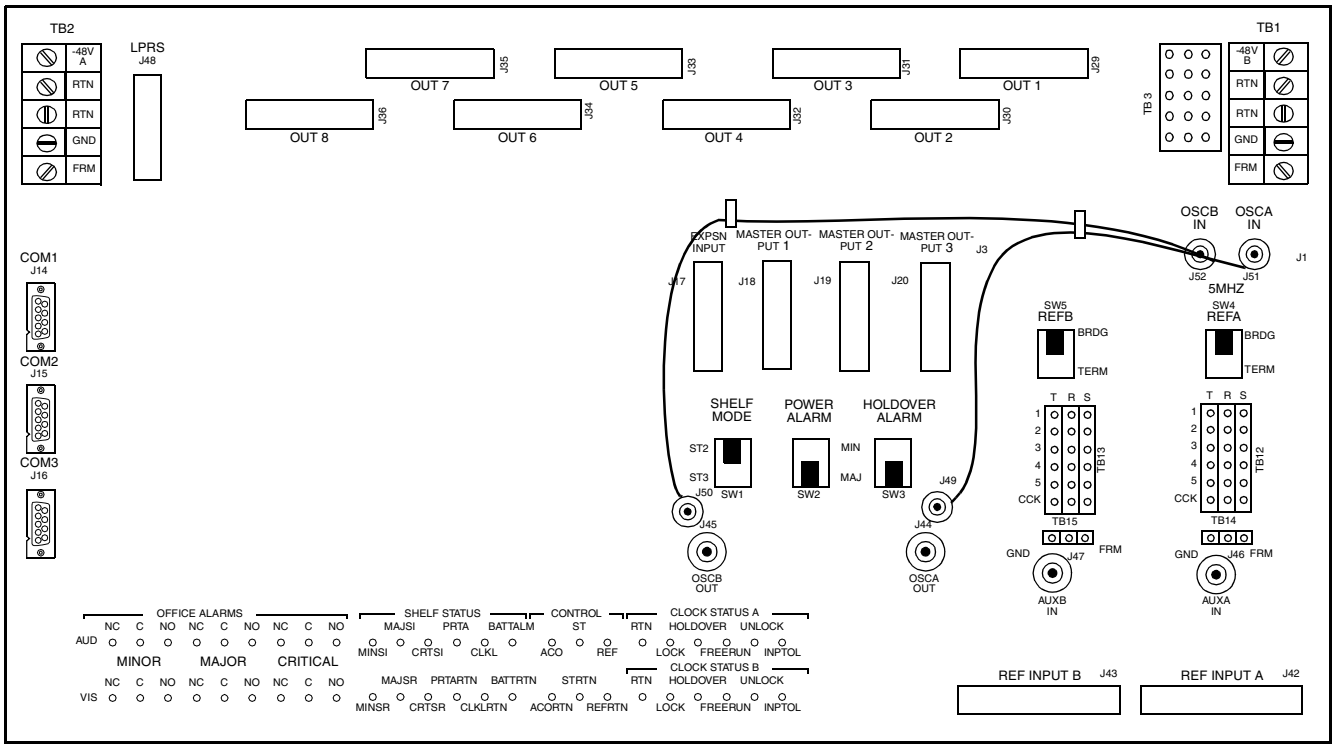


Figure 1. DCD-519 HD Shelf (Rear View)

4. CARD REPLACEMENT PROCEDURES

4.01 Each card in the system has a FAIL lamp on its front panel. This lamp lights when the power supply or the microprocessor on the card has failed. When a card's FAIL lamp is lit, its output is squelched and the card may be removed from the shelf without negative effect to the shelf's operation.

4.02 Observe the following when replacing cards:

- Always use Tables B, D, F, G, and H to isolate the source of the trouble before removing or replacing cards. Reseating cards in attempts to clear alarms is not a recommended course of action. This action may cause loss of ALL timing in the office.
- If a replacement card does not clear the trouble symptom, remove the replacement card and install the original card, after reverifying its option switch settings.
- When removing or replacing a card, do not "drag" it in or out slowly.
- When a replacement card is inserted, verify that its FAIL lamp does not light. If its FAIL lamp lights, it is defective and should be replaced with another card.

Caution: Do not perform test and acceptance procedures on replacement cards installed in a DCD-519 HD Shelf supplying timing to network equipment. Failure to observe this caution will result in service interruption.

4.03 Refer to Charts 1 through 10 for instructions on card replacement.

A. Clock Input Cards

4.04 Refer to Charts 1 through 2 for clock input card replacement procedures.

B. Clock Cards

Caution: Never remove both clock cards at the same time if their HOLD OV/HOLD-OVER or FREE RUN lamps are lit. This action will cause ALL DCD system outputs to fail. Swapping clock cards that are not in holdover mode or freerun mode may cause hits on the outputs. Always use the Alarm Conditions tables (Table B, Table D, Table F, and Table G) to properly isolate the trouble condition before attempting to fix the trouble by card replacement.

4.05 Refer to Charts 3 through 5 for clock card replacement procedures.

C. Output Cards

4.06 Refer to Charts 6 and 7 for TO card replacement procedures. Refer to Chart 8 for SCIU or ESCIU card replacement procedures.

D. Control and Monitor Cards

4.07 Refer to Chart 9 for PSM card replacement procedures. Refer to Chart 10 for MIS card replacement procedures.

Chart 1. CI-EA, CI, DCIM-EA, DCIM-T, or ACI Card Replacement

STEP	PROCEDURE
Use this procedure to replace a CI-EA, CI, DCIM-EA, DCIM-T, or ACI card. ***Notes:*** 1. Use this chart whether or not the card's FAIL lamp is lit. 2. See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	If the shelf is in alarm, press the ACO pushbutton on the MIS card or use a TL1 command to silence the office audible alarm.
2	If a failed card is being replaced, skip this step. To replace a card that is in service, remove the input reference signal associated with the clock input card to be removed. Perform one of the following: a. If the equipment at the source of the reference input has a miscellaneous synchronization jack, insert an open plug or the end of a patch cord in the jack to stop the input reference signal. b. If the input reference is cabled through an external bridging repeater, insert an open plug or the end of a patch cord in the OUT jack at the bridging repeater to stop the input reference signal. c. If the input reference signal is directly cabled from the source to the DCD shelf, either lift the leads off the input module connectors, or short the tip (T) and ring (R) pins of the input module connector, using a clip cord that is no longer than 5.1 cm (2 inches). ***Caution: A clip cord longer than 5.1 cm (2 inches) may not look like a short to the clock input card and the input reference may continue to drive it.*** ***Requirement:*** On a CI card, the DS1 lamp is off and the FAIL lamp is lit. On an ACI card, the SRC FAIL and INPUT FAIL lamps are lit red. On a CI-EA card, the SIGNAL FAULT and FAIL lamps are lit red. On a DCIM-EA or DCIM-T card, the FAIL, REF 1, and REF 2 lamps are lit red, and the STATUS 1, STATUS 2, and SRC ACTIVE lamps are off. ***Note:*** Do not proceed if the requirements have not been met; unmet requirements are an indication that the input reference has not been properly removed.
3	Follow the instructions in the TL1 Operations Guide to remove the card from service.
4	If the SRC ACTIVE or SRC ACT lamp is lit on only one input card, press the transfer (XFR) pushbutton on either input card to transfer active status to the nonfailed input card. ***Requirement:*** The SRC ACTIVE or SRC ACT lamp is off on the card to be replaced.
5	Remove the card from the shelf. ***Requirement:*** Wait for a CARD IS MISSING message to appear on the terminal.

Chart 1. CI-EA, CI, DCIM-EA, DCIM-T, or ACI Card Replacement (Contd)

STEP	PROCEDURE
6	Set the option switches on the replacement card to the same positions as the switches on the removed card.
7	Insert the replacement card into the same slot as the card that was removed.
8	If a failed card is being replaced, skip this step. Restore the input references by removing the open plug, clip cord, or reconnecting the leads to the input module connector.
9	Observe the front-panel lamps. ***Requirement:*** Wait for the input card to acquire the input reference signal (about 8 seconds to 60 seconds). The SRC ACT or SRC ACTIVE lamp lights green on the active card.
10	For DCIM cards, ignore this step. Use the ENT-INVENTORY command to enter the serial number of the replacement card (if replacing a failed card) or the complete inventory of the replacement card (if replacing with a card of a different part number) into the MIS card's database and place the card into service. ***Requirement:*** The response indicates the command was completed successfully.
11	Follow the instructions in the TL1 Operations Guide to place the card into service.
12	If no MRC or PSM cards are in the shelf, skip this step. Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
13	This procedure is completed.

Chart 2. MRC^{V5} Card Replacement

STEP	PROCEDURE
Use this procedure to replace a MRC^{V5} card. ***Notes:*** 1. Use this chart whether or not the card's FAIL lamp is lit. 2. When replacing an MRC^{V5} card, make sure the replacement card has the same part number as the card being replaced; i.e., replace a -56 card with a -56 card. 3. See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	If the shelf is in alarm, press the ACO pushbutton on the MIS card or use a TL1 command to silence the office audible alarm.
2	If the shelf is equipped with an ST3E or TNC card, the ST2/ST3 switch (SW1) on the rear panel (Figure 1) is set to ST3, and the FAIL lamp on the failed input card is not lit, check the status of the input card SRC ACT or SRC ACTIVE lamp. If lit, press the transfer (XFR) push-button on either input card. ***Requirement:*** The SRC ACT or SRC ACTIVE lamp on the nonfailed input card lights. The SRC ACT or SRC ACTIVE lamp on the failed input card goes off.
3	If a failed card is being replaced, skip this step. To replace a card that is in service, remove the input reference signal associated with the clock input card to be removed. Perform one of the following: a. If the equipment at the source of the reference input has a miscellaneous synchronization jack, insert an open plug or the end of a patch cord in the jack to stop the input reference signal. b. If the input reference is cabled through an external bridging repeater, insert an open plug or the end of a patch cord in the OUT jack at the bridging repeater to stop the input reference signal. c. If the input reference signal is directly cabled from the source to the DCD shelf, either lift the leads off the input module connectors, or short the tip (T) and ring (R) pins of the input module connector, using a clip cord that is no longer than 5.1 cm (2 inches). ***Caution: A clip cord longer than 5.1 cm (2 inches) may not look like a short to the clock input card and the input reference may continue to drive it.*** ***Requirement:*** On a CI card, the DS1 lamp is off and the FAIL lamp is lit. On an ACI card, the SRC FAIL and INPUT FAIL lamps are lit red. On a CI-EA card, the SIGNAL FAULT and FAIL lamps are lit red. On a DCIM-EA or DCIM-T card, the FAIL, REF 1, and REF 2 lamps are lit red, and the STATUS 1, STATUS 2, and SRC ACTIVE lamps are off. ***Note:*** Do not proceed if the requirements have not been met; unmet requirements are an indication that the input reference has not been properly removed.
4	Follow the instructions in the TL1 Operations Guide to remove the card from service.
5	If the shelf is equipped with ST3E or TNC cards, and the ST2/ST3 switch is set to ST3, check the status of the SRC ACTIVE lamp on the card to be replaced. If lit, press the transfer (XFR) pushbutton on either input card. ***Requirement:*** The SRC ACTIVE lamp is off on the card to be replaced.

Chart 2. MRC^{V5} Card Replacement (Contd)

STEP	PROCEDURE
6	Remove the card from the shelf. ***Requirement:*** Wait for a CARD IS MISSING message to appear on the terminal.
7	Set the option switches on the replacement card to the same positions as the switches on the removed card and insert the replacement card into the shelf.
8	If the replaced card was a failed card, skip this step. Restore the input reference by removing the open plug, clip cord, or reconnecting the leads to input module connectors. ***Requirement:*** Wait for the MRC card to acquire the input reference signal (about 3 minutes to 5 minutes). The appropriate REF and SRC ACTIVE lamps light green on the MRC card. ***Note:*** The MIS card detects that a new card has been installed, gets the inventory data from the new card, and configures the new MRC card to the settings of the previous MRC card (determined by switch SW1, section 5). If MRC card configuration changes are required, see the TL1 Users Guide for instructions.
9	Wait 1 minute while the MIS card verifies the configuration of the shelf cards.
10	Set the ST3/ST2 switch (SW1) on the rear panel to conform to the requirements for this installation: Set 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 to the ST3 position if no ST2E, ST2, or TNC-E clock cards will be installed in the shelf. ***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.
11	Follow the instructions in the TL1 Operations Guide to place the card into service.
12	Use the INIT-REG command to initialize all MRC and PSM registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
13	This procedure is completed.

Chart 3. ST2E or TNC-E Card Replacement

STEP	PROCEDURE
	Use this procedure to replace an ST2E or TNC-E card. The only time an ST2E or TNC-E card should be replaced is when its FAIL or OSC lamp is lit red, or its OSC lamp is flashing green (indicating the oscillator requires factory maintenance). If its LKD, ACTIVE, and SRC (A or B) lamps are lit green while the network elements (NE) being timed from the shelf are reporting slips, the slips are probably caused by a timing loop (the ST2E or TNC-E card is probably good). Do not replace the ST2E or TNC-E if its INP TOL (input tolerance) and/or HOLD OVER lamp(s) are lit red, since these are indications that the input reference (and not the card) has failed, has excessive errors, or has excessive jitter, wander, phase movement, or frequency offset. In this case the input reference should be repaired or reassigned. ***Notes:*** 1. On the ST2E or TNC-E card in the ST B slot, the DSBL pushbutton does not function. 2. See the TL1 Users Guide for instructions about commands indicated in this procedure.
1	Press the ACO pushbutton on the MIS card to silence the office audible alarm, if the shelf is in alarm.
2	Verify that the input references meet or exceed the specifications in the Description and Specifications section of this manual, and both clock input cards are installed and functioning properly with both cards' SRC ACT or SRC ACTIVE lamps lit. If the DRIFT lamp on the ST2E or TNC-E card is lit amber, it is one indication that the input reference does not meet specifications. Ensure that the SHELF MODE switch SW1 on the rear panel is set to the ST2 position.
3	Use the OPR-SYNCNSW command to force the timing output cards to use a nonfailed timing source on the internal timing bus. ***Requirement:*** The response indicates the command was completed successfully.
4	***Caution: Do not press the DSBL pushbutton on the ST2E or TNC-E card in ST A unless is to be removed from the shelf, since its output will be disabled for 10 minutes to 20 minutes. Do not remove the ST2E or TNC-E card in ST B when the ST2E or TNC-E card in ST A has been disabled. Removing the ST2E or TNC-E card in ST A without first pressing the DSBL pushbutton may cause hits on the timing outputs.*** ***Warning: The ST2E or TNC-E card is heavier than a normal card, and must be supported with both hands during installation and removal.*** If the card to be replaced is in slot A (ST A), remove the mylar cover over the DSBL pushbutton and press and release the recessed DSBL (disable) pushbutton switch with a shorting pin or paper clip to disable the output of the card. Remove the card immediately. If the card to be replaced is in slot B (ST B), remove the card. ***Requirement:*** The alarm lamp on the MIS card goes off 10 seconds after the TNC-E card is removed.
5	Set the option switches on the replacement card to the same positions as the switches on the removed card (all sections of SW1 should be set to the OFF position).

Chart 3. ST2E or TNC-E Card Replacement (Contd)

STEP	PROCEDURE
6	Insert the replacement ST2E or TNC-E in the shelf and install the upper and lower securing screws. ***Requirement:*** The HOLD OVER lamp flashes for 30 minutes to 1 hour during the warm-up (stabilization) period. Upon completion of the stabilization period, the HOLD OVER lamp stops flashing and goes off, and either SRC A or SRC B lamp lights (depending on which clock input card is its active input). This indicates that the ST2E or TNC-E has recognized a valid input reference signal from its clock input card and is converging on the input reference. ***Note:*** If the ST2E or TNC-E does not recognize the input reference signal as valid, it enters freerun mode, its HOLD OVER lamp lights steady green, the ACTIVE lamp lights, and SRC A and SRC B lamps are off. ***Requirement:*** 5 minutes to 20 minutes after an SRC lamp lights, the LKD and ACTIVE lamps light, indicating the card is within lock range of the input reference. It may take an additional hour or two for the ST2E or TNC-E to completely converge on the input reference. ***Note:*** If the LKD lamp does not light, verify that the input reference is at least TNC quality and does not have excessive jitter, wander, phase movement, or frequency offset on it. If so, the input reference will have to be repaired or reassigned before proceeding.
7	Verify that the alarm (MAJOR or MINOR) and ACO lamps on the MIS card are off.
8	If the card was entered into the MIS card's database, enter the serial number of the replacement card using the ED-INVENTORY command. If the failed card was not entered into the MIS card's database, enter the replacement card inventory data using the ENT-INVENTORY command. ***Requirement:*** The response indicates the command was completed successfully.
9	Use the ENT-EQPT command with no parameters for the replaced clock card. ***Requirement:*** The response indicates the command was completed successfully.
10	If the OPR-SYNCNSW command was used in Step 3, use the RLS-SYNCNSW command to allow the timing output cards to use the appropriate signal on the internal timing bus. ***Requirement:*** The response indicates the command was completed successfully.
11	If no MRC or PSM cards are in the shelf, skip this step. Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
12	This procedure is completed.

Chart 4. ST2 Card Replacement

STEP	PROCEDURE
Use this procedure to replace an ST2 card. The only time an ST2 card should be replaced is when its FAIL lamp is lit, or its REF lamp is flashing (indicating maintenance is required within 180 days). If its LOCKED, ACTIVE and REF (A or B) lamps are lit while the network elements (NE) being timed from the shelf are reporting slips, the slips are probably caused by a timing loop and not a failed ST2 card. ***Notes:*** 1. Verify the need for replacing the ST2 card, because the replacement ST2 requires 1 hour to warm-up and up to 2 hours to stabilize. 2. See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	Press the ACO pushbutton on the MIS card to silence the office audible alarm, if the shelf is in alarm.
2	Verify that the input references meet ANSI T1.101 ST2 or better specifications, and both clock input cards are installed and functioning properly with both card's SRC ACTIVE lamps lit. Ensure that the SHELF MODE switch (ST2/ST3) SW1 on the shelf backplane is set to ST2.
3	Remove the ST2 card from the shelf. ***Warning: The ST2 card is heavier than a normal card, and must be supported with both hands during installation and removal.*** ***Requirement:*** If the ST2 card's FAIL lamp was lit, the alarm lamp on the MIS card should go off 10 seconds after the ST2 card is removed.
4	Insert the replacement ST2 in the shelf and lock it into place by rotating its lock lever downward. Secure into place by installing the upper and lower securing screws. ***Requirement:*** The FREE RUN lamp flashes for 40 minutes to 1 hour during the warm-up (stabilization) period. Upon completion of the stabilization period, the FREE RUN lamp stops flashing and goes off, and either REF A or REF B lamp lights (depending on which clock input card is its active input). This indicates that the ST2 has recognized a valid input reference signal from its clock input card and is converging on the input reference. ***Note:*** If the ST2 does not recognize the input reference signal as valid it enters free run mode, its FREE RUN lamp lights steady and REF A and REF B lamps are off. ***Requirement:*** 5 minutes to 20 minutes after a REF lamp lights, the LOCKED lamp lights, indicating the card is within lock range of the input reference. The ST2 may be made active at this time, but an additional hour or two may be needed to completely converge on the input reference. ***Note:*** If this is the only ST2 card in the shelf, the XFR pushbutton on its front panel may need to be pressed to cause its ACTIVE lamp to light. If two ST2 cards are in the shelf, the other ST2's ACTIVE lamp is already lit (only one ST2 is active at a time). If the LOCKED lamp does not light, verify that the input reference is at least Stratum-2 quality and does not have excessive wander, jitter, phase movement, or frequency offset on it. If so, the input reference will have to be repaired or reassigned before proceeding.

Chart 4. ST2 Card Replacement (Contd)

STEP	PROCEDURE
5	Verify that the alarm (MAJOR or MINOR) and ACO lamps on the MIS card are off. If desired, press the XFR pushbutton on either ST2 card to make the new ST2 card active.
6	Use the ENT-INVENTORY command to enter the serial number of the replacement card (if replacing a failed card) or the complete inventory of the replacement card (if replacing with a card of a different part number) into the MIS card's database and place the card into service. ***Requirement:*** The response indicates the command was completed successfully.
7	Use the ENT-EQPT command with no parameters for the replaced clock card. ***Requirement:*** The terminal indicates a completed command.
8	Use the INIT-REG command to initialize all MRC and PSM registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
9	This procedure is completed.

Chart 5. ST3E or TNC Card Replacement

STEP	PROCEDURE
Use this procedure to replace an ST3E or TNC card. The only time an ST3E or TNC card should be replaced is if its FAIL lamp is lit. If it is in the ST A slot, its LOCKED and ACTIVE lamps are lit and the network elements (NE) being timed from the shelf are reporting slips, the problem is probably a timing loop and not a bad ST3E or TNC card. ***Note:*** See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	Press the ACO pushbutton on the MIS card or use TL1 a command to silence the office audible alarm, if desired.
2	Use the OPR-SYNCNSW command to force the timing output cards to use a nonfailed timing source on the internal timing bus. ***Requirement:*** The response indicates the command was completed successfully.
3	***Note:*** If a ST3E or TNC card has been replaced, allow the first ST3E or TNC card 6 hours to stabilize before replacing the second ST3E or TNC card. Remove the failed ST3E or TNC card from the shelf. ***Requirement:*** If the card is in the ST A slot and not failed, the ST B clock card will automatically become the preferred source for the outputs. ***Note:*** If the ST A card had failed, the ST B clock card is already the preferred source to the outputs. If ST B is being replaced, it is in standby and may be removed without negative effect to the outputs.
4	Set the option switches on the replacement card to the same positions as the switches on the removed card.

Chart 5. ST3E or TNC Card Replacement (Contd)

STEP	PROCEDURE
5	Insert the replacement ST3E or TNC card in the shelf. ***Requirement:*** The FREE RUN lamp flashes for 30 minutes during the warm-up (stabilization) period. ***Requirement:*** Upon completion of the stabilization period, the FREE RUN lamp stops flashing and goes off, and either REF A or REF B lamp lights (depending on which clock input card is the active input). This indicates that the ST3E or TNC card has recognized a valid input reference signal from the clock input card and is converging on the input reference. ***Note:*** If the ST3E or TNC card does not recognize the input reference signal as valid, it enters free run mode, its FREE RUN and ACTIVE lamps light solid, and REF A and REF B lamps are off. ***Requirement:*** After a REF lamp lights (5 minutes to 20 minutes), the LOCKED lamp lights, indicating the card is within lock range of the input reference. ***Requirement:*** Approximately 0.5 hour to 2 hours after insertion in the shelf, the ACTIVE lamp lights. If ST A was the replaced card, it will automatically become the preferred source to the outputs when its ACTIVE lamp lights. It may take up to 6 hours for the ST3E or TNC card to completely converge on the input reference. During this period, its LOCKED lamp may go off and on several times as part of the converging process. ***Note:*** If the other ST3E or TNC card is also to be replaced, allow the first ST3E or TNC card 6 hours to stabilize before replacing the second ST3E or TNC card.
6	If the card was entered into the MIS card's database, enter the serial number of the replacement card using the ED-INVENTORY command. If the failed card was not entered into the MIS card's database, enter the replacement card inventory data using the ENT-INVENTORY command. ***Note:*** Inventory data is available on the front panel of the card. Where data for a field in the command is unavailable, leave the field blank. ***Requirement:*** The response indicates the command was completed successfully.
7	Use the ENT-EQPT command with no parameters for the replaced clock card. ***Requirement:*** The terminal indicates a completed command.
8	If the OPR-SYNCNSW command was used in Step 3, use the RLS-SYNCNSW command to allow the timing output cards to use the appropriate signal on the internal timing bus. ***Requirement:*** The response indicates the command was completed successfully.
9	If no MRC or PSM cards are in the shelf, skip this step. Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
10	This procedure is completed.

Chart 6. EA10, EA20, EA10M, EA20M, TO-EA5, TOTA-5, or TOTA-M Card Replacement

STEP	PROCEDURE
Use this procedure to replace an EA10, EA20, EA10M, EA20M, TO-EA5, TOTA-5, or TOTA-M card. ***Notes:*** 1. If a TO-EA5, TOTA-5, or TOTA-M card's PORT ALM lamp is lit, determine if the failure is on the card, or if it is a shorted or unterminated cable external to the shelf (Table F). If the PORT ALM failure can be isolated to the card, use this procedure. 2. See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	Press the ACO pushbutton on the MIS card to silence the office audible alarm, if the shelf is in alarm.
2	If redundant-pair protection is not used with the card to be replaced, skip this step. If the card which is paired with the failed card is active, skip this step. Use the OPR-PROTNSW or RLS-PROTNSW command to make the nonfailed card in the pair active. ***Requirement:*** The FAIL and PORT ALM lamps are not lit on the nonfailed card in the pair.
3	If the card to be replaced is failed (automatically removed from service), skip this step. Follow the instructions in the TL1 Operations Guide to remove the card from service.
4	Remove the output card from the shelf. ***Requirement:*** After 30 seconds, a CARD IS MISSING message appears on the terminal.
5	Set the option switches to the same positions as the switches on the removed card. If the card is part of a redundant pair, be sure the replacement card is configured the same as the other card in the pair. Insert the replacement card in the same slot from which the card was removed. ***Requirement:*** The MIS card performs a lamp test. After 30 seconds, the MIS card has cleared the error message.
6	Follow the instructions in the TL1 Operations Guide to bring the card into service. ***Requirement:*** The response indicates that each command was completed successfully.
7	Wait 10 seconds after the requirement in the previous step to allow the replacement card to warm up and generate outputs.
8	Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
9	This procedure is completed.

Chart 7. TO Card Replacement

STEP	PROCEDURE
Use this procedure to replace a non-Version 5 TO card. If the TO PORT ALM lamp is lit, determine if the failure is on the card, or if it is a shorted or unterminated cable external to the shelf (Table F). If the PORT ALM failure can be isolated to the card, replace the TO card. ***Note:*** See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	Press the ACO pushbutton on the MIS card to silence the office audible alarm, if the shelf is in alarm.
2	If protection is not used with the card to be replaced, skip this step. Verify that the card which protects the failed card is active. ***Requirement:*** The FAIL and PORT ALM lamps are not lit on the protection card. If an automatic 1:N protection switch has been activated, the Output Protection pushbutton lamps are lit over the failed card and a like HS TO card. ***Note:*** If the protection card is active and a protection switch has not been made, activate a protection switch using TL1 commands. If 1:N protection is in effect, press and hold the Output Protection pushbuttons over the failed card and a like HS TO card until the switch is made (about 2 seconds).
3	If the card to be replaced has been removed from service, skip this step. Follow the instructions in the TL1 Operations Guide to remove the card from service.
4	Remove the failed TO card from the shelf. ***Requirement:*** After 30 seconds, a CARD IS MISSING message appears on the terminal.
5	Set the option switches to the same positions as the switches on the removed card. Insert the replacement card in the shelf. ***Requirement:*** The FAIL lamp on the replacement card remains off and the INPUT lamp is lit. An ST lamp lights if the system is equipped with one or more clock cards. After 30 seconds, the MIS card has cleared the CARD IS MISSING error message.
6	Wait 10 seconds after the requirement in the previous step to allow the replacement card to warm up and generate outputs.
7	If 1:N protection is not in effect, skip this step. Press the lit Output Protection pushbutton over the HS TO card slot for about 2 seconds. ***Requirement:*** The Output Protection pushbutton lamps go off over the failed card and the HS TO card. This releases the HS protection switch and puts the replacement card on-line.
8	If the card was entered into the MIS card's database, enter the serial number of the replacement card using the ED-INVENTORY command. If the failed card was not entered into the MIS card's database, enter the replacement card inventory data using the ENT-INVENTORY command. ***Requirement:*** The response indicates the command was completed successfully.

Chart 7. TO Card Replacement (Contd)

STEP	PROCEDURE
9	If no MRC or PSM cards are in the shelf, skip this step. Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
10	This procedure is completed.

Chart 8. SCIU or ESCIU Card Replacement

STEP	PROCEDURE
Use this procedure to replace an SCIU or ESCIU card. The SCIU or ESCIU card should not be replaced if its SYNC lamp is off or lit red (indicating loss of 4-kHz signal from ST and input cards), or its DS1A or DS1B (SCIU), or E1 A or E1 B (ESCIU) lamps are lit red (indicating loss of signal from the traffic-carrying DS1/E1 bit stream from either the EAST A IN or WEST B IN direction of transmission), or the HI SLIP, SLIP, and bit slip lamps are lit (indicating the EAST A IN received bit stream has a frequency offset from the DCD clock [WEST A OUT]), which are facility related problems outside the DCD System. The SCIU or ESCIU card must be replaced if its FAIL lamp is lit. ***Note:*** See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	Press the ACO pushbutton on the MIS card to silence the office audible alarm, if the shelf is in alarm.
2	If the card to be replaced is failed, skip this step. Follow the instructions in the TL1 Operations Guide to remove the card from service.
3	Remove the SCIU or ESCIU card from the shelf. Set the option switches on the replacement card to the same positions as the switches on the removed card. Insert the replacement card into the shelf. ***Requirement:*** The FAIL lamp is off, and the SYNC, DS1 A and DS1 B (SCIU) or E1 A and E1 B (ESCIU) lamps are lit green. ***Caution: The SCIU or ESCIU card's inputs and outputs must be cabled from an SCIU wire-wrap module (p/n 990-40021-10) or an ESCIU module (p/n 990-45021-11) which have bypass relays that release to maintain continuity on the traffic-carrying DS1 or E1 while the SCIU or ESCIU card is removed from the shelf. If the SCIU or ESCIU inputs and outputs are cabled from a standard DCD shelf wire-wrap panel, the SCIU or ESCIU must be patched around at the DSX-1 jacks (the NEs supplying and receiving the traffic-carrying DS1 or E1) before the SCIU or ESCIU is removed from the shelf.***
4	If the card was entered into the MIS card's database, enter the serial number of the replacement card using the ED-INVENTORY command. If the failed card was not entered into the MIS card's database, enter the replacement card inventory data using the ENT-INVENTORY command. ***Requirement:*** The response indicates the command was completed successfully.
5	If no MRC or PSM cards are in the shelf, skip this step. Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
6	This procedure is completed.

Chart 9. PSM Card Replacement

STEP	PROCEDURE
Use this procedure to replace a PSM card. ***Notes:*** 1. The PSM cards, failed or not, may be removed or inserted in the shelf any time without negative effect on the DCD synchronization outputs. 2. See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	Press the ACO pushbutton on the MIS card to silence the office audible alarm, if the shelf is in alarm.
2	If the card to be replaced is failed, skip this step. Follow the instructions in the TL1 Operations Guide to remove the card from service.
3	Remove the failed PSM card from the shelf. ***Requirement:*** Wait for a CARD IS MISSING message to appear on the terminal.
4	If the failed card was entered into the MIS/C card's database, skip this step. Set the option switches to the same positions as the switches on the removed card. ***Requirement:*** The FAIL lamp on the replacement card remains off and the INPUT lamp is lit. An ST lamp lights if the system is equipped with one or more clock cards.
Warning: Do not attempt to install a PSM card into the TO3 slot of a master shelf or the TO4 slot of an expansion shelf. Failure to observe this warning may result in damage to the PSM card.	
5	Install the replacement PSM card in the same slot as the failed PSM card and wait 2 minutes. ***Note:*** During the 2 minutes, the PSM performs a lamp test (green and red lamps). The remainder of the time is spent qualifying equipped input signals. ***Requirement:*** The FAIL lamp is off. The REF lamps are lit green for the enabled inputs and are off for the disabled inputs. All TOL lamps are off. The ST and INP lamps are lit green.
6	If the card was entered into the MIS card's database, enter the serial number of the replacement card using the ED-INVENTORY command. If the failed card was not entered into the MIS card's database, enter the replacement card inventory data using the ENT-INVENTORY command. ***Requirement:*** The response indicates the command was completed successfully.
7	If no MRC or PSM cards are in the shelf, skip this step. Use the INIT-REG command to initialize all registers on the shelf. ***Requirement:*** The response indicates the command was completed successfully.
8	This procedure is completed.

Chart 10. MIS Card Replacement

STEP	PROCEDURE
Use this procedure to replace an MIS card. ***Note:*** See the TL1 Users Guide for instructions about commands indicated in this procedure.	
1	If the shelf is in alarm, press the ACO pushbutton on the MIS card to silence the office audible alarm. The CRITICAL, MAJOR, and MINOR lamps may or may not be lit, depending on the nature of the failure on the card.
2	Remove the failed MIS card from the shelf. ***Note:*** All communications and alarms from the shelf are lost. Synchronization services provided by the shelf are not interrupted. ***Caution: SSM messages will change state.***
3	On the replacement card, set section 7 of SW1 to OFF if the shelf is a master shelf, or to ON if the shelf is an expansion shelf or part of a remote system. Set all other sections of SW1 to the factory-set position.
4	Be sure the RS-232 settings for the external terminal or computer allow communication with the MIS card. ***Note:*** COM1, COM2, and COM3 on the rear panel of the shelf 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. COM2 may be set to 1200 baud by SW1 on the MIS card. COM1 and COM3 may be set to 1200 baud by TL1 command.
5	Insert the replacement card into the shelf. ***Requirement:*** The MIS card performs a lamp test, and the MINOR lamp flashes for up to a minute. The CRITICAL and MINOR lamps stay lit.

6	Use the terminal to enter a semicolon and a carriage return.
	
	Requirement: The terminal displays a three-line message from the MIS card as follows:
	
	`TELECOM <date> <time>`
	`M <ctag> DENY`
	`ICNV`
	`;`
	
	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 TL1 User's Guide for TL1 language definitions.)

Chart 10. MIS Card Replacement (Contd)

STEP	PROCEDURE
7	Use the INIT-SYS command with <ph> 9 to reset the MIS card to its factory settings. ***Requirement:*** After up to 5 minutes, the response includes COMPLD. ***Note:*** The INIT-SYS command with <ph> 9: • 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
8	Be sure the RS-232 settings for the external terminal or computer allow communication with the MIS card. ***Note:*** COM1, COM2, and COM3 on the rear panel of the shelf 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. COM2 may be set to 1200 baud by SW1 on the MIS card. COM1 and COM3 may be set to 1200 baud by TL1 command.

9	Use the terminal to enter a semicolon and a carriage return.
	
	Requirement: The terminal displays a three-line message from the MIS card as follows:
	
	`TELECOM <date> <time>`
	`M <ctag> DENY`
	`ICNV`
	`;`
	
	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 TL1 User's Guide for TL1 language definitions.)

10	Refer to the Software Release Document to install and activate the software appropriate for this installation (if required).

Chart 10. MIS Card Replacement (Contd)

STEP	PROCEDURE
11	***Caution: Use the following command to transfer information in the direction indicated. Transferring configuration information to cards that are in service may interrupt service.*** Use the COPY-MEM command from the shelf to the MIS card to gather configuration information from the Version 5 cards in the DCD-519 HD shelf, and any GTI cards in an associated DCD-LPR shelf. ***Requirement:*** The response includes COMPLD.
12	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.
13	Refer to the Operations Section of the TL1 User's Guide for the steps to put the equipment into service and into the database.
14	If no changes to switch SW1 on the MIS card are required, skip this step. Remove the MIS card, change the switches, and insert the card back into the slot. ***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.
15	This procedure is completed.

5. REPAIR AND RETURN PROCEDURES

5.01 When returning defective equipment for factory repair, obtain the following information *prior* to calling your local Symmetricom distributor, or Symmetricom's Customer Service Department:

- A complete description of the trouble (alarms observed, equipment behavior, etc.), part number, serial number, issue/revision level, and warranty expiration date.
- If the warranty has expired, a purchase order with "bill to" information.
- A customer field contact, address, phone number, and FAX number.
- Return shipping information.

5.02 To return defective or damaged equipment:

1. Call your local Symmetricom distributor, or Symmetricom's Inside Sales at one of the following, and obtain a Return Material Authorization (RMA) number:
    - +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.)

    Note: Retain the RMA number for future reference. The RMA number is used by Symmetricom for internal tracking of the unit. Reference the RMA number in all communications regarding the unit.
2. Pack the defective equipment, including a list containing all the information obtained above, in the original packing material. If the original packing material is not available, inform Symmetricom and the appropriate shipping material will be provided.

    Note: Equipment *must be returned in the original packaging* or approved replacement packaging for the warranty to be honored.
3. Mark the RMA number and the equipment serial number on the outside of the shipping carton.
4. Ship the equipment prepaid and insured to one of the addresses below as directed by the Customer Assistance Center:

    Symmetricom
    Attn: Customer Service
    2300 Orchard Parkway
    San Jose, CA 95131

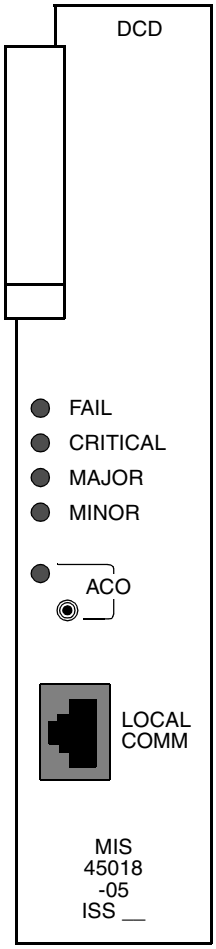
    or

    Symmetricom
    Attn: Repair and Return
    Building 7
    Aguada West Industrial Site
    Aguada, Puerto Rico 00602

5.03 Repaired equipment is typically shipped within 30 days of receipt by Symmetricom, or per contract terms. Shipping costs to Symmetricom are paid by the customer; shipping costs back to the customer are paid by Symmetricom.

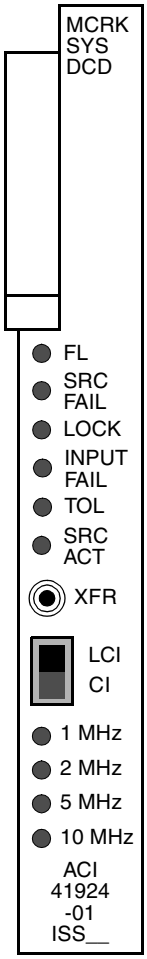
6. CONTROLS AND INDICATORS

6.01 The controls and indicators of the cards used in DCD-519 HD shelves are shown in Figure 2 through Figure 30. Each figure includes an explanation of all front panel items.



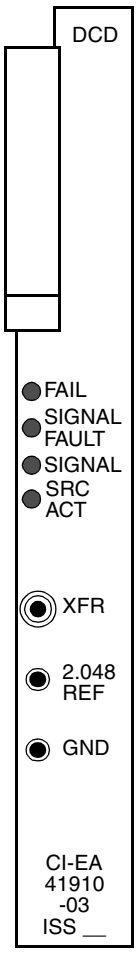
FAIL:	Lamp that lights red if the card or power supply fails.
CRITICAL:	Lamp that lights red if the system or card has a critical alarm.
MAJOR:	Lamp that lights red if the system or card has a major alarm.
MINOR:	Lamp that lights yellow if the system or card has a minor alarm.
ACO:	Lamp that lights green if the ACO pushbutton has been pressed during an alarm state. When pressed, this pushbutton silences the office audible alarm.
LOCAL COMM:	RJ45 connection to a local communication device.

Figure 2. MIS Card Controls and Indicators



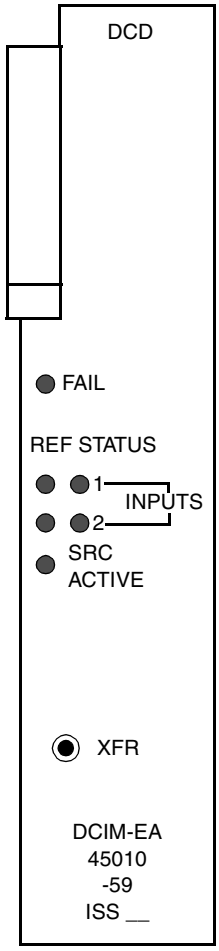
FAIL:	Lamp that lights red if this card fails.
SRC FAIL:	Lamp that lights yellow when reference signal is not present.
LOCK:	Lamp that lights red if this card unlocks from the input signal (indicating an input signal error).
INPUT FAIL:	Lamp that lights red if this card unlocks from the input signal, or the input signal fails.
TOL:	If equipped with two ACI cards, this lamp lights red when the difference between the ACI cards is >5 ppm. If equipped with one ACI card, this lamp is not used.
SRC ACT:	Lamp that lights green when the card is on-line providing a DCD reference to clock and output cards. The lamp is off if the card is in standby mode.
XFR:	Pushbutton switch that, when pressed, switches source (SRC ACT status) from one clock input card to the other.
LCI/CI:	LCI (up) Used when operating with an ST2E, ST2, or TNC-E clock; CI (down) used when operating with an ST3E or TNC clock.
1-10 MHz:	Lamps that light green to indicate the input frequency (1 MHz, 2 MHz, 5 MHz, or 10 MHz).

Figure 3. ACI Card Controls and Indicators



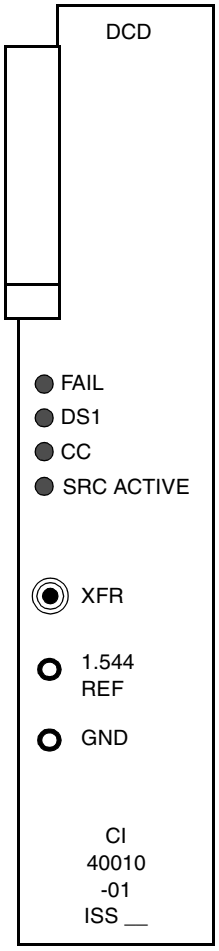
FAIL:	Lamp that lights red if the card or input fails (major alarm).
SIGNAL FAULT:	Lamp that lights red when an E1 source is not present.
SIGNAL:	Lamp that lights green when an E1 source is present.
SRC ACT:	Lamp that lights green when the card is on-line providing a DCD reference.
XFR:	Pushbutton switch that, when pressed, switches source (SRC ACT status) from one clock input card to the other.
2.048 REF:	Test point used to check the stability of the internal 2.048 Mb/s signal.
GND:	Test point reference for the 2.048 REF test point.

Figure 4. CI-EA Card Controls and Indicators



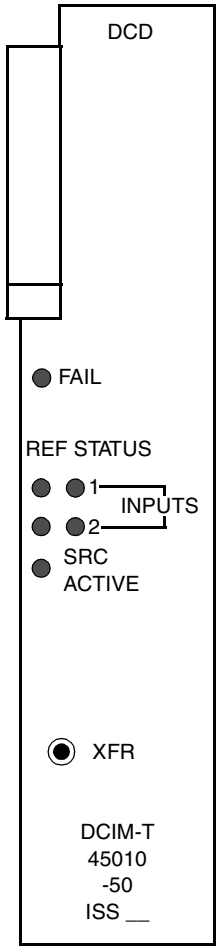
FAIL:	Lamp that lights red if the card or input fails (major alarm).
REF 1:	Lamp that lights green if Input 1 is provisioned with an error-free signal; red if Input 1 is provisioned, but the signal has errors or is missing; off if Input 1 is not provisioned.
REF 2:	Lamp that lights green if Input 2 is provisioned with an error-free signal; red if Input 2 is provisioned, but the signal has errors or is missing; off if Input 2 is not provisioned.
STATUS 1:	Lamp that lights green if the Input 1 reference is being used, off if the Input 1 reference is not being used.
STATUS 2:	Lamp that lights green if the Input 2 reference is being used, off if the Input 2 reference is not being used.
SRC ACTIVE:	Lamp that lights green when the card is providing a DCD reference to the clock and output cards.
XFR:	Pushbutton switch that, when pressed, switches source (SRC ACTIVE status) from one clock input card to the other.

Figure 5. DCIM-EA Card Controls and Indicators



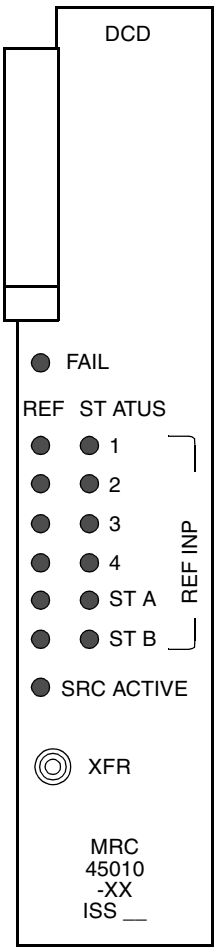
FAIL:	Lamp that lights red if the card or input fails (major alarm).
DS1:	Lamp that lights green when a DS1 source is present. The lamp is off when DS1 source is not present.
CC:	Lamp that lights green when a CC source is present.The lamp is off when CC source is not present.
SRC ACTIVE:	Lamp that lights green when the card is on-line providing a DCD reference to ST and output cards. The lamp is off if the card is in standby mode.
XFR:	Pushbutton switch that, when pressed, switches source (SRC ACT status) from one clock input card to the other.
1.544 REF:	Test point used to check the stability of the internal 1.544 Mb/s signal.
GND:	Test point reference for the 1.544 REF test point.

Figure 6. CI Card Controls and Indicators



FAIL:	Lamp that lights red if the card or input fails (major alarm).
REF 1:	Lamp that lights green if Input 1 is provisioned with an error-free signal; red if Input 1 is provisioned, but the signal has errors or is missing; off if Input 1 is not provisioned.
REF 2:	Lamp that lights green if Input 2 is provisioned with an error-free signal; red if Input 2 is provisioned, but the signal has errors or is missing; off if Input 2 is not provisioned.
STATUS 1:	Lamp that lights green if the Input 1 reference is being used, off if the Input 1 reference is not being used.
STATUS 2:	Lamp that lights green if the Input 2 reference is being used, off if the Input 2 reference is not being used.
SRC ACTIVE:	Lamp that lights green when the card is providing a DCD reference to the clock and output cards.
XFR:	Pushbutton switch that, when pressed, switches source (SRC ACTIVE status) from one clock input card to the other.

Figure 7. DCIM-T Card Controls and Indicators



FAIL: Lamp that lights red if the self tests performed during power up fail.

REF: Lamp for each input (1, 2, 3, 4, ST A, ST B) that lights green when the input is enabled and passed error check; lights red when failed error check (high CRC, OOF, BPV, AIS, or LOS); does not light if the input is not enabled. There is a separate lamp for each reference source.

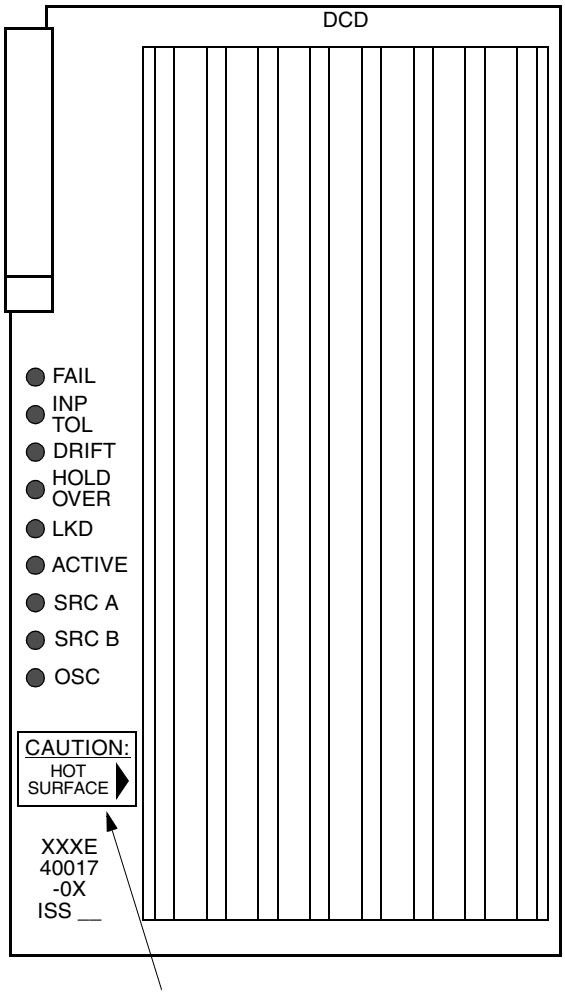
STATUS: Lamp for each input (1, 2, 3, 4, ST A, ST B) that lights green when the enabled input has been selected as first priority; lights yellow when the input has exceeded stability threshold and is rejected; goes off when the reference is accepted by majority vote and has not exceeded stability threshold. A STATUS lamp is operational only when its associated REF lamp is green.

SRC ACTIVE: Lamp that lights green when the MRC is on-line providing DCD reference to ST and output cards. The lamp is dark if the MRC is in standby mode.

XFR: Pushbutton that, when pressed, switches source active status (SRC ACTIVE) from one MRC card to the other. (Active only when backplane ST2/ST3 switch is in ST3 position.)

Note: MRC-EA^{V5} (090-45010-56) and MRC-T^{V5} (090-45010-53) cards contain the same controls and indicators.

Figure 8. MRC Card Controls and Indicators



DSBL PUSHBUTTON
(UNDER CAUTION: HOT SURFACE LABEL)

Note: Access to the DSBL pushbutton is restricted by a puncture-resistant cover labeled CAUTION: HOT SURFACE to prevent inadvertent switch activation.

Caution: Do not remove a TNC-E A or ST2E A card without first pressing the DSBL pushbutton.

FAIL: Lamp that lights red if this card has failed (its output is disabled when this lamp is lit).

INP TOL: Lamp that lights red if the input frequency offset is greater than the pull-in range.

DRIFT: Lamp that lights yellow when the input reference rate of frequency change, compared to the oscillator output, has exceeded the factory-set threshold (the SRC A and/or SRC B lamp flashes green to indicate which reference is drifting).

HOLD OVER: Lamp that flashes green during warm up; lights solid green after warm-up if neither input reference is present or not qualified; lights red if all clock input signals are removed or exceed the pull-in range, causing the clock to go into holdover mode.

LKD: Lamp that lights green when this card has converged on the input reference.

ACTIVE: Lamp that lights green when the TNC-E or ST2E is active and providing internal reference to the timing output cards.

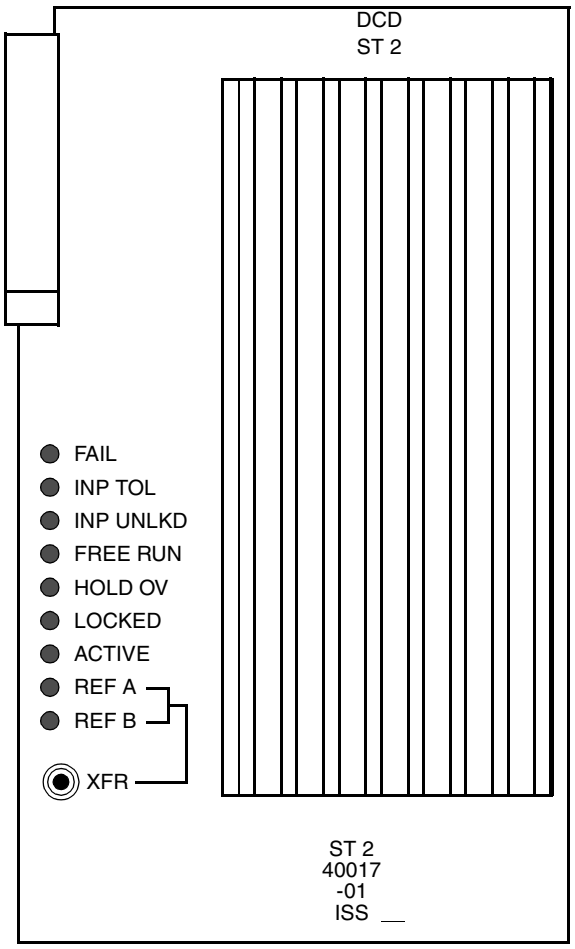
SRC A: Lamp that lights green if the TNC-E or ST2E is tracking the output of clock input card A; lights red if the reference from clock input card A is disqualified; is off if the reference from clock input card A is missing; flashes green if the input reference from clock input card A is drifting.

SRC B: Lamp that lights green if the TNC-E or ST2E is tracking the output of clock input card B; lights red if the reference from clock input card B is disqualified; is off if the reference from clock input card B is missing; flashes green if the input reference from clock input card B is drifting.

OSC: Lamp that flashes red if the oscillator has failed, which disables the TNC-E or ST2E card output; flashes green if the card requires factory maintenance (flashes for approximately two weeks, then flashes red and disables the card output).

DSBL: A recessed pushbutton switch that, when pressed, disables the output of the card (used to prevent phase hits when removing the card from the shelf). This pushbutton functions only on TNC-E A or ST2E A if a second TNC-E or ST2E is installed in the shelf with its LKD and ACTIVE lamps lit. The output, once disabled, will remain disabled for up to 20 minutes. (This pushbutton does not function on the TNC-E or ST2E in the ST B slot.)

Figure 9. TNC-E and ST2E Card Controls and Indicators



FAIL: Lamp that lights red if this card has failed (its output is disabled and causes a major alarm when this lamp is lit).

INP TOL: Lamp that lights red if the input reference to the clock input card is out of Stratum-2 pull-in range.

INP UNLKD: Lamp that lights red if the input references to clock input cards A and B have exceeded frequency offset parameter. Indicates one or both input references are not Stratum-1 quality.

FREE RUN: Lamp that lights green and steady if no valid input reference is available at power-up. This lamp flashes during the 1 hour stabilization period. This lamp goes off when either the REF A or REF B lamp lights.

HOLD OV: Lamp that lights red if the input reference is degraded or lost; the ST2 is now in holdover mode (minor alarm for one ST2 holdover, minor or major switch-selectable for both ST2 clocks in holdover); must have been previously locked to an input reference.

LOCKED: Lamp that lights green when this card has converged on the signal from a clock input card. This lamp goes off when the input wander spec is exceeded.

ACTIVE: Lamp that lights green when the ST2 clock is active and providing internal reference to timing output cards.

REF A: Lamp that lights green if the card is tracking the output of clock input A. If this lamp flashes, factory maintenance is required.

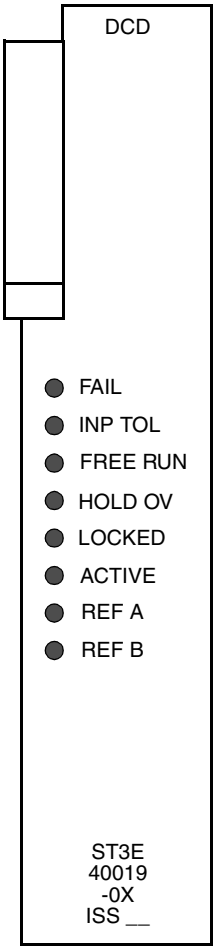
REF B: Lamp that lights green if the card is tracking the output of clock input B. If this lamp flashes, factory maintenance is required.

XFR: Pushbutton switch that, when pressed, does one of the following:

If only one ST2 installed, switches active status to the reference signal from the other clock input card.

If two ST2s installed, switches active status to the other ST2 card.

Figure 10. ST2 Card Controls and Indicators



FAIL: Lamp that lights red if the card has failed. Failures include the microprocessor, the card power converter, and the absence of 4 kHz output.

INP TOL: Lamp that lights red if the input signal frequency exceeds the input tolerance. This parameter is verified every 10 seconds.

FREE RUN: Lamp that flashes green when the card is in warm-up (approximately 30 minutes). The lamp then changes to a steady green to indicate that the card is not yet locked to an incoming signal and has never been locked since being powered. This lamp goes off when either the REF A or REF B lamp lights.

HOLD OV: Lamp that lights red if the input signal is not present or is out of pull-in range.

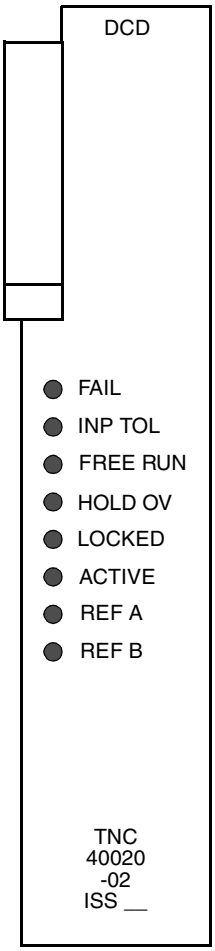
LOCKED: Lamp that lights green when the difference between the input signal and the synthesizer output is less than the lock range (approximately 10 minutes to 30 minutes after power-up).

ACTIVE: This lamp lights green when the 4 kHz output signal is present.

REF A: Lamp that lights green if card is tracking the output of clock input card A.

REF B: Lamp that lights green if card is tracking the output of clock input card B.

Figure 11. ST3E Card Controls and Indicators



FAIL: Lamp that lights red if the card has failed. Failures include the microprocessor, the card power converter, and the absence of 4 kHz output.

INP TOL: Lamp that lights red if the input signal frequency exceeds the input tolerance. This parameter is verified every 10 seconds.

FREE RUN: Lamp that flashes green when the card is in warm-up (approximately 30 minutes). The lamp then changes to a steady green to indicate that the card is not yet locked to an incoming signal and has never been locked since being powered. This lamp goes off when either the REF A or REF B lamp lights.

HOLD OV: Lamp that lights red if the input signal is not present or is out of pull-in range.

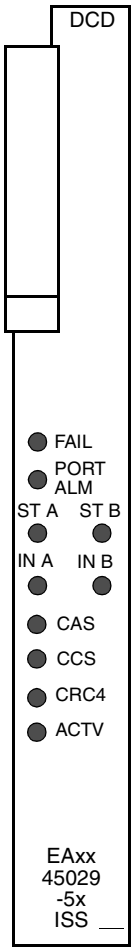
LOCKED: Lamp that lights green when the difference between the input signal and the synthesizer output is less than the lock range (approximately 10 minutes to 30 minutes after power-up).

ACTIVE: This lamp lights green when the 4 kHz output signal is present.

REF A: Lamp that lights green if card is tracking the output of clock input card A.

REF B: Lamp that lights green if card is tracking the output of clock input card B.

Figure 12. TNC Card Controls and Indicators



FAIL: Lamp that lights red if this card fails or if there is a loss of all input references to this card. All outputs are squelched when this lamp lights.

PORT ALM: Lamp that lights red if at least one of the outputs fail or have been externally shorted; card can be configured (via switch or TL1 command) to send a minor or major alarm upon the detection of a port alarm.

ST A: Lamp that lights green when clock card A is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card A is present but not qualified, and is off if clock card A is either qualified and not selected, or not present.

ST B: Lamp that lights green when clock card B is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card B is present but not qualified, and is off if clock card B is either qualified and not selected, or not present.

INP A: Lamp that lights green when clock input A is present, qualified, and selected as the input reference for this card. This lamp lights red if clock input A is present but not qualified, and is off if timing input A is either qualified and not selected, or not present.

INP B: Lamp that lights green when clock input B is present, qualified, and selected as the input reference for this card. This lamp lights red if clock input B is present but not qualified, and is off if timing input B is either qualified and not selected, or not present.

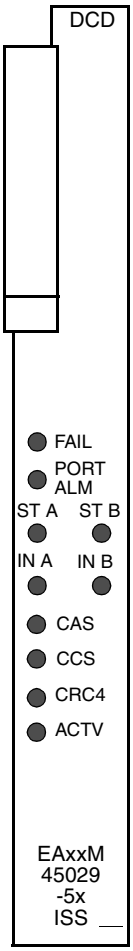
CAS: Lamp that lights green when the outputs are set for CAS framing.

CCS: Lamp that lights green when the outputs are set for CCS framing.

CRC-4: Lamp that lights green when the outputs are set for CRC-4 framing.

ACTV: Lamp that lights green when the card is active and providing at least one output (card and port must be entered and restored).

Figure 13. EA10 and EA20 Card Controls and Indicators



FAIL: Lamp that lights red if this card fails or if there is a loss of all input references to this card. All outputs are squelched when this lamp lights.

PORT ALM: Lamp that lights red if at least one of the outputs fail or have been externally shorted; card can be configured (via switch or TL1 command) to send a minor or major alarm upon the detection of a port alarm.

ST A: Lamp that lights green when clock card A is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card A is present but not qualified, and is off if clock card A is either qualified and not selected, or not present.

ST B: Lamp that lights green when clock card B is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card B is present but not qualified, and is off if clock card B is either qualified and not selected, or not present.

INP A: Lamp that lights green when clock input A is present, qualified, and selected as the input reference for this card. This lamp lights red if clock input A is present but not qualified, and is off if timing input A is either qualified and not selected, or not present.

INP B: Lamp that lights green when clock input B is present, qualified, and selected as the input reference for this card. This lamp lights red if clock input B is present but not qualified, and is off if timing input B is either qualified and not selected, or not present.

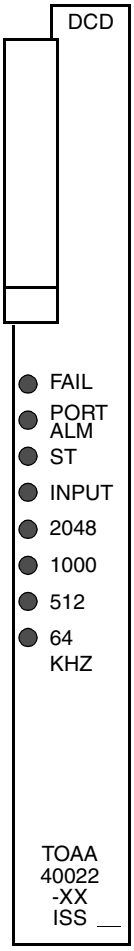
CAS: Lamp that lights green when the outputs are set for CAS framing.

CCS: Lamp that lights green when the outputs are set for CCS framing.

CRC-4: Lamp that lights green when the outputs are set for CRC-4 framing.

ACTV: Lamp that lights green when the card is active and providing at least one output (card and port must be entered and restored).

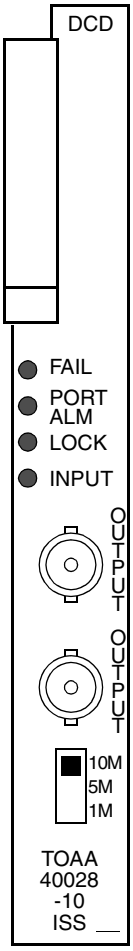
Figure 14. EA10M and EA20M Card Controls and Indicators



FAIL:	Lamp that lights red if this card fails, both outputs fail, or there is a loss of input reference to this card.
PORT ALM:	Lamp that lights red if one output fails.
ST:	Lamp that lights green when an active clock card is supplying the input reference for this card.
INPUT:	Lamp that lights green when this card is receiving a reference signal from one or more of the clock input cards and clock cards.
2048:	Lamp that lights green when option switch SW1 on this card has been set for an output frequency of 2.048 MHz.
1000:	Lamp that lights green when option switch SW1 on this card has been set for an output frequency of 1 MHz.
512:	Lamp that lights green when option switch SW1 on this card has been set for an output frequency of 512 kHz.
64 (8): (See Note)	Lamp that lights green when option switch SW1 on this card has been set for an output frequency of 64 kHz (or 8 kHz).

Note: The 090-40022-01 and 090-40022-02 cards have the lamps shown. The 090-40022-03 card has an 8 kHz lamp instead of a 64 kHz lamp. The 090-40022-05 and 090-40022-15 cards do not have output frequency lamps.

Figure 15. 090-40022-xx TOAA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails or there is a loss of all input references to this card (major alarm).

PORT ALM: Lamp that lights red if one output fails (minor alarm).

LOCK: Lamp that lights red if the card is not locked to the input from the DCD internal timing bus.

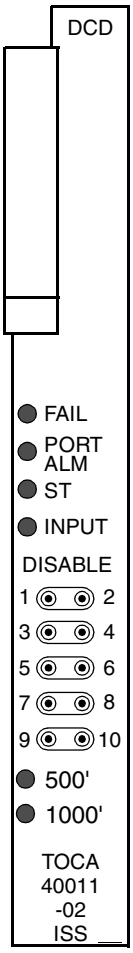
INPUT: Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A or clock card B.

OUTPUT (2): BNC connector for output signal.

10M/5M/1M: Switch to select frequency of output signal:
10M selects 10 MHz signal
5M selects 5 MHz signal
1M selects 1 MHz signal

Notes:
1. No outputs from this card are available at the rear panel.
2. Do not change the settings of any switches other than the one on the front panel.
3. No output protection is available for this card.

Figure 16. 090-40028-10 TOAA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, all ports fail, or there is a loss of input reference to this card (major alarm).

PORT ALM: Lamp that lights red if one to five outputs fail or have been externally shorted; a minor alarm is sent when the lamp lights. If the card option switch is set to LOCAL, disabling an output via the front-panel DISABLE jacks will send a minor alarm. If six or more outputs are disabled, this lamp is off and the alarm is cleared.

ST: Lamp that lights green when an active clock card is supplying the input reference for this card.

INPUT: Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A, or clock card B.

DISABLE 1 – 10: Input jacks that accept disabling pins which disable the corresponding port (1 – 10). The card sends a minor alarm if the card option switch is set to LOCAL. A maximum of six ports may be disabled at one time.

500': Lamp that lights green when option switch SW1-4 on this board is set to the down (ON) position. (Refer to the table below.)

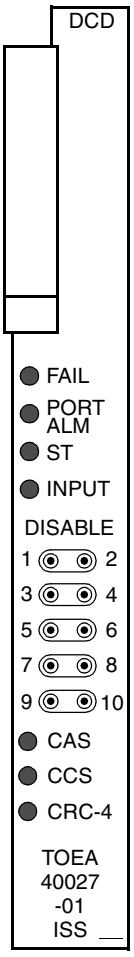
1000': Lamp that lights green when option switch SW1-3 on this board is set to the down (ON) position. (Refer to the table below.)

Note: Both the 500' and 1000' lamps will be off if SW1-3 and SW1-4 are set to the up (OFF) position. (Refer to the table below.)

Switch Settings and Indicators for Cable Length Compensation

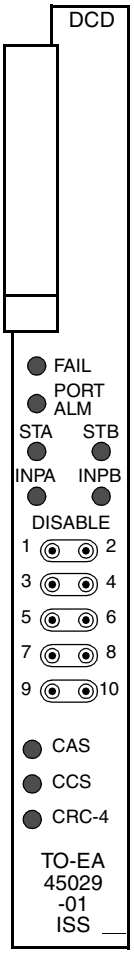
Section		Lamp Lit		Cable Compensation
4	3	500'	1000'	
OFF	OFF	No	No	0 m to 455 m (0 ft to 1500 ft)
ON	OFF	Yes	No	456 m to 610 m (1501 ft to 2000 ft)
OFF	ON	No	Yes	611 m to 760 m (2001 ft to 2500 ft)
ON	ON	Yes	Yes	761 m to 915 m (2501 ft to 3000 ft)

Figure 17. TOCA Card Controls and Indicators



FAIL:	Lamp that lights red if this card fails, all ports fail, or there is a loss of input reference to this card (major alarm).
PORT ALM:	Lamp that lights red if one to five outputs fail or have been externally shorted; a minor alarm is sent when the lamp lights. If the card option switch is set to LOCAL, disabling an output via the front-panel DISABLE jacks will send a minor alarm. If six or more outputs are disabled, this lamp is off and the alarm is cleared.
ST:	Lamp that lights green when an active clock card is supplying the input reference for this card.
INPUT:	Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A or clock card B.
DISABLE 1 – 10:	Input jacks that accept disabling pins which disable the corresponding port (1 – 10). The card sends a minor alarm if the card option switch is set to LOCAL. A maximum of six ports may be disabled at one time.
CAS:	Lamp that lights green when the outputs are set for CAS framing.
CCS:	Lamp that lights green when the outputs are set for CCS framing.
CRC-4:	Lamp that lights green when the outputs are set for CRC-4 framing.

Figure 18. TOEA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, all ports fail, or there is a loss of input reference to this card (major alarm).

PORT ALM: Lamp that lights red if one to nine outputs fail or have been externally shorted. Alarm severity is set through switch selection, with MINOR or MAJOR alarm options.

STA: Lamp that lights green if reference is used for synchronization from the clock card installed in slot ST A; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

STB: Lamp that lights green if reference is used for synchronization from the clock card installed in slot ST B; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

INPA: Lamp that lights green if reference is used for synchronization from clock input A; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

INPB: Lamp that lights green if reference is used for synchronization from clock input B; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

DISABLE 1–10: Input jacks that accept disabling pins which disable the corresponding output (1–10).

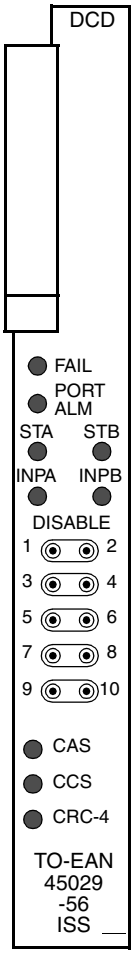
> Note: When configured for 1+1, and using the disabling pins to verify the correct functionality of the disabling jacks, the same port on both cards must be shorted. This is due to the power combining feature of the TO-EA card.

CAS: Lamp that lights green when the outputs are set for CAS framing.

CCS: Lamp that lights green when the outputs are set for CCS framing.

CRC-4: Lamp that lights green when the outputs are set for CRC-4 framing.

Figure 19. TO-EA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, all ports fail, or there is a loss of input reference to this card (major alarm).

PORT ALM: Lamp that lights red if one to nine outputs fail or have been externally shorted. Alarm severity is set through switch selection, with MINOR or MAJOR alarm options.

STA: Lamp that lights green if reference is used for synchronization from the clock card installed in slot ST A; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

STB: Lamp that lights green if reference is used for synchronization from the clock card installed in slot ST B; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

INPA: Lamp that lights green if reference is used for synchronization from clock input A; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

INPB: Lamp that lights green if reference is used for synchronization from clock input B; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

DISABLE 1–10: Input jacks that accept disabling pins which disable the corresponding output (1–10).

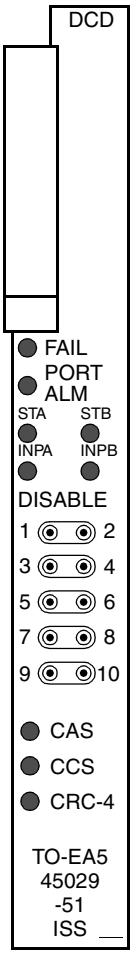
CAS: Lamp that lights green when the outputs are set for CAS framing.

CCS: Lamp that lights green when the outputs are set for CCS framing.

CRC-4: Lamp that lights green when the outputs are set for CRC-4 framing.

Note: The TO-EAN card can be used in stand-alone mode.

Figure 20. TO-EAN Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, all ports fail, or there is a loss of input reference to this card (major alarm).

PORT ALM: Lamp that lights red if one to nine outputs fail or have been externally shorted. Alarm severity is set through switch selection, with MINOR or MAJOR alarm options.

STA: Lamp that lights green if reference is used for synchronization from the clock card installed in slot ST A; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

STB: Lamp that lights green if reference is used for synchronization from the clock card installed in slot ST B; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

INPA: Lamp that lights green if reference is used for synchronization from clock input A; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

INPB: Lamp that lights green if reference is used for synchronization from clock input B; lights red if reference has been disqualified; lamp is off if reference has been qualified and found to be good, or if reference is not in use.

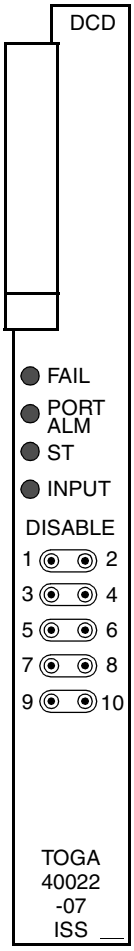
DISABLE 1–10: Input jacks that accept disabling pins which disable the corresponding output (1–10).

CAS: Lamp that lights green when the outputs are set for CAS framing.

CCS: Lamp that lights green when the outputs are set for CCS framing.

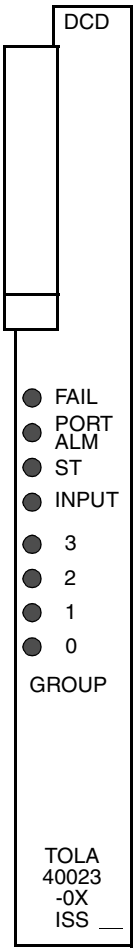
CRC-4: Lamp that lights green when the outputs are set for CRC-4 framing.

Figure 21. TO-EA5 Card Controls and Indicators



FAIL:	Lamp that lights red if this card fails or there is a loss of all input references to this card (major alarm).
PORT ALM:	Lamp that lights red if one to five outputs fail or have been externally shorted; a minor alarm is sent when the lamp lights. If the card option switch is set to LOCAL, disabling an output via the front-panel DISABLE jacks will send a minor alarm. If six or more outputs are disabled, this lamp is off and the alarm is cleared.
ST:	Lamp that lights green when an active clock card is supplying the input reference for this card.
INPUT:	Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A, or clock card B.
DISABLE 1 – 10:	Input jacks that accept disabling pins which disable the corresponding port (1 – 10). The card sends a minor alarm if the card option switch is set to LOCAL. A maximum of six ports may be disabled at one time.

Figure 22. TOGA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails or there is a loss of all input references to this card (major alarm).

PORT ALM: Lamp that lights red if one to five outputs fail or have been externally shorted; a minor alarm is sent when the lamp lights. If the card option switch is set to LOCAL, disabling an output via the front-panel DISABLE jacks will send a minor alarm. If six or more outputs are disabled, this lamp is off and the alarm is cleared.

ST: Lamp that lights green when an active clock card is supplying the input reference for this card.

INPUT: Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A or clock card B.

GROUP 3: Lights when Group 3 frequencies are selected.

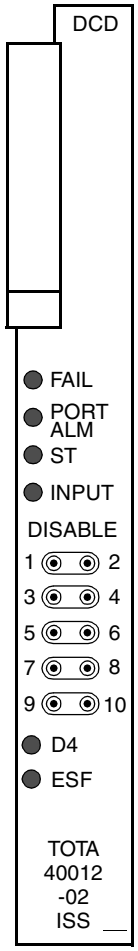
GROUP 2: Lights when Group 2 frequencies are selected.

GROUP 1: Lights when Group 1 frequencies are selected.

GROUP 0: Lights when Group 0 frequencies are selected.

Note: For information on the TOLA card frequencies, refer to the Description and Specifications section of this manual.

Figure 23. TOLA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails or there is a loss of all input references to this card (major alarm).

PORT ALM: Lamp that lights red if one to five outputs fail or have been externally shorted; a minor alarm is sent when the lamp lights. If the card option switch is set to LOCAL, disabling an output via the front-panel DISABLE jacks will send a minor alarm. If six or more outputs are disabled, this lamp is off and the alarm is cleared.

ST: Lamp that lights green when an active clock card is supplying the input reference for this card.

INPUT: Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A or clock card B.

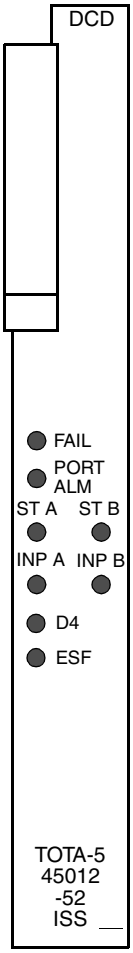
DISABLE 1 – 10: Input jacks that accept disabling pins which disable the corresponding port (1 – 10). The card sends a minor alarm if the card option switch is set to LOCAL. A maximum of six ports may be disabled at one time.

D4: Lamp that lights green when the outputs are set for D4 framing.

ESF: Lamp that lights green when the outputs are set for ESF framing.

Note: If both the D4 and ESF lamps are lit, check optioning; only one or the other should be set.

Figure 24. TOTA Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, there is a loss of all input references to this card, or if 7 or more port alarms exist (major alarm). All outputs are squelched when this lamp lights.

PORT ALM: Lamp that lights red if one to ten outputs fail or have been externally shorted; card can be configured (via switch or TL1 command) to send a minor or major alarm upon the detection of a port alarm.

ST A: Lamp that lights green when clock card A is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card A is present but not qualified, and is off if clock card A is either qualified and not selected, or not present.

ST B: Lamp that lights green when clock card B is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card B is present but not qualified, and is off if clock card B is either qualified and not selected, or not present.

INP A: Lamp that lights green when timing input A is present, qualified, and selected as the input reference for this card. This lamp lights red if timing input A is present but not qualified, and is off if timing input A is either qualified and not selected, or not present.

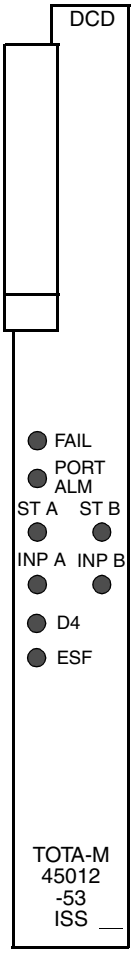
INP B: Lamp that lights green when timing input B is present, qualified, and selected as the input reference for this card. This lamp lights red if timing input B is present but not qualified, and is off if timing input B is either qualified and not selected, or not present.

D4: Lamp that lights green when the outputs are set for D4 framing.

ESF: Lamp that lights green when the outputs are set for ESF framing.

Note: If both the D4 and ESF lamps are lit, check optioning; only one or the other should be set.

Figure 25. TOTA-5 Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, there is a loss of all input references to this card, or if 7 or more port alarms exist (major alarm). All outputs are squelched when this lamp lights.

PORT ALM: Lamp that lights red if one to ten outputs fail or have been externally shorted; card can be configured (via switch or TL1 command) to send a minor or major alarm upon the detection of a port alarm.

ST A: Lamp that lights green when clock card A is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card A is present but not qualified, and is off if clock card A is either qualified and not selected, or not present.

ST B: Lamp that lights green when clock card B is present, qualified, and selected as the input reference for this card. This lamp lights red if clock card B is present but not qualified, and is off if clock card B is either qualified and not selected, or not present.

INP A: Lamp that lights green when timing input A is present, qualified, and selected as the input reference for this card. This lamp lights red if timing input A is present but not qualified, and is off if timing input A is either qualified and not selected, or not present.

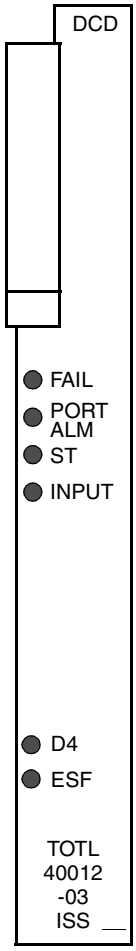
INP B: Lamp that lights green when timing input B is present, qualified, and selected as the input reference for this card. This lamp lights red if timing input B is present but not qualified, and is off if timing input B is either qualified and not selected, or not present.

D4: Lamp that lights green when the outputs are set for D4 framing.

ESF: Lamp that lights green when the outputs are set for ESF framing.

Note: If both the D4 and ESF lamps are lit, check optioning; only one or the other should be set.

Figure 26. TOTA-M Card Controls and Indicators



FAIL: Lamp that lights red if this card fails or there is a loss of all input references to this card (major alarm).

PORT ALM: Lamp that lights red if one to five outputs fail or have been externally shorted; a minor alarm is sent when the lamp lights. If the card option switch is set to LOCAL, disabling an output via the front-panel DISABLE jacks will send a minor alarm. If six or more outputs are disabled, this lamp is off and the alarm is cleared.

ST: Lamp that lights green when an active clock card is supplying the input reference for this card.

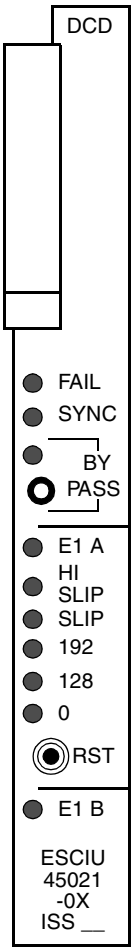
INPUT: Lamp that lights green when this card is receiving a reference signal from one or more of the following: clock input A, clock input B, clock card A, or clock card B.

D4: Lamp that lights green when the outputs are set for D4 framing.

ESF: Lamp that lights green when the outputs are set for ESF framing.

Note: If both the D4 and ESF lamps are lit, check optioning; only one or the other should be set.

Figure 27. TOTL Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, or there is a loss of input reference to this card (major alarm).

SYNC: Lamp that lights green when a system reference is present, and red when it is not present.

BYPASS: Lamp that lights red if the electronic bypass is activated. When Bypass is activated, the card's reclocking feature is inhibited.

Jack that allows the user to bypass the card's buffer. This function is provided for test purposes only, and is not recommended for general use.

E1 A: Lamp that lights green when E1 A is a valid signal; red when E1 A has LOS, OOF (major, minor, or none alarm option settings).

HI SLIP: Lamp that lights red when E1A has had 8 or more frame slips (major, minor, or none alarm option settings).

SLIP: Lamp that lights red when E1 A has 1 or more frame slips (major, minor, or none alarm option settings).

192: Lamp that lights yellow when E1 A has 192 to 256 bit slips (major, minor, or none alarm option settings [it is strongly recommended that the none option setting be used]).

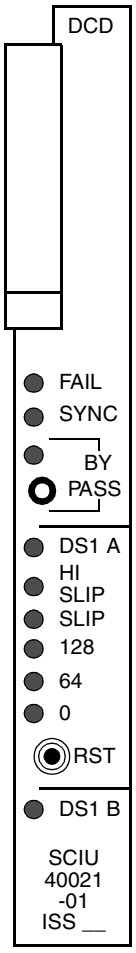
128: Lamp that lights green when E1 A has 128 to 191 bit slips.

0: Lamp that lights green when E1 A has less than 128 bit slips.

RST: Pushbutton that clears the HI SLIP and SLIP alarms and lamps. It does not clear the 192-bit slip alarm and lamp.

E1 B: Lamp that lights green when E1 B is a valid signal; red when E1 B has LOS (major, minor, or none alarm option settings); and is off when ESCIU is in monitor mode.

Figure 28. ESCIU Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, or there is a loss of input reference to this card (major alarm).

SYNC: Lamp that lights green when a system reference is present, and red when it is not present.

BYPASS: Lamp that lights red if the electronic bypass is activated. When Bypass is activated, the card's reclocking feature is inhibited.

Jack that allows the user to bypass the card's buffer. This function is provided for test purposes only, and is not recommended for general use.

DS1 A: Lamp that lights green when DS1 A is a valid signal; red when DS1 A has LOS, OOF (major, minor, or none alarm option settings).

HI SLIP: Lamp that lights red when DS1A has had 8 or more frame slips (major, minor, or none alarm option settings).

SLIP: Lamp that lights red when DS1 A has 1 or more frame slips (major, minor, or none alarm option settings).

128: Lamp that lights yellow when DS1 A has 128 to 192 bit slips (major, minor, or none alarm option settings [it is strongly recommended that the none option setting be used]).

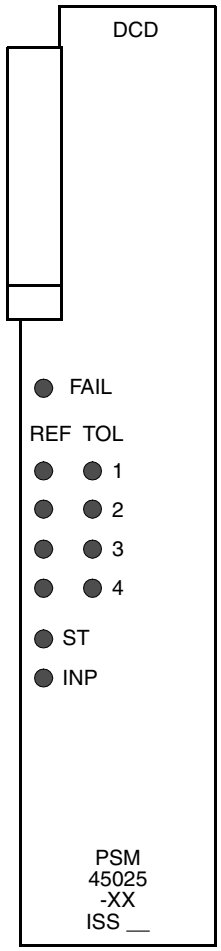
64: Lamp that lights green when DS1 A has 64 to 127 bit slips.

0: Lamp that lights green when DS1 A has less than 64 bit slips.

RST: Pushbutton that clears the HI SLIP and SLIP alarms and lamps. It does not clear the 128-bit slip alarm and lamp.

DS1 B: Lamp that lights green when DS1 B is a valid signal; red when DS1 B has LOS (major, minor, or none alarm option settings); and is off when SCIU is in monitor mode.

Figure 29. SCIU Card Controls and Indicators



FAIL: Lamp that lights red if this card fails, all ports fail, or there is a loss of input reference to this card (major alarm).

REF: Lamps that indicate the status of reference inputs 1, 2, 3, and 4: off if the input is not enabled; lights green if the input is enabled and has no E1 or T1 errors; lights red if the input is enabled but has excessive E1 or T1 errors.

TOL: Lamps that indicate the stability of reference inputs 1, 2, 3, and 4: off if the input is not enabled, or enabled and within stability tolerance; lights yellow if the input is enabled and out of stability tolerance.

ST: Lamp that is off if no stratum clock cards are active; lights green if at least one stratum clock card is active.

INP: Lamp that is off if no stratum clock cards or clock input cards are active; lights green if at least one stratum clock card or clock input card is active.

Note: PSM-T^{V5} (090-45025-51 and 090-45025-53), PSM-E^{V5} (090-45025-52) and PSM-EA^{V5} (090-45025-54) cards contain the same controls and indicators.

Figure 30. PSM Card Controls and Indicators