

DIGITAL CLOCK DISTRIBUTOR

519 HIGH DENSITY

INSTALLATION

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1. GENERAL

1.01 This section is a set of instructions for installing the Digital Clock Distributor 519 High Density (DCD-519 HD) System.

Note: Follow the instructions in the order they appear in this section.

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

- Added TO-EAN card.
- Replaced master/expansion shelf ribbon cable p/n 060-40004-01 with master/expansion shelf ribbon cable p/n 060-40004-12.
- Updated Figures 15, 30, 31, 32, 33, and 35, and Tables D and U.
- Added Figures 10, 11, and 16, and Tables E, F, G, H, and I.

1.03 All 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
AWG	American wire gauge
CAS	channel associated signaling
CC	composite clock
CCS	common channel signaling
CI	Clock Input
CRC	cyclic redundancy check
D4	D4 framing format
DCD	Digital Clock Distributor
DSX-1	Digital cross-connect, Level 1
ESD	electrostatic discharge
LOS	loss of signal
TL1	Transaction Language 1
TNC	Transit Node Clock
TO	Timing output card or slot

Notes:

1. Where information is common to the MRC-EA, MRC-EA^{V5}, MRC-T, MRC-T^{V5}, ACI, CI-EA, CI, DCIM-T, and DCIM-EA 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 MRC-T^{V5} cards, these cards are collectively referred to as MRC cards.
3. Where information is common to the 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, and the ST3E cards, these cards are collectively referred to as clock cards.
5. Where information is common to the TNC-E and the 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. "Interface panel" is used when referring to either the input/output panel of the master shelf or the output panel of the expansion shelf.
8. 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.

1.05 The DCD-519 HD may be purchased as individual shelves for installation into a standard ETSI (535 mm), ANSI (21 inch), or 19 inch rack with either 44 mm or 51 mm rack unit mounting screw holes.

2. SHELF INSTALLATION

A. Required Tools and Materials

2.01 The following items are needed for installing the DCD-519 HD System:

- Flat-blade screwdriver (small and medium)
- Phillips screwdriver (large and medium)
- Flat-nose pliers

- Cable cutting and stripping tools
- Wire-wrap/unwrap tool
- Multimeter with high-impedance inputs and clip-type probes
- Spade/ring-terminal crimp tool for 50.8 mils, 1.29 mm (16 AWG) stranded wire
- 25 W soldering iron (optional)
- Fine-grain sandpaper (for removing paint under ground stud)
- Conductive antioxidant (for all connections)
- Plastic tie-wrap tightening and cutting tool for miniature, intermediate, and standard size tie-wraps

B. Unpacking

2.02 This section provides guidelines and instructions for unpacking the equipment and returning damaged equipment.

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

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

2.03 Save packing material. All equipment returned *must be packed in the original packing material. Returned equipment not packed in original packing material voids warranty.* Contact your local Symmetricom distributor, or call Symmetricom's Customer Service Department if additional packaging is needed at one of the following:

+44 1483 510300 (U.K.)

+1 408 428 7907 (U.S.A.)

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

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

2.04 The DCD-519 HD System is shipped in several boxes. One box contains a bare shelf (card chassis), hardware kit, and manual; one box contains the interface panel and mounting hardware; one box contains the cards. Each card is packed in its own carton inside a large box. Other boxes, if any, contain TNC-E or ST2E clock cards, each packed in its own box.

1. Unpack equipment carefully; check for completeness against the purchase order. (Be sure to save the packing material.)
2. Notify your local Symmetricom distributor, or Symmetricom's Customer Service Department if any of the items are missing.
3. Inspect equipment for shipping damage, including bent or loose hardware, and broken connectors. Inspect the front and rear panels for damage; if extensive damage is found, remove the panels and inspect inside for damage
4. Notify your local Symmetricom distributor, or Symmetricom's Customer Service Department and the carrier if equipment was damaged in transit.

C. Site Preparation

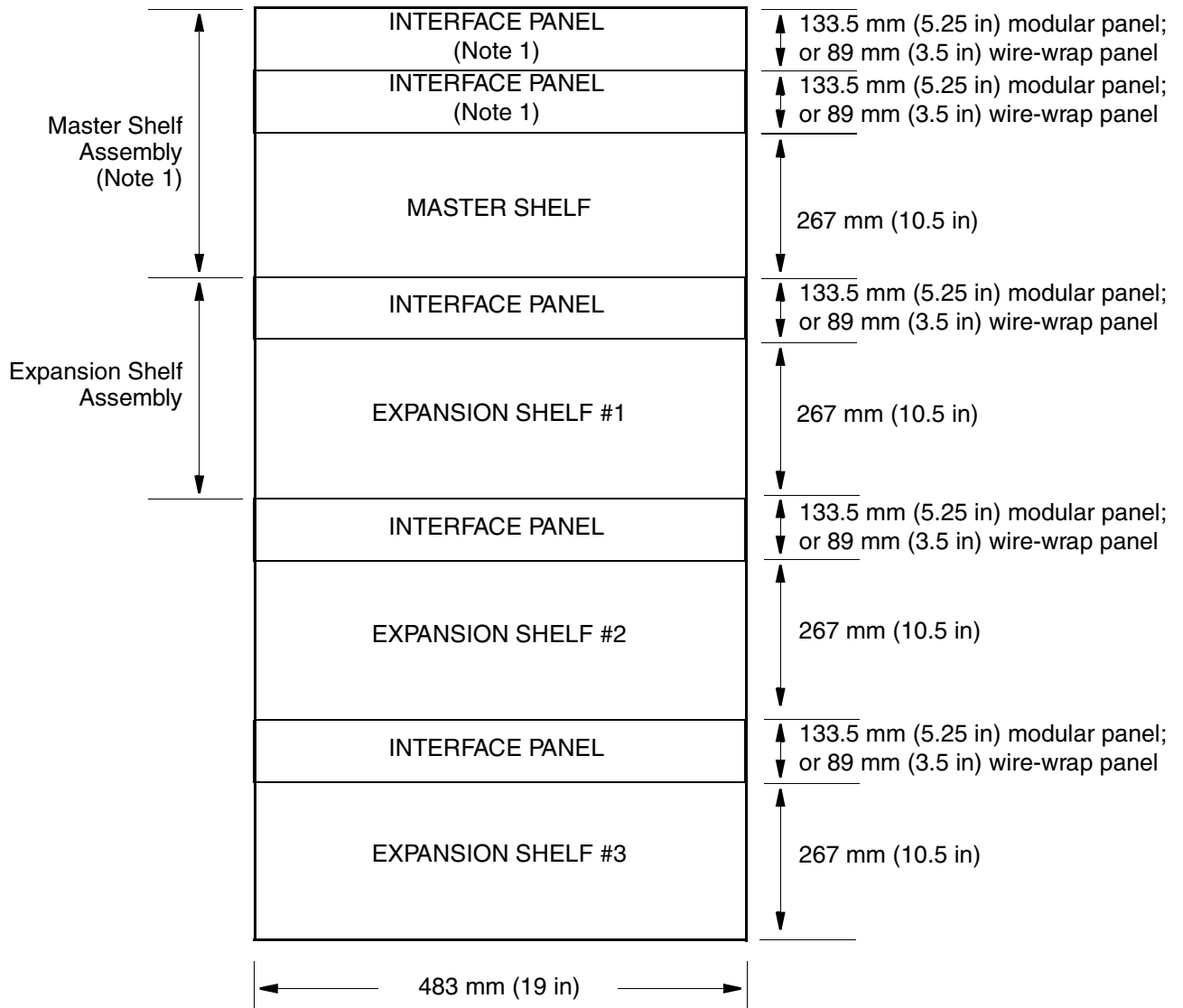
Caution: *The DCD-519 HD System should not be installed near large motors, generators, transformers, or other equipment which radiate strong magnetic fields. Placing the DCD-519 HD near such equipment does not ensure proper operation.*

2.05 This manual assumes that a site survey was performed and Installation Job Specifications were developed by the local company as supplements to this manual. The Installation Job Specifications should contain the following:

- The number of shelf assemblies to be installed
- The racks and rack positions where the shelf assemblies are to be installed
- Power and frame ground connections between the office and the shelves
- Cable routing lists for power, ground, inputs, and outputs
- Options for cards and placement of cards
- Assignment of timing outputs to Network Elements (NE)
- Timing lines to be monitored, if any

2.06 Each system consists of a master shelf and up to three expansion shelves. Each shelf assembly consists of a shelf and at least one interface panel (see Figure 1). An additional interface panel may be added to the master shelf to accommodate outputs from slots TO7 and TO8.

2.07 If two racks are required for mounting, the racks must be mounted adjacent and as close as possible to keep the cable length as short as possible. Refer to local company manuals for ribbon cable runs between equipment bays, if permitted.



Notes:

1. A fully equipped master shelf requires two interface panels.
2. An optional DCD-LPR shelf is typically mounted at the top of the rack.
3. Expansion shelves and accompanying interface panels are optional.

Figure 1. DCD-519HD Rack Layout

D. Shelf and Interface Panel Mounting

2.08 Mount a DCD-LPR at the top of the rack. If a DCD-LPR is not part of the installation, mount the master shelf assembly at the top of the rack.

2.09 The mounting ears on the master and expansion shelf assemblies can be positioned for either EIA (485 mm [19 inch]) or ETSI (535 mm [21 inch]) standard mounting.

2.10 Mount the shelves and interface panels as specified in the local company’s Installation Job Specification as follows:

1. Position the mounting ears on the master and expansion shelf assemblies for mounting as appropriate (Figure 2).

Note: Position the mounting ears the same way for the interface panel and the shelf; either flush-mounted or offset-mounted.

2. Align the mounting holes so that at least four screws on each side can be installed, and attach using the provided screws.
3. Mount the interface panel and shelf for the first expansion shelf directly under the master shelf. Air circulation is provided by the grill on the bottom of the shelf. (See Figures 3 through 5 for interface panels.)
4. If capacity requires more expansion shelves, install the appropriate number of expansion shelves per instructions in Step 3.
5. If the cable distance between the DCD-519 HD system and the NEs being timed exceeds the specifications, set up a remote DCD-519 HD system with the appropriate number of output slots.

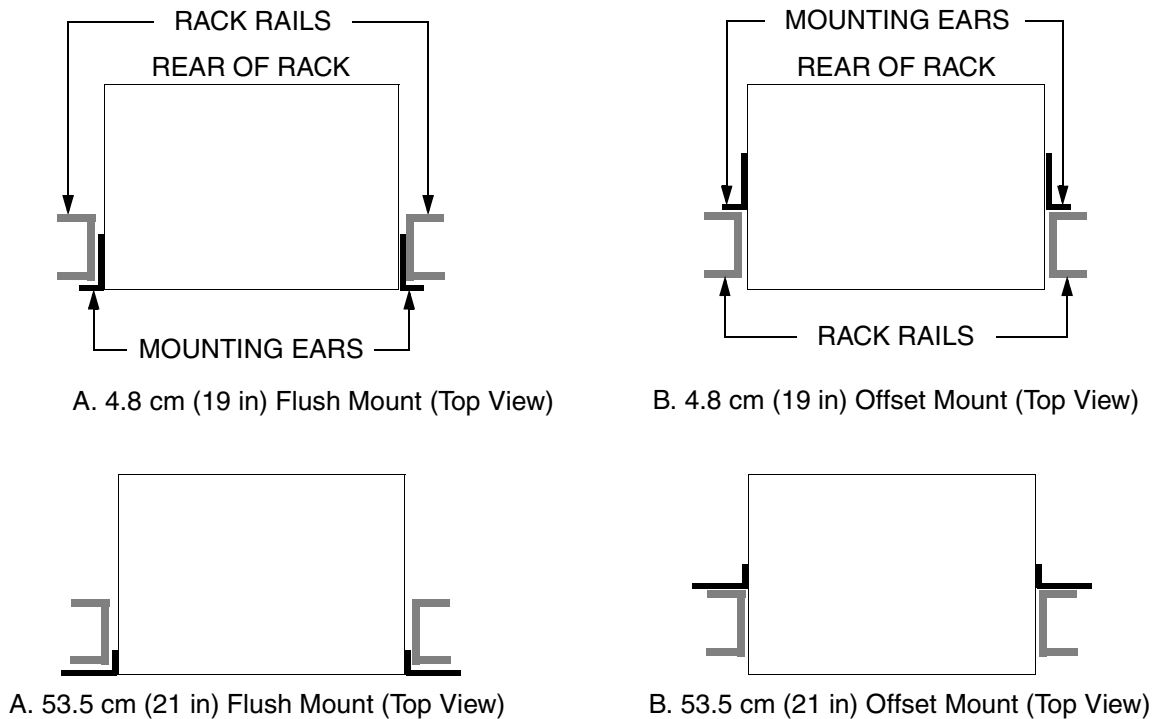


Figure 2. Rack Mounting Positions

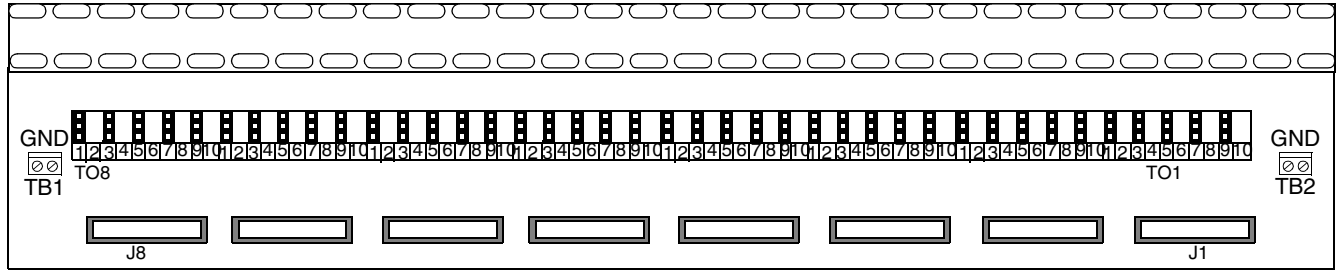


Figure 3. Wire-Wrap Panel

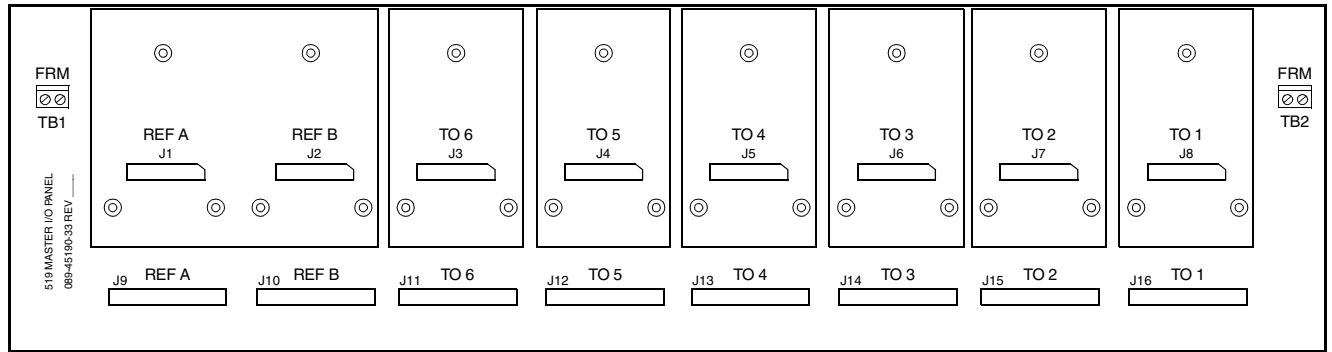


Figure 4. ITU-Class I/O MMP

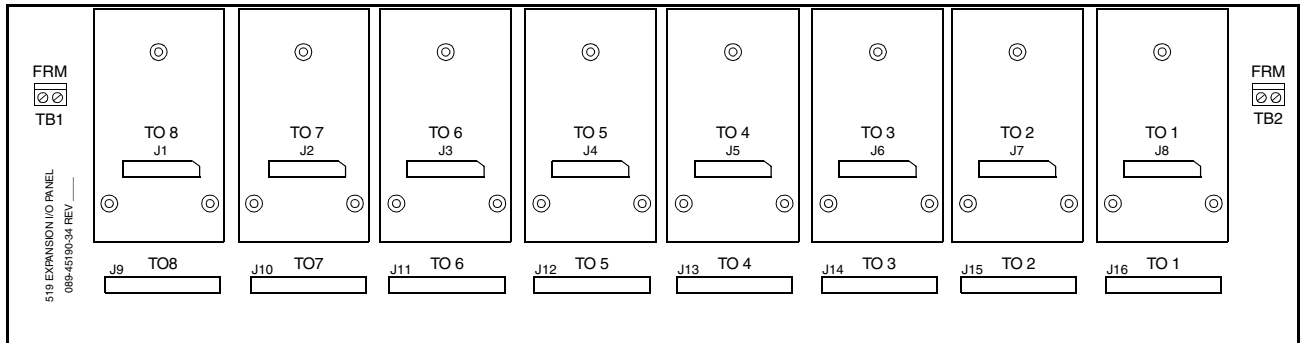


Figure 5. ITU-Class Output MMP

E. Shelf Switch Settings

Master Shelf Switches

2.11 Consult the local company Installation Job Specifications to set switches SW1 through SW5 (Figure 6) on the master shelf rear panel.

Note: If the shelf is to be equipped with ST3E-01 clock cards, then SW3 and the switches on the ST3E-01 cards must be set to the same alarm function. If the shelf is to be equipped with ST3E-03 or ST3 clock cards, then SW3 must be set to MAJ.

Note: SW4 sets the input at row 4 of terminal block REF A, SW5 sets the input at row 4 of terminal block REF B. Set these switches to

BRDG if using -20 dB level reference input; set these switches to TERM if using 0 dB level reference input (the default setting is TERM).

- Using Figure 6 and Table A as reference, set switches SW1 through SW7 on the rear panel of the master shelf assembly per local company Installation Job Specifications.
- Repeat Step 1 for each remote system master shelf in the building.

Expansion Shelf Switches

2.12 Set the switches on the rear panel of an expansion shelf to the same positions as the switches on the master shelf.

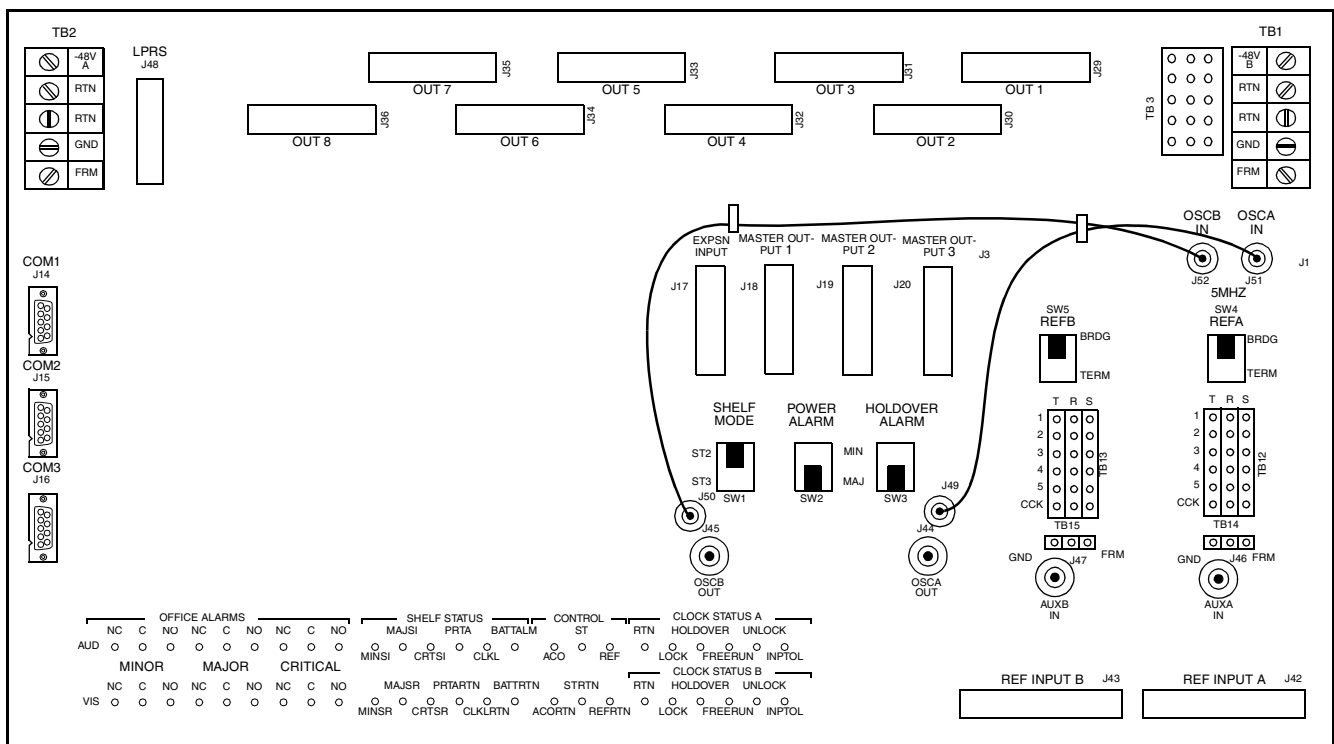


Figure 6. Shelf (Rear View)

Table A. Master Shelf Switches

SWITCH	SETTING	FUNCTION	FACTORY SETTING
SW1	ST2	Clock option set for ST2E/ST2/TNC-E clock operation Required setting for 090-45010-54 and -57 MRC cards	X
	ST3	Clock option set for ST3E/ST3/TNC clock operation	—
SW2	MAJ	Sets the system to generate a major alarm in the event of a power alarm (A or B)	X
	MIN	Sets the system to generate a minor alarm in the event of a power alarm (A or B)	—
SW3	MAJ	Generates a major alarm if both clock cards go into holdover mode	X
	MIN	Generates a minor alarm if both clock cards go into holdover mode	—
SW4	BRDG	Sets reference input signal at input 4 of REF A as bridged (-20 dB input level)	X
	TERM	Sets reference input signal at input 4 of REF B as terminated (0 dB input level)	—
SW5	BRDG	Sets reference input signal at input 4 of REF A as bridged (-20 dB input level)	X
	TERM	Sets reference input signal at input 4 of REF B as terminated (0 dB input level)	—

Notes:

- SW6 and SW7 do not have any effect on 1:1 or 1+1 output protection. 1:1 protection is configured via the installation of the appropriate 1:1 TO card pair and correct cabling.
- If the shelf is to be equipped with ST3E-01 clock cards, set the rear-panel switches and the ST3E-01 cards for the same alarm type (shelf and card switches set to generate a major alarm, or set to generate a minor alarm). If the shelf is to be equipped with ST3E-03 or ST3 clock cards, set the rear-panel switches to generate a major alarm.

F. Interface Module Installation

2.13 Interface modules (Tables B through D) must be installed on the MMP as an interface between the cards and external cabling. Each interface module provides a different type of connector for the DCD-519 HD shelf input or output signals. Use a module compatible with the card.

2.14 Install an interface module in the position corresponding to the slot the card is to be installed. For example, an EA10 card installed in slot TO1 requires an EA10-compatible interface module installed in the OUTPUT1 position on the MMP. Installation procedures for the master and expansion shelves are identical.

Note: Reference input cables may be connected to the shelf rear panel or to a module. Refer to the Installation Job Specifications to determine whether a module for the reference inputs is required.

2.15 To install an interface module, perform the following:

1. Choose and prepare the appropriate interface module for each output card to be installed (refer to Tables B through D) on the master shelf.
 - 2-port BNC interface module (Figure 7): install the appropriate attenuation pads (2 dB, 3 dB, 3.5 dB, 6 dB, 30 dB, or 60 dB) on the interface module. (The pad values should be determined from the local company Installation Job Specifications.) To install the pads, line up pins on the pad with U1 (with labeling on the pad right-side up) and insert until firmly seated. Repeat for U2.
 - 2-port BNC interface module (Figure 7): if required to isolate DC ground (SHIELD) from DCD equipment, remove jumper(s) (DC GND), J1 and/or J2.
 2. To install an interface module, line up the three spring-loaded screws on the modules to the holes on the panel
 3. Use a medium flat-blade screwdriver to lock each screw in place. Screw in evenly to prevent skewing the module. Also make sure that the top screw is securely in place; this is the FRM GND connection to the MMP.
 4. Repeat Steps 1 through 3 for all interface modules for the shelf.
 5. Repeat Steps 1 through 4 for each expansion shelf in the system, if applicable.
 6. Repeat Steps 1 through 5 for the remote system, if applicable.
- Reference input modules (all) (Figure 8): The sections of SW1 determine whether the shield of the associated connector is connected to ground at the DCD shelf. The OPEN position holds the shield disconnected from ground.
 - PSM card input modules (all coaxial-connector models) (Figure 8): The sections of SW1 determine whether the shield of the associated connector is connected to ground at the DCD shelf. The OPEN position holds the shield disconnected from ground.
 - 990-45105-11 module (Figure 9): determine which external equipment are to be connected by wire-wrap cable and which by Siemens 1.6/5.6 connections. When the jumper is connected (factory setting), the wire-wrap connectors are active. When the jumper is not connected, the coaxial connectors are active. Each port (OUT 1 through OUT10) can be set independently.

Table B. Clock Input Modules for ITU-Class MMPs

CARD	MODULE				
	PART NUMBER	CONNECTOR TYPE	IMPEDANCE	INPUT SIGNAL LEVEL	NO. OF INPUTS
ACI (Connect input at AUX or A5 only) (SW4 and SW5 at BRDG only) (Note 1)	990-45107-02	SMB	75 Ω (unbalanced)	0.3 V to 1.5 V rms (AUX only)	4 + AUX (Use AUX)
	990-45107-03	Siemens 1.6/5.6	75 Ω (unbalanced)	0.3 V to 1.5 V rms (AUX only)	4 + AUX (Use AUX)
	990-45107-04	Siemens 1.0/2.3	75 Ω (unbalanced)	0.3 V to 1.5 V rms (A5 only)	5 (Use A5)
CI (Connect input at A3 only) (SW4 and SW5 at TERM or BRDG) (Note 1)	990-45107-06	Wire-wrap	T1: 100 Ω (balanced) CC: 133 Ω (balanced)	TERM: T1: 1.0 V to 3.5 V b-p (A3 only) BRDG: T1: 0.1 V to 0.35 V b-p BRDG: CC: 1.5 V to 4.0 V p-p	4 (Use A3)
CI-EA (Connect input at A3, AUX, or A5 only) (SW4 and SW5 at TERM or BRDG) (Note 1)	990-45107-02	SMB	75 Ω (unbalanced)	TERM: E1: 1.0 V to 3.5 V b-p (A3 only) BRDG: E1: 0.1 V to 0.35 V b-p (A3 only) BRDG: Analog: 1.5 V to 3.0 V p-p (AUX only)	4 + AUX (Use inputs listed)
	990-45107-03	Siemens 1.6/5.6	75 Ω (unbalanced)	TERM: E1: 1.0 V to 3.5 V b-p (A3 only) BRDG: E1: 0.1 V to 0.35 V b-p (A3 only) BRDG: Analog: 1.5 V to 3.0 V p-p (AUX only)	4 + AUX (Use inputs listed)
	990-45107-04	Siemens 1.0/2.3	75 Ω (unbalanced)	TERM: E1: 1.0 V to 3.5 V b-p (A3 only) BRDG: E1: 0.1 V to 0.35 V b-p (A3 only) BRDG: Analog: 1.5 V to 3.0 V p-p (A5 only)	5 (Use inputs listed)
	990-45107-06	Wire-wrap	120 Ω (balanced)	TERM: E1: 1.0 V to 3.5 V b-p (A5 only) BRDG: E1: 0.1 V to 0.35 V b-p (A3 only)	4 (Use inputs listed)

Table B. Clock Input Modules for ITU-Class MMPs (Contd)

CARD	MODULE				
	PART NUMBER	CONNECTOR TYPE	IMPEDANCE	INPUT SIGNAL LEVEL	NO. OF INPUTS
MRC-EA MRC-EA ^{V5} DCIM-EA (Connect all inputs to A1 through A4) (SW4 and SW5 at BRDG only) (Notes 1 and 2)	990-45107-02	SMB	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	4 + AUX (Do not use AUX)
	990-45107-03	Siemens 1.6/5.6	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	4 + AUX (Do not use AUX)
	990-45107-04	Siemens 1.0/2.3	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	5 (Do not use A5)
	990-45107-06	Wire-wrap	120 Ω (balanced)	E1 and analog: 0.1 V to 3.5 V b-p	4
<p>Notes:</p> <ol style="list-style-type: none"> SW4 and SW5 are located on the DCD rear panel. MRC-T and DCIM-T cards cannot use input modules. Connect inputs for all MRC-T and DCIM-T cards directly to TB12 and TB13, rows 2 through 5 on the DCD rear panel. Part numbers shown are for ordering purposes; part numbers on modules start with 089 instead of 990. 					

Table C. PSM Modules for ITU-Class MMPs

CARD	MODULE				
	PART NUMBER	CONNECTOR TYPE	IMPEDANCE	INPUT SIGNAL LEVEL	NO. OF INPUTS
PSM-T PSM-T ^{V5}	990-45106-11 (Note 1)	Wire-wrap	100 Ω (balanced)	T1: 0.1 V to 3.5 V b-p	4
PSM-E PSM-E ^{V5} PSM-EA PSM-EA ^{V5}	990-45106-11 (Note 1)	Wire-wrap	120 Ω (balanced)	E1: 0.1 V to 3.5 V b-p	4
	990-45106-12	Siemens 1.6/5.6	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	4
	990-45106-13	BNC	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	4
	990-45106-14	SMB	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	4
	990-45106-15	Siemens 1.0/2.3	75 Ω (unbalanced)	E1 and analog: 0.1 V to 3.5 V b-p	4
<p>Notes:</p> <ol style="list-style-type: none"> 1. Use this module for E1 or T1 signals only. 2. Part numbers shown are for ordering purposes; part numbers on modules start with 089 instead of 990. 3. DCD rear panel switches SW4 and SW5 must be in the BRDG position. 					

Table D. Timing Output Modules for ITU-Class MMPs

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
SCIU	Stand-alone	990-45021-10	Wire-wrap (Note 1)	100 Ω (balanced)	I/O for 2-way T1
ESCIU	Stand-alone	990-45021-11	SMB	75 Ω (unbalanced)	I/O for 2-way E1
		990-45021-12	Siemens 1.6/5.6	75 Ω (unbalanced)	I/O for 2-way E1
EA10 EA10M	Stand-alone	990-45105-06	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10
		990-45105-13	SMB	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-14	Siemens 1.6/5.6	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-15	Siemens 1.0/2.3	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45108-01	Wire-wrap (Note 1)	E1: 120 Ω Analog: 75 Ω (balanced)	10 (11, 12, 13 not used)
	1:1, 1+1	990-45105-10 (double-wide)	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10
		990-45105-11 (double-wide)	Wire-wrap or Siemens 1.6/5.6	E1: 120 Ω (balanced) or E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-16 (double-wide)	SMB	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-17 (double-wide)	Siemens 1.6/5.6	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-18 (double-wide)	Siemens 1.0/2.3	E1: 75 Ω Analog: 75 Ω (unbalanced)	10

Table D. Timing Output Modules for ITU-Class MMPs (Contd)

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
EA20 EA20M	Stand-alone, 1:1, 1+1	990-45105-06	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10
		990-45105-13	SMB	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-14	Siemens 1.6/5.6	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-15	Siemens 1.0/2.3	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45108-01	Wire-wrap (Note 1)	E1: 120 Ω Analog: 75 Ω (balanced)	10 (11, 12, 13 not used)
		Note: EA20 and EA20M cards each require two output modules on adjacent positions to accommodate 20 outputs.			
TOAA (except 090-40028-10)	Stand-alone	990-45122-01	BNC	Analog: 75 Ω (unbalanced) (includes 0 dB, 3.0 dB, 3.5 dB, 30.0 dB, 60.0 dB pads)	2
TOAA (090-40022-02)	Stand-alone	990-45122-01	BNC	Analog: 50 Ω (unbalanced) (includes 0 dB, 3.0 dB, 3.5 dB, 30.0 dB, 60.0 dB pads)	2
TOCA	Stand-alone	990-45108-01	Wire-wrap (Note 1)	CC: 133 Ω (balanced)	10 (Do not use 11, 12, 13)

Table D. Timing Output Modules for ITU-Class MMPs (Contd)

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
TO-EA5	Stand-alone	990-45105-06	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10
		990-45105-12	Wire-wrap and Siemens 1.6/5.6	E1: 120 Ω (balanced) and E1: 75 Ω Analog: 75 Ω (unbalanced)	5 Wire-wrap and 5 Siemens 1.6/5.6
		990-45105-13	SMB	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-14	Siemens 1.6/5.6	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-15	Siemens 1.0/2.3	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45108-01	Wire-wrap (Note 1)	E1: 120 Ω Analog: 75 Ω (balanced)	10 (Do not use 11, 12, 13)
	1:1, 1+1	990-45105-10 (double-wide)	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10
		990-45105-11 (double-wide)	Wire-wrap or Siemens 1.6/5.6	E1: 120 Ω (balanced) or E1: 75 Ω Analog: 75 Ω (unbalanced)	10 Wire-wrap or 10 Siemens 1.6/5.6 or combination
		990-45105-16 (double-wide)	SMB	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-17 (double-wide)	Siemens 1.6/5.6	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-18 (double-wide)	Siemens 1.0/2.3	E1: 75 Ω Analog: 75 Ω (unbalanced)	10

Table D. Timing Output Modules for ITU-Class MMPs (Contd)

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
TO-EA TO-EAN	Stand-alone	990-45105-12	Wire-wrap and Siemens 1.6/5.6	E1: 120 Ω Analog: 75 Ω (balanced) and E1: 75 Ω Analog: 75 Ω (unbalanced)	5 Wire-wrap and 5 Siemens 1.6/5.6
		990-45105-13	SMB	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-14	Siemens 1.6/5.6	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45105-15	Siemens 1.0/2.3	E1: 75 Ω Analog: 75 Ω (unbalanced)	10
		990-45108-01	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10 (Do not use 11, 12, 13)
	1:1, 1+1 (TO-EA) 1:N (TO-EAN)	990-45105-10 (double-wide)	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10
		990-45105-11 (double-wide)	Wire-wrap or Siemens 1.6/5.6	E1: 120 Ω (balanced) or E1: 75 Ω Analog: 75 Ω (unbalanced)	10 Wire-wrap or 10 Siemens 1.6/5.6 or combination
	TOEA	Stand-alone	990-45105-12	Wire-wrap and Siemens 1.6/5.6	E1: 120 Ω (balanced) or E1: 75 Ω (unbalanced)
990-45105-13			SMB	E1: 75 Ω (unbalanced)	10
990-45105-14			Siemens 1.6/5.6	E1: 75 Ω (unbalanced)	10
990-45105-15			Siemens 1.0/2.3	E1: 75 Ω (unbalanced)	10
990-45108-01			Wire-wrap (Note 1)	E1: 120 Ω (balanced)	10 (Do not use 11, 12, 13)

Table D. Timing Output Modules for ITU-Class MMPs (Contd)

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
TOGA	Stand-alone	990-45105-12	Wire-wrap and Siemens 1.6/5.6	Analog: 75 Ω (unbalanced)	5 Wire-wrap and 5 Siemens 1.6/5.6
		990-45105-13	SMB	Analog: 75 Ω (unbalanced)	10
		990-45105-14	Siemens 1.6/5.6	Analog: 75 Ω (unbalanced)	10
		990-45105-15	Siemens 1.0/2.3	Analog: 75 Ω (unbalanced)	10
	1+1	990-45105-16 (double-wide)	SMB	Analog: 75 Ω (unbalanced)	10
TOLA	Stand-alone	990-45108-01	Wire-wrap (Note 1)	RS-422: 100 Ω (balanced) RS-423 (TTL): 450 Ω (unbalanced)	10 (Do not use 11, 12, 13)
TOTA-5 TOTA TOTL TOTA-M	Stand-alone	990-45105-06	Wire-wrap (Note 1)	T1: 100 Ω (balanced)	10
		990-45108-01	Wire-wrap (Note 1)	T1: 100 Ω (balanced)	10 (Do not use 11, 12, 13)
Notes: 1. Use this module for E1 or T1 signals only. 2. Part numbers shown are for ordering purposes; part numbers on modules start with 089 instead of 990.					

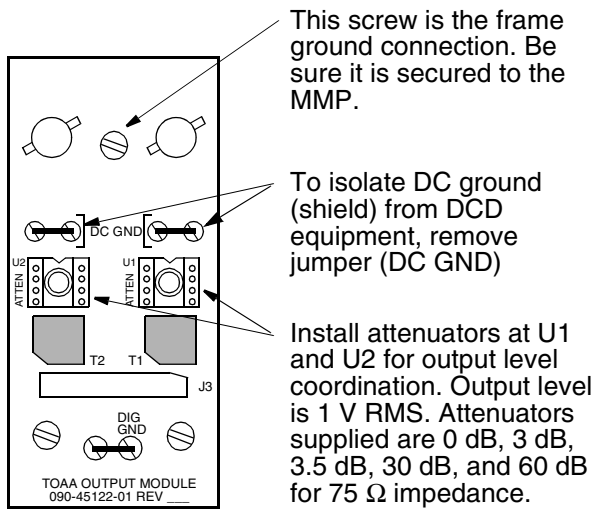


Figure 7. TOAA 2-port BNC Interface Module

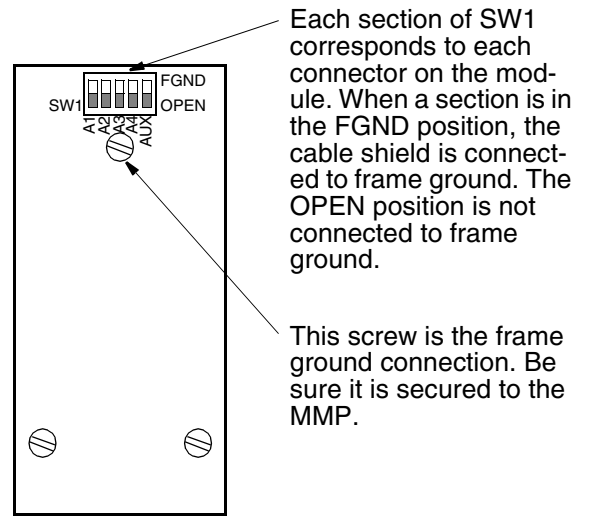


Figure 8. Reference and PSM Input Module Switches

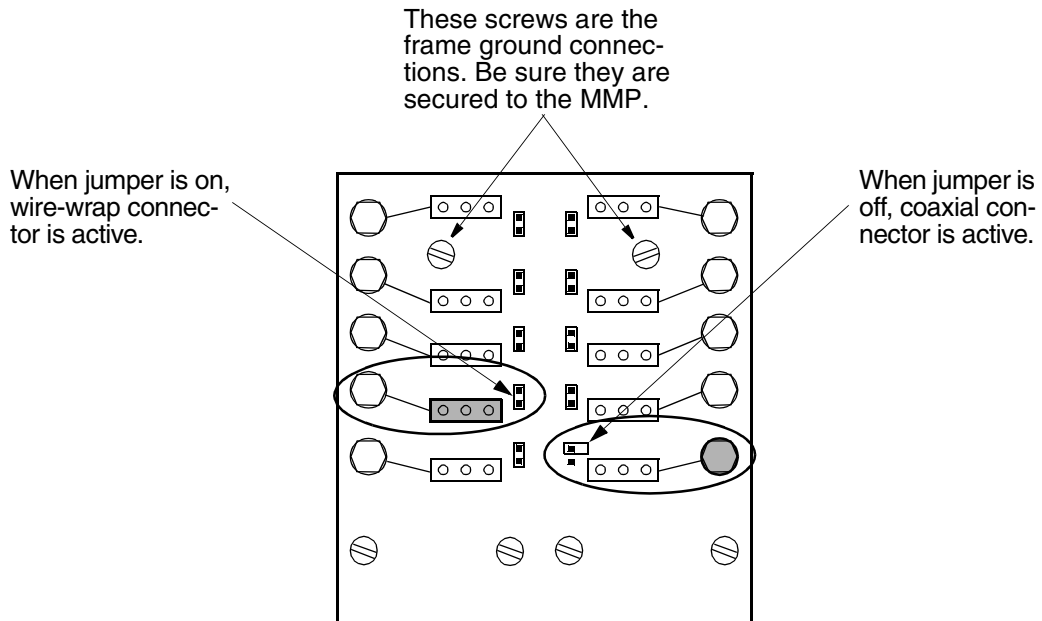


Figure 9. 990-45105-11 Module Jumpers

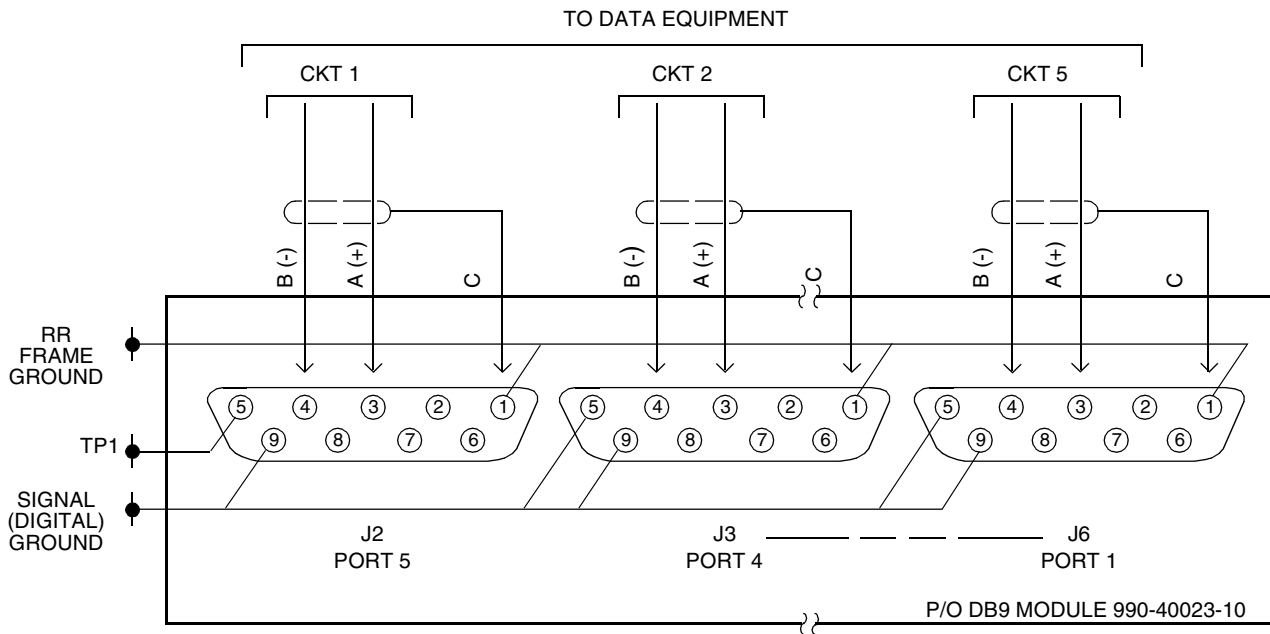


Figure 10. DB9 Module (RS-422) (For TOLA Card)

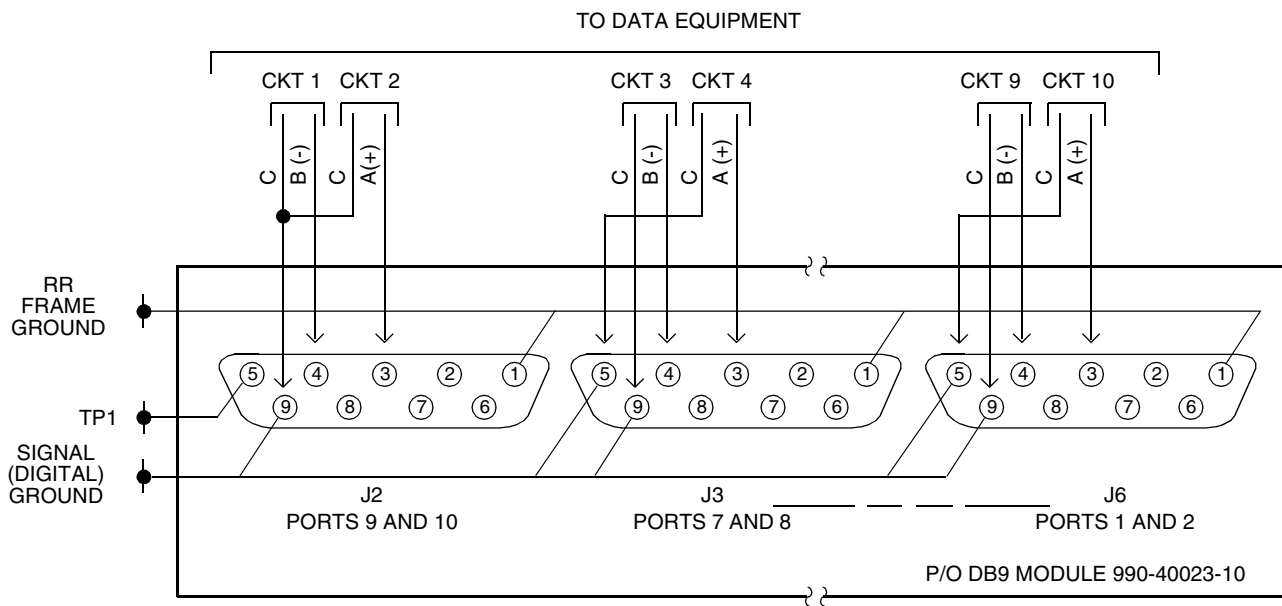


Figure 11. DB9 Module (RS-423) (For TOLA Card)

Table E. Wire-Wrap Output Connections

WIRE-WRAP LEADS *		TOTA, TOTA-2, TOCA (DS1 or CC) TOEA, TOGA (E1 or G.703)		TOLA (RS-422)**		TOLA (TTL)***		TOAA (ANALOG)	
OUTPUT	PIN	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD
1	T R S	1	T R S	1	D+ D-	1 2	D1 D2		
2	T R S	2	T R S			— —	C1 C2		
3	T R S	3	T R S	2	D+ D-	3 4	D3 D4	2 (Note 1)	T S —
4	T R S	4	T R S			— —	C3 C4		
5	T R S	5	T R S	3	D+ D-	5 6	D5 D6		
6	T R S	6	T R S			—	C5 C6		
7	T R S	7	T R S	4	D+ D-	7 8	D7 D8		
8	T R S	8	T R S			— —	C7 C8	1 (Note 1)	T S —
9	T R S	9	T R S	5	D+ D-	9 10 —	D9 D10		
10	T R S	10	T R S			— —	TP1 C9 & C10		

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

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

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

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

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

Table F. Wire-Wrap Interface Module Output Port Connections for TOLA-03 Only

WIRE-WRAP MODULE		TIMING PORT	LEAD
TERMINAL SET	PIN		
1	T R S	1	CLOCK GND —
2	T R S	—	—
3	T R S	2	CLOCK GND —
4	T R S	—	—
5	T R S	3	CLOCK GND —
6	T R S	4	CLOCK GND —
7	T R S	—	—
8	T R S	5	CLOCK GND —
9	T R S	—	—
10	T R S	—	TEST GND —

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

Table G. Wire-Wrap Interface Module Input Port Connections for PSM-T Only

WIRE-WRAP MODULE		PSM-T PORT	LEAD
TERMINAL SET	PIN		
1	T R S	1	T R S
3	T R S	2	T R S
5	T R S	3	T R S
7	T R S	4	T R S

Table H. 10-Port BNC Interface Module Input Port Connections for PSM-T Only

10-PORT BNC MODULE CONNECTOR	PSM-T PORT
1	1
3	2
5	3
7	4

Table I. DB9 Interface Connections

DB9 CONNECTOR		TOTA, TOTA-2, TOCA, TOEA, TOGA		TOLA (RS-422)		TOLA (TTL)		TOAA (ANALOG)	
LABEL	PIN	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD
J2	9 5 1	1	T R S	5	— — —	—	C9 and C10 — —		
	4 3 1	2	T R S		D+ D- S	9 10	D9 D10		
J3	9 5 1	3	T R S	4	— — —	C7 C8 —	C7 C8	2	T S —
	4 3 1	4	T R S		D+ D- S	6 7 —	D7 D8		
J4	9 5 1	5	T R S	3	— — —	5 6	C5 C6 —		
	4 3 1	6	T R S		D+ D- S	3 4	D5 D6		
J5	9 5 1	7	T R S	2	— — —	1 2	C3 C4 —		
	4 3 1	8	T R S		D+ D- S	—	D3 D4 —	1	T S —
J6	9 5 1	9	T R S	1	— — —	C — —	C1 C2 —		
	4 3 1	10	T R S		D+ D- S	—	D1 D2		

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

G. Ground Connections

2.16 Connect terminal blocks on the rear panel of the shelf and on the interface panels to frame ground. Frame ground is a #6 ground rod connected to the rack, or the rack itself.

2.17 Connect the following terminals to frame ground:

- Shelf rear panel TB1 & TB2
- Wire-wrap Interface Panel TB1
- Modular Mounting Panel TB1

2.18 At the rear panel of the shelf, apply -48 V B power to TB1, and -48 V A power to TB2. Both terminal blocks are screw terminal type for spade lug office battery connections. Figure 12 illustrates the DCD-519 HD ground connections.

Note: To prevent battery return to frame ground fault, do not connect digital GND or battery RTN on either the master or the expansion shelves to frame ground.

Note: Use 50.8 mils, 1.29 mm (16 AWG) stranded insulated wire for grounding connections; these wires are supplied by the user.

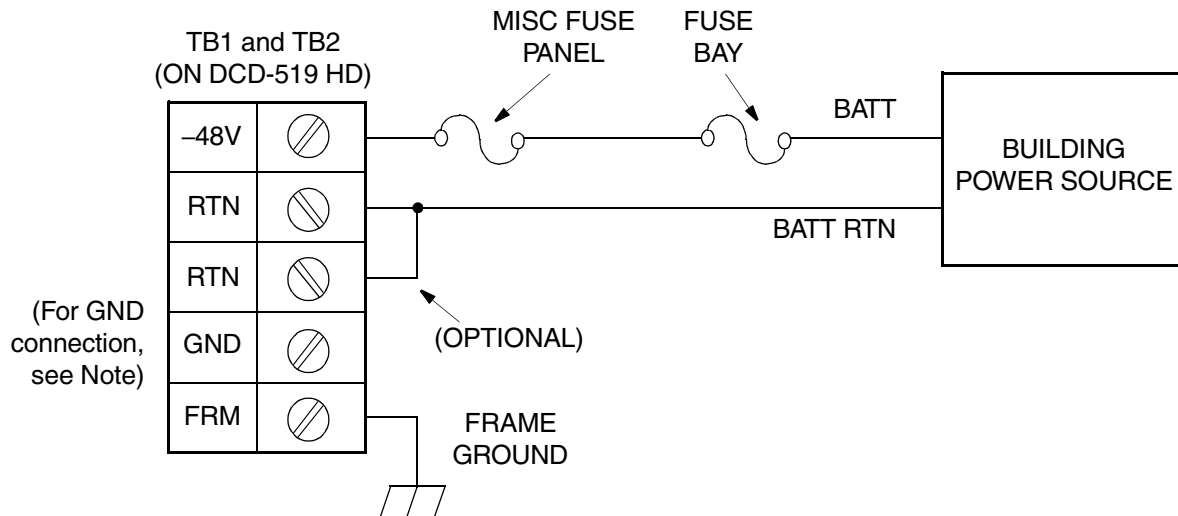
Note: Ensure the ground source is low noise.

2.19 Use one of the two methods following to connect to frame ground.

Using a #6 Ground Rod as Frame Ground

Note: Use a 25 W soldering iron to heat sufficiently the #6 rod.

1. Strip enough insulation from the wire to allow three complete turns around the #6 rod.
2. Crimp an appropriate size spade lug to the ground wire, bend the lug around the #6 rod, and solder the lug.
3. Turn the wire around the rod and solder the wire to the rod.
4. Strip approximately 5 mm (0.2 inch) of insulation from the other end of the wire, and crimp a spade lug or ring-terminal lug to the wire.
5. Screw the lug to FRM on the terminal block.
6. Repeat Steps 1 to 5 for each shelf and interface panel in the system that uses a #6 ground rod as a frame ground.
7. Repeat Steps 1 to 6 for remote systems if applicable.



Note: To prevent battery return to frame ground fault, do not connect digital GND or battery RTN to FRM ground on either the master or the expansion shelves, or on any shelf in a remote system.

Figure 12. Ground and Power Connections

Using a Rack as Frame Ground

1. Find an unused screw hole on the rack and sand the paint from around the hole to ensure good contact.
2. Prepare the 16 gauge wire and crimp a spade lug to it. Screw the lug to the rack.
3. Strip approximately 5 mm (0.2 inch) of insulation from the other end of the wire, and crimp a spade lug or ring-terminal lug to the wire.
4. Screw the lug to FRM on the terminal block.
5. Repeat Steps 1 to 4 for each shelf and interface panel in the system that uses a rack as a frame ground.
6. Repeat Steps 1 to 5 for remote systems if applicable.

H. Power Connections (Battery and Return Leads)

2.20 Connect power to TB1 and TB2 (Figure 6 and Figure 12) at the rear of the shelf. The DCD-519 HD master and expansion shelves require 5 A fuses. The fuse requirement at the fuse bay or miscellaneous fuse panel is 150% of the shelf rating, or the nearest larger size (7.5 A to 10 A).

Note: Ensure that the power load sources (A and B) are fully diverse and cable routes are as diverse as possible. Do not install any type of redundant lead lying parallel and adjacent in the same cable rack. Route leads A and B on separate sides of each shelf. If the site only has one power source, connect both A and B feeds from that single source, diversely routed.

Note: Two 50.8 mils, 1.29 mm (16 AWG) stranded wires are used for power connections, one with red insulation (–48 V) and the other with black insulation (RTN); these wires are user-supplied.

–48 V Connections

2.21 Use the stranded wire to connect office battery supply leads from the power source to the terminals on the DCD-519 HD rear panel (Figure 6 and Figure 12). The –48 V dc A and B input voltage supplies may be filtered or unfiltered.

Note: A and B power inputs must come from two separate sources (leads). The power sources should be specified in the local company Installation Job Specifications. These may be from a battery distribution fuse board (BDFB), a miscellaneous fuse bay, or a miscellaneous fuse panel in the same rack as the DCD-519 HD.

Note: Be sure the –48 V dc source is electricaly isolated from any ac source and reliably connected to earth ground.

1. Remove shelf fuses from the front panel.
2. Remove battery source fuses from the rack fuse bay.
3. Run the power wires from the power sources to the DCD-519 HD shelf.
4. Crimp a spade or ring-terminal lug (user-provided) to the shelf end of the power wires.
5. Connect A power source lugs to –48V (red wire) and RTN (black wire) terminals on TB2.
6. Connect B power source lugs to –48V (red wire) and RTN (black wire) terminals on TB1.
7. Verify with a volt-ohmmeter that there are no foreign battery, grounds, or shorts at the power source end of the wires.
8. Connect the leads to the power source terminals with the appropriate type of connectors or lugs.
9. Reinstall battery source fuses in the rack fuse bay.
10. Using a multimeter, verify that the input voltage level is between –42 V and –56 V dc at the following terminals:

- –48V B and RTN terminals of TB1 (if used)
- –48V A and RTN terminals of TB2 (if used)

11. Reinstall shelf fuses in the front panel and repeat Step 1 through Step 10 for each shelf in the system (master and expansion shelves in both master and remote systems, if applicable).

RTN Connections

2.22 The battery return wiring may be connected to one or both RTN terminals. Use 50.8 mils, 1.29 mm (16 AWG) stranded wire (black insulation) to connect RTN leads from the fuse panel to the terminals on the DCD-519 HD rear panel

3. PRE-TEST CONNECTIONS

A. Shelf to Interface Panel Connections

3.01 Make connections between interface panel connectors and the output connectors on the rear of the shelf (Figures 6 and 13) as specified in the local company Installation Job Specifications.

3.02 The local company Installation Job Specifications should specify which timing output slots (TO1 through TO8) and reference inputs (REF INPUT A and REF INPTU B) are to be connected to which interface panel positions.

3.03 Follow the Wire-wrap Panel procedure or the Modular Mounting Panel procedure as appropriate.

Note: Ensure that the cables are not twisted and the key on the cable connector aligns with the key slot on the shelf connectors and interface panel connectors. Be sure to lock the cables in place.

Wire-wrap Panel

3.04 Use Table J and Figure 13 for connector information. For each shelf with a wire-wrap panel, connect the supplied cable between the 20-pin locking connectors (J29 through J36) on the shelf rear panel to the corresponding connectors on the wire-wrap panel (TO1 through TO8). Refer to Table J and Figure 13 for connections.

Table J. Shelf to Wire-wrap Panel Connections

SHELF CONNECTOR	INTERFACE PANEL CONNECTOR
J29 – OUT 1	TO1
J30 – OUT 2	TO2
J31 – OUT 2	TO3
J32 – OUT 4	TO4
J33 – OUT 5	TO5
J34 – OUT 6	TO6
J35 – OUT 7	TO7
J36 – OUT 8	TO8

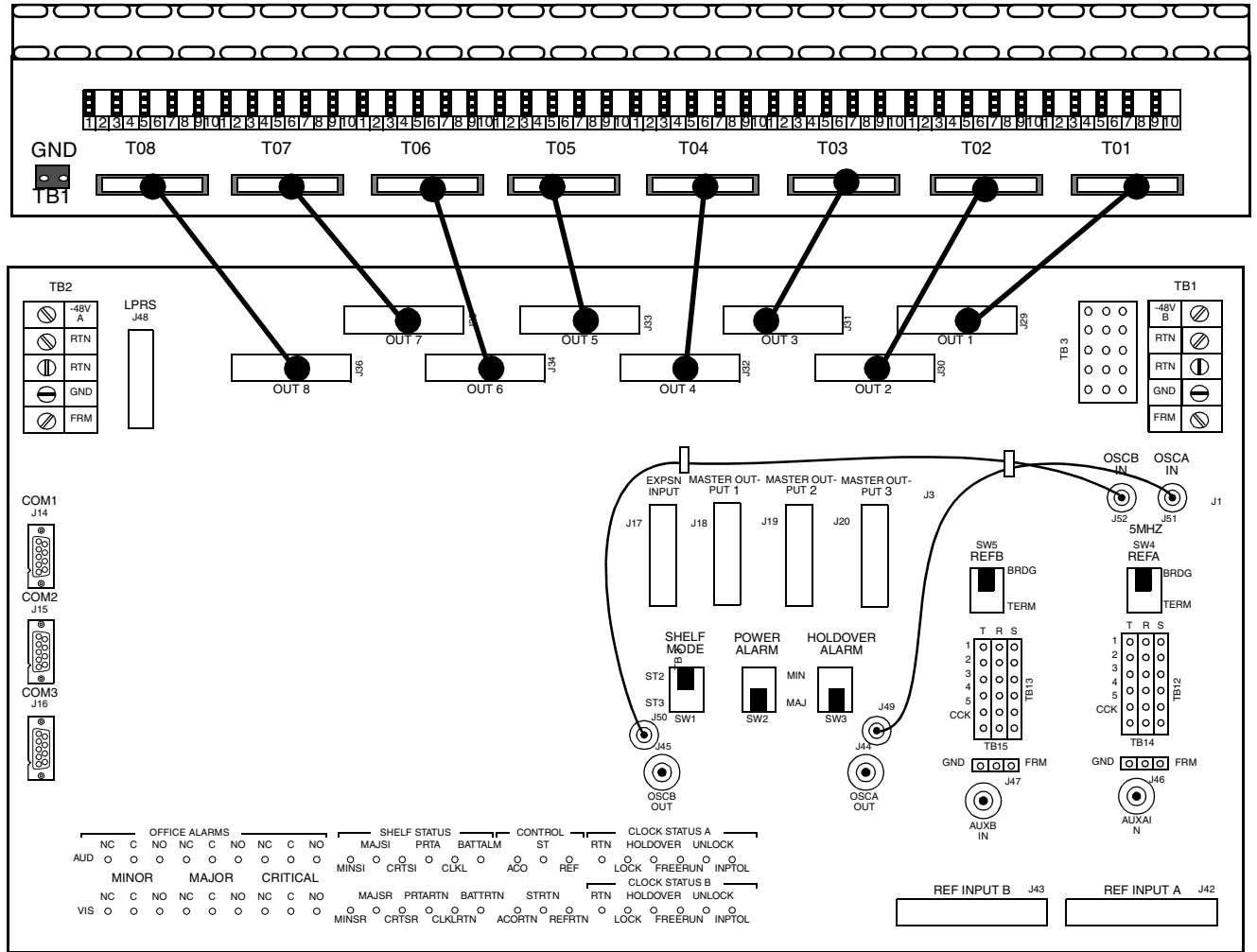


Figure 13. Shelf to Wire-wrap Interface Panel Connections

Modular Mounting Panel

3.05 To connect a shelf to a modular mounting panel (MMP), refer to Table K, Table L, Figure 14, and the following:

Note: 16.5 cm (6.5 inch) ribbon cables (p/n 060-40001-01) and 41 cm (16 inch) ribbon cables (p/n 060-40001-16) are shipped with each interface panel (an SCIU wire-wrap module is shipped with a 100 cm (40 inch) cable (p/n 060-40001-11)). If the MMP is beyond the reach of the supplied cables, a 100 cm (40 inch) cable must be ordered as a separate item for each module.

1. If reference inputs are to be connected at the MMP, connect the provided ribbon cable between REF A on the MMP and REF INPUT A (J42) on the master shelf rear panel, and between REF B on the MMP and REF INPUT B (J43) on the master shelf rear panel (Figure 14).
2. Connect the 20-pin locking slot connectors labeled OUT 1 through OUT 8 on the rear panel of the shelf to the corresponding connectors on an MMP.
3. Dress the cables per local company practice.
4. Repeat Steps 1 through 3 for any remote master shelf in the system.
5. Repeat Steps 2 and 3 for each expansion shelf in the system.

Table K. Master Shelf to Modular Mounting Panel Connections

CARD SLOT	SHELF CONNECTOR	INTERFACE PANEL	
		BOTTOM	TOP
MRC1	REF1	REF1	
MRC2	REF2	REF2	
TO1	J40	TO1	—
TO2	J41	TO2	—
TO3	J42	TO3	—
TO4	J43	TO4	—
TO5	J44	TO5	—
TO6	J45	TO6	—
TO7	J46		TO7
TO8	J47		TO8

Table L. Expansion Shelf to Modular Mounting Panel Connections

CARD SLOT	SHELF CONNECTOR	INTERFACE PANEL
TO1	J40	TO1
TO2	J41	TO2
TO3	J42	TO3
TO4	J43	TO4
TO5	J44	TO5
TO6	J45	TO6
TO7	J46	TO7
TO8	J47	TO8

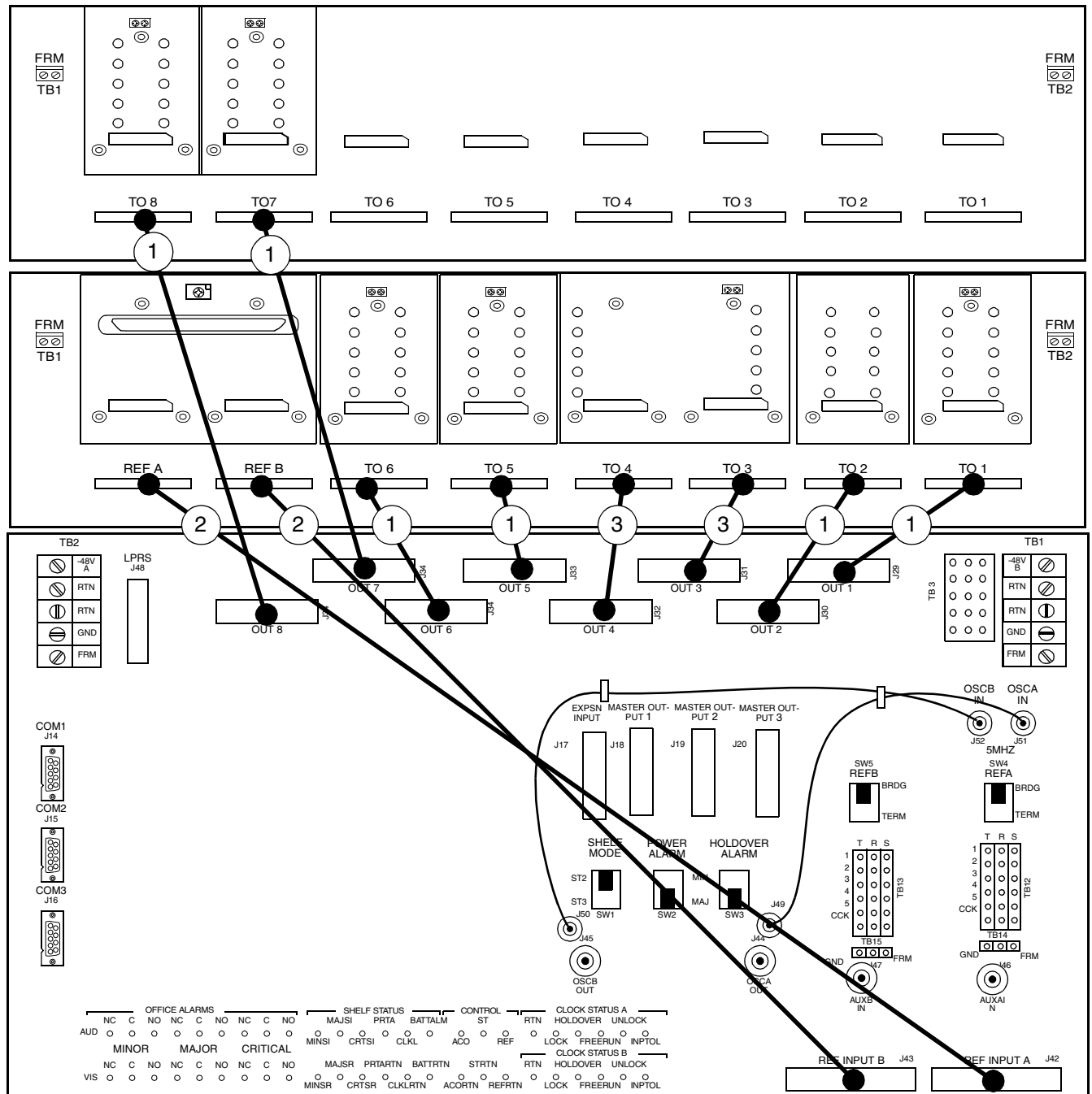


Figure 14. Shelf to Modular Mounting Panel Connections (Typical)

B. Master to Expansion Shelf Interconnections

Note: If a remote system will be attached to the master shelf, *do not* connect the expansion shelves at this point. Proceed to Part 3C.

3.06 To connect the master and expansion shelves, refer to Table M, Figure 6, Figure 15, and the following:

1. If more than one rack is required, place the two racks as close as possible to each other. Follow local company manual for routing ribbon cables between racks.
2. Using the provided 1.8 meter (60 inch) master/expansion shelf ribbon cable (p/n 060-40004-12), connect between the connectors of the shelves as shown in Figure 15.

Note: Cabling shown in Figure 15 is for reference only, and should not be considered as the recommended cable placement. Cables should be run as short and straight as possible.

3. Route expansion cables per local company manual. If required, secure cables using stick-on ribbon cable clamps as appropriate, exercising care not to damage the ribbon cables.

C. Master System to Remote System Connections

3.07 The DCD-519 HD master and expansion shelf outputs can be used as inputs to remote systems within the building. A remote system consists of a remote master shelf and up to three remote expansion shelves.

3.08 Refer to Figure 15 and the following paragraphs to connect a master system to a remote system. The master and remote systems can be equipped for phase-aligned timing signals (via two TOCA card outputs) or G.703 timing signals (via two TOEA, TO-EA, TO-EAN, or TOGA card outputs).

Note: It is recommended that outputs from two different output cards in the master system be used for diversity.

Requirements for Phase-aligned Systems

3.09 If phase-aligned timing signals (64 kb/s messaging using CC signals) are required by the switching office, equip the systems as follows:

- Master system: requires two TOCA cards, one in the master shelf and the other in the expansion shelf. If no expansion shelf is installed, both TOCA cards may be installed in the master shelf.
- Remote system: requires two CI cards set for CC inputs in the master shelf. One or two ST3E clock cards provide holdover during any timing interruptions.

Requirements for G.703 Systems

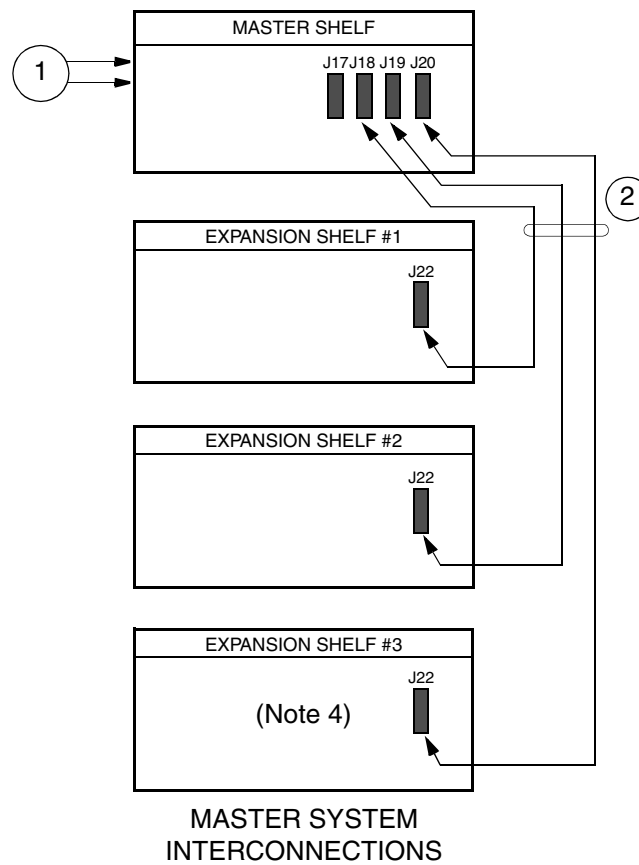
3.10 If 2.048 Mb/s (G.703), or 2.048 MHz (G.703) signals are used, phase alignment is not required. Equip the system as follows:

- Master system: use one output from a TOGA, TO-EA5, TO-EA, TO-EAN, or TOEA card in one shelf, and another output from another card of the same type in a different shelf.
- Remote system: master shelf requires a CI-EA clock input card for E1 inputs from the master system, or an ACI clock input card for TOGA inputs. One or two ST3E clock cards provide holdover during any timing interruptions.

Note: If other frequencies supported by the DCD are used, consult the switching or transmission elements guide to determine if phase alignment is critical.

Table M. Master to Expansion Shelf Cable Connections

FROM MASTER SHELF		TO EXPANSION SHELVES	
MASTER OUTPUT 1	J18	EXPANSION SHELF 1: EXPSN INPUT	J22
MASTER OUTPUT 2	J19	EXPANSION SHELF 2: EXPSN INPUT	J22
MASTER OUTPUT 3	J20	EXPANSION SHELF 3: EXPSN INPUT	J22



- ① Upstream reference
- ② Expansion ribbon cables (Note 3)

Notes:

1. If attaching a remote system to the master system, refer to Part 3C for connection instructions.
2. Make connections from MASTER OUTPUT 1, 2, 3 on the master shelf to “EXPANSION INPUT” on the corresponding expansion shelf with the provided cable (p/n 060-40004-12).
3. Cabling is shown to illustrate connections only. Follow local company practice for cable runs.

Figure 15. System and Shelf Connections

Connecting the Systems

3.11 Refer to Figures 6 and 16 to connect the master system to the remote shelf system as follows:

Note: If the installation uses an MIS^{V5} in the remote system, the MIS^{V5} is installed in the Test and Acceptance procedures. Do not connect RS-232 cable and expansion shelves at this time.

1. Setup and mount a DCD-519 HD System in the same manner as a master system (Parts 2A through 3B) at a remote site in the building

Note: The shield (S) terminals on TB12 and TB13 are connected to frame ground inside the shelf. If the input reference cable shield leads are connected to frame ground at the signal source end (e.g., at the output card in the master system), the shield lead of the cable *must not be connected* to the S terminal at TB12 and TB13, or vice versa. Do not connect the cable shield to frame ground at both ends.

2. (Phase-aligned) Use 25.3 mils, 0.643 mm (22 AWG) tinned solid copper, shielded twisted pair cable, to connect an output port from any pair of TOCA cards (can be located in different shelves) in the master system to the CCK inputs (TB12 and TB13) on the remote master shelf (see Figure 15).
2. (G.703) Connect from two outputs on the master system to reference input modules on the remote system. The cables must be diversely routed. Use 25.3 mils, 0.643 mm (22 AWG), tinned solid copper, shielded twisted pair cable.
3. Connect the RS-232 cable between COM 3 on each master shelf.

D. Bridging Isolator Installation

3.12 The Bridging Isolator (Figure 17) is installed in-line in a traffic-carrying E1/CEPT bitstream. It provides no loss to the traffic-carrying E1 signal. It also provides one or three 750 Ω high impedance bridged output connections which have 20.8 dB isolation from the traffic signal. The bridged output connection may be used to drive a DCD shelf input, or an input to a PSM-E or PSM-EA^{V5} card. The signal grounds are carried through the Bridging Isolator for both the traffic signal and the bridged signal.

3.13 Figure 17A shows a block diagram of the Bridging Isolator. The 750 Ω bridging resistor on each prevents the bridging cable or equipment from loading or distorting the signal.

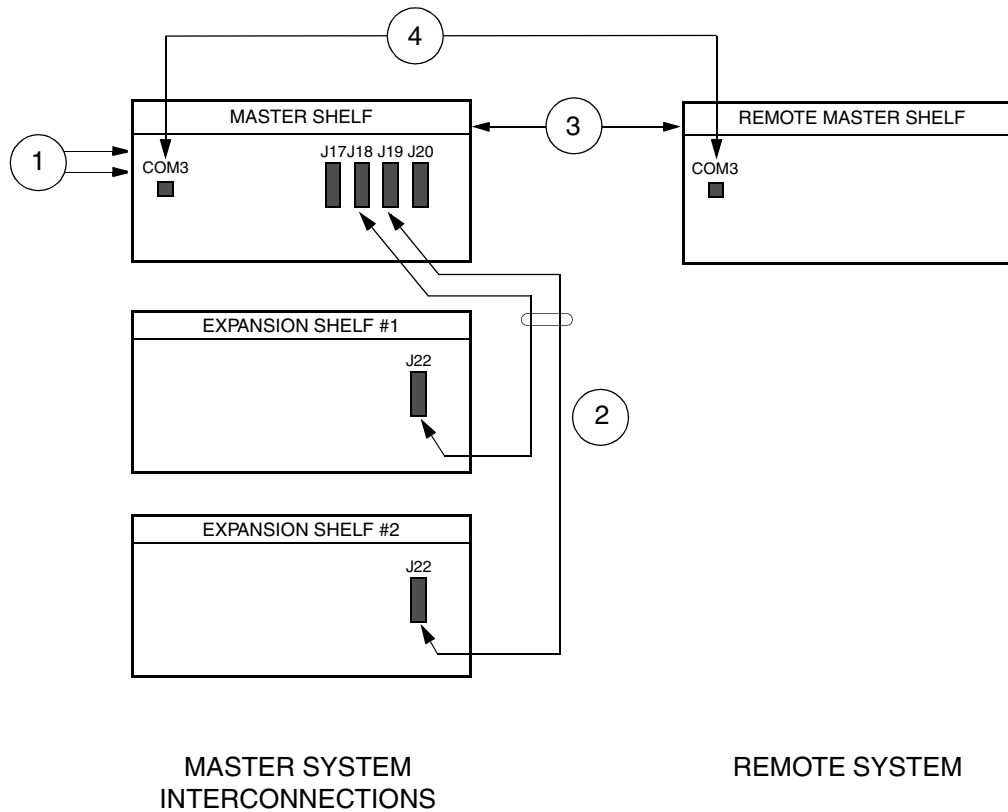
3.14 Install the Bridging Isolator in series with the E1 signal coax at any point between the multiplexer output and the receiver input as shown in Figure 17B. The Bridging Isolator can be located in a cable tray or supported by the cable in a vertical cable run. A cable from the bridging output to the DCD-519 HD shelf input must be less than 100 meters.

E. Reference Input Connections

Installation Considerations

3.15 If the local company Installation Job Specifications do not specify the DCD shelf timing input assignments, a local assignment plan must be developed before proceeding with the connections. Reference inputs can be connected at the rear panel of the shelf, or at input modules. The following information is provided to assist in developing a plan:

- Do not route reference input cables near inductive devices (large motors, generators, transformers, etc.) or other equipment which radiates strong magnetic fields.
- If a cable shield is to be connected to the DCD-519 HD shelf, connect the cable shield first.
- It is preferable to ground the shield at the timing source end only, but certain vendor applications may require grounding at the receive end. However, under no circumstances should the shield be connected to frame ground at both ends unless one end is capacitor-coupled to ground.
- Ensure that reference input cables are routed as diverse as possible. Do not install any type of redundant lead lying parallel and adjacent in the same cable rack.
- Assign redundant timing input cables to different clock input cards.



- ① Upstream reference
- ② Expansion ribbon cables: Make connections from MASTER OUTPUT 1 and 2 on the master shelf to "EXPANSION INPUT" on the corresponding expansion shelf with the provided cable (p/n 060-40004-12). If the MIS^{V5} card is used, do not connect before MIS^{V5} card is installed.
- ③ For phase-aligned systems, connect from two TOCA card outputs on the master system to two CI cards on the remote system. For G.703 systems, connect two TOEA, TO-EA5, TO-EA, or TO-EAN card outputs from the master system to CI-EA cards on the remote system, or two TOGA outputs from the master system to ACI cards on the remote system. The cables must be diversely routed. Use 25.3 mils, 0.643 mm (22 AWG), tinned solid copper, shielded twisted pair cable.
- ④ RS-232 communications between MIS cards in master shelves (COM3 of master system connects to COM3 of remote system). If the MIS^{V5} card is used, do not connect before MIS^{V5} card is installed.

Notes:

1. The remote system master shelf can be equipped with one or two LNC or ST3 clock cards to provide holdover timing if both timing inputs fail.
2. Cabling is shown to illustrate connections only. Follow local company practice for cable runs.
3. If communications are not required, up to 3 expansion shelves may be used on both the master system and remote system.

Figure 16. Remote System and Shelf Connections

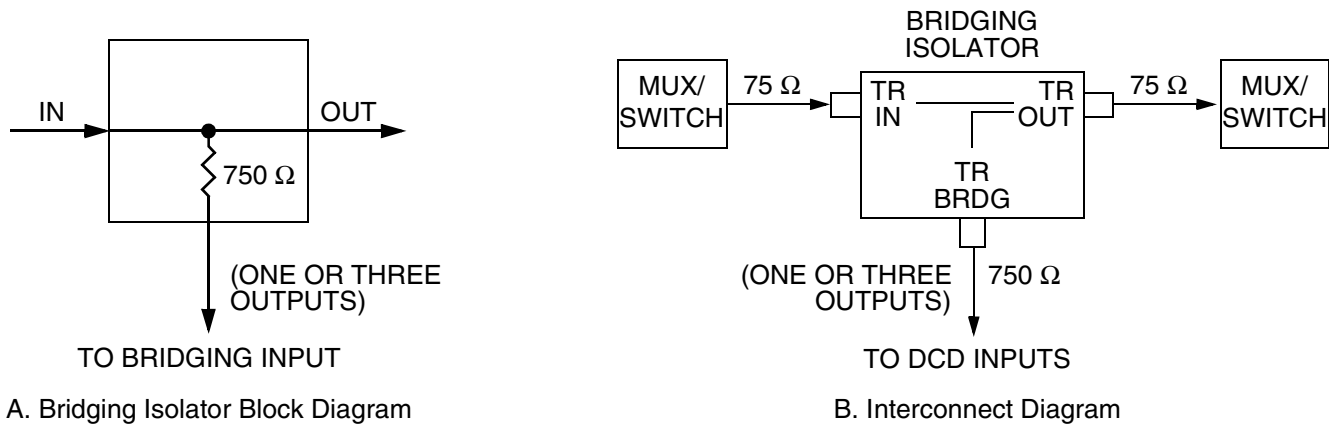


Figure 17. Bridging Isolator

- Keep all reference input cables unbroken. Do not use tie cables or otherwise break the shield between the DCD-519 HD System and the device delivering the clock input. If broken, the shield leads must be bonded.
- The cables for reference input connections are user-supplied 25.3 mils, 0.643 mm (22 AWG), tinned solid copper, shielded twisted pair cable for E1, DS1, and CC, and coaxial cable for E1 and analog inputs.
- When a shelf is to contain both a TNC-E clock and an ST3E clock, see Table N for information.

Table N. Acceptable Reference Inputs for a Shelf with Both TNC-E and ST3E Clock Cards

TNC-E ISSUE	ACCEPTABLE INPUTS
A	LPR
B	(Replace with TNC-E Issue C)
C	LPR, network reference

- When a shelf is to contain both an ST2E clock and an ST3E clock, see Table P for information.

Table O. Acceptable Reference Inputs for a Shelf with Both ST2E and ST3E Clock Cards

ST2E ISSUE	ACCEPTABLE INPUTS
A	(Cannot share shelf with ST3E)
B	LPR
C	(Replace with ST2E Issue D)
D	LPR, network reference

Reference Input Connections at the Rear Panel

3.16 Use these instructions to connect reference inputs to the REF A and REF B section of the shelf rear panel (Figure 18). The REF A section accepts signals for the clock input card in the MRC 1 slot, and the REF B section accepts signals for the clock input card in the MRC 2 slot. The next section provides instructions for connecting reference inputs to input modules.

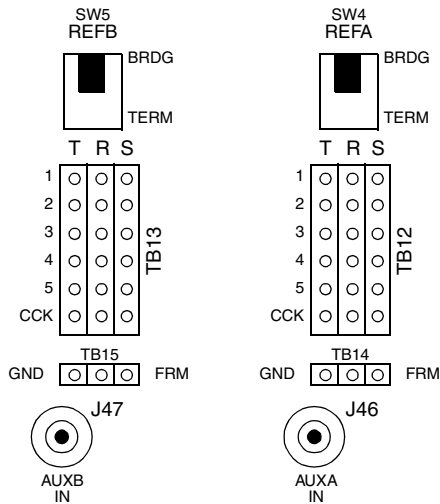


Figure 18. Rear Panel Clock Input Connectors

Caution: *Input references for the MRC-T and DCIM-T cards must be connected at the REF A and REF B connectors.*

Caution: *Connect CC inputs only to CCK connectors. Improper connection may result in improper operation.*

Caution: *Connect analog inputs only to AUX A and AUX B connectors. Otherwise, improper operation may result.*

Caution: *Do not connect a signal to both the Row 4 connector and the AUX connector within REF A or REF B simultaneously. The connectors within each REF section are connected inside the DCD shelf. Improper operation may result.*

3.17 Connect wire-wrap input signals to the connectors on the rear panel according to Table P.

Note: TB14 and TB15 below the wire-wrap connections are grounding option straps used to ground the shield of the AUX input (analog) to either frame ground or digital ground. This is ordinarily not required, but may be used in noisy environments to reduce noise. Contact Symmetricom's Field Service Engineering if this option needs to be exercised.

Reference Input Connections at an Input Module

3.18 Connect reference input signals to interface modules according to Figure 19 or Figure 20.

3.19 Connect only one input to a module for ACI, CI-EA, or CI card as shown.

Note: Ensure that SW4 and SW5 on the shelf rear panel are set to the appropriate termination for reference inputs A4. These switches only affect the termination for port A3 (CI-EA or CI clock input cards).

Table P. Reference Input Signal Connections and Relationship to Card Ports

Reference Input Connections		Card Input Ports		
Rear Panel Connector (Ref. A and Ref. B) (Note 1)	Input Module Connector (Note 1)	MRC (all)	DCIM (all)	CI, CI-EA, ACI
1 (Note 2)	—	—	—	—
2	A1	Port 1	—	—
3	A2	Port 2	Port 1	—
4 (Note 3)	A3 (Note 3)	Port 3	Port 2	Port 1
5	A4	Port 4	—	—
CCK	—	—	—	—
AUX (Note 4)	AUX (Notes 4, 5)	Port 3	Port 2	Port 1

Notes:

- Connectors listed in the same row in this table are connected to the same port (Row 2 and A1, Row 3 and A2, etc.). Do not connect an input to the rear panel and a module simultaneously.
- Row 1 carries signals for an MRE card (obsolete).
- SW4 affects only rear-panel connector 4 and module connector A3 of input reference A (REF A). SW5 affects only rear-panel connector 4 and module connector A3 of input reference B (REF B).
- Rear-panel connector 4 and module connector A3 are connected to the AUX connectors. Do not use AUX and rear-panel connector 4 or module connector A3 simultaneously.
- The same connector is labeled A5 on 097-45107-04.

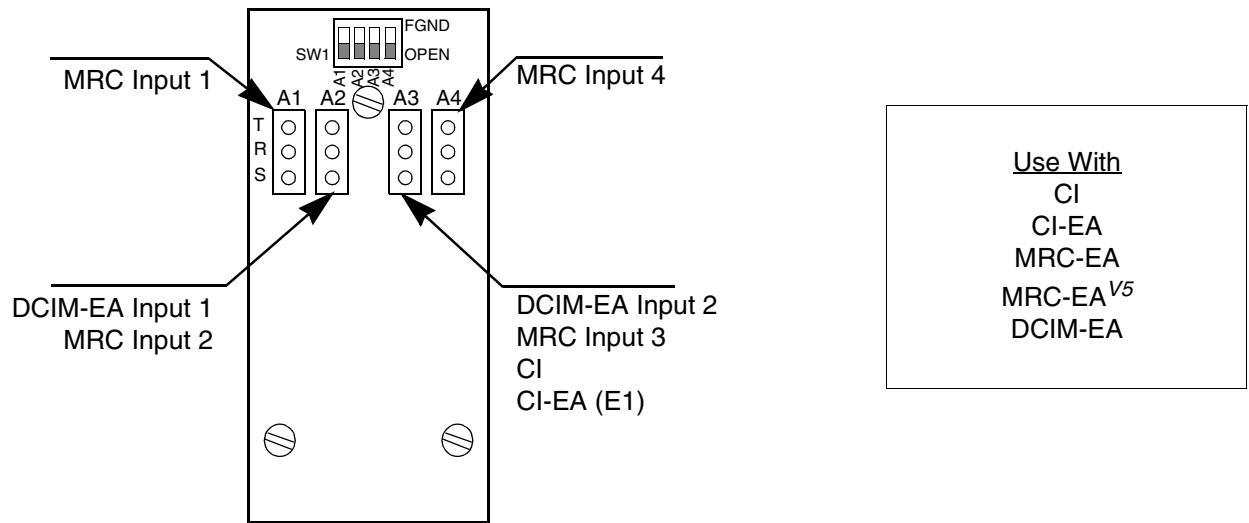
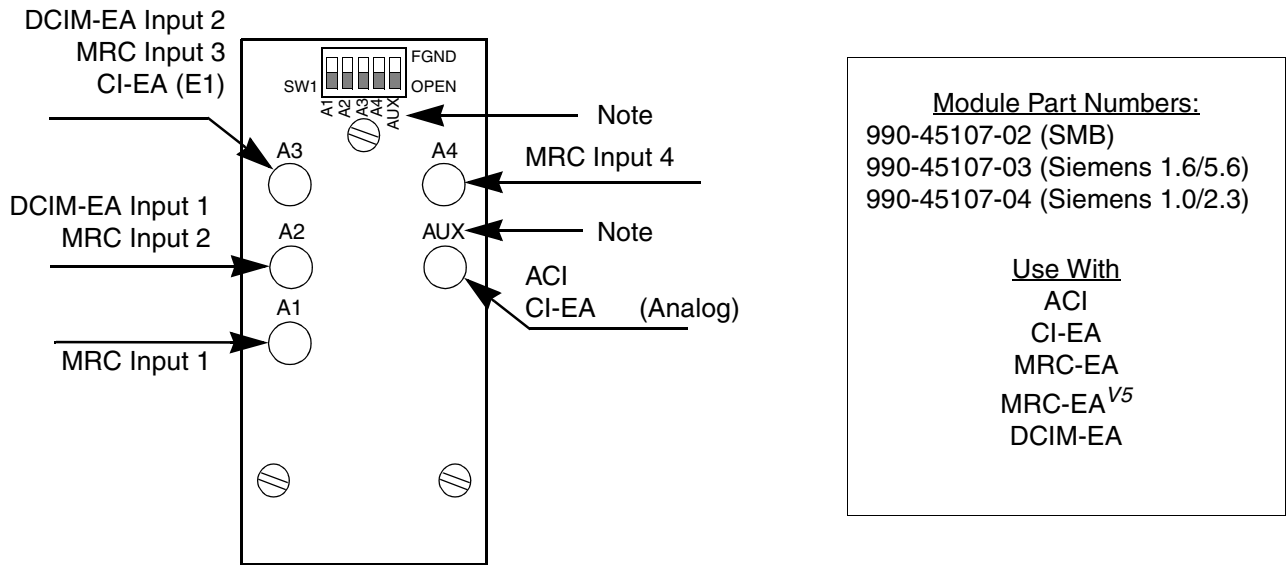


Figure 19. 990-45107-06 Module



Note: "AUX" is replaced by "A5" on 990-45107-04 modules.

Figure 20. Coaxial Clock Input Module

F. 5 MHz Stratum Connections

3.20 Two BNC connectors, J44 (OSC A OUT) and J45 (OSC B OUT) (Figure 21), are for connecting to the DCD-LPR shelf. They provide the necessary 5 MHz stratum signal source for the DCD-LPR shelf. To connect the 5 MHz stratum source to the DCD-LPR shelf, the proper filter module and cable must be used. Symmetricom's Isolation Module Kit for the DCD-LPR Shelf (p/n 093-45100-04) contains the appropriate filter module and cables for connecting the signal between the DCD-519 HD shelf and the DCD-LPR shelf.

Note: Two SMB connectors on the master shelf rear panel (OSCA IN [J51] and OSCB IN [J52]) carry 5 MHz signals. These connectors are factory-installed and not user-selectable. (J51 is cabled to J49, and J52 is cabled to J50.)

G. Communications Port Connections

3.21 The MIS card sends serial alarm and status data and accepts control commands in the TL1 language via either the RS-232 DB9 DCE connectors (COM1, COM2, and COM3) on the shelf rear panel, or the RJ45 LOCAL COMM connector on the face-plate of the MIS card.

Note: COM2 is recommended for connection to a centralized surveillance and control cen-

ter. It is recommended that the front panel LOCAL COMM connector be used for front-of-bay terminal connection only. The LOCAL COMM and COM2 ports are switch-selectable, and cannot be used simultaneously.

3.22 The company Installation Job Specifications should specify a modem circuit, packet switch circuit, or a dedicated private line circuit from the centralized alarm surveillance and control center for connection to the data-communication connector when and MIS card is provided.

3.23 Use an 8-lead Telco cable (user-supplied) with an RJ-45 connector from the MIS card front-panel LOCAL COMM jack (refer to Table Q and Figure 22 for the RJ45 pin assignments) to the local communication device.

Note: It is recommended that the RJ45 modular jack on the MIS card front panel be used for front of bay terminal connection only.

3.24 Use a DCE-to-DCE cable (Black Box Corporation p/n B1BA22722) or equivalent cable to connect from the COM connector on the rear panel to the communications device (refer to Table R and Figure 23). The DCE-to-DCE cable is a 1.8 meter (6 foot) cable with male DB9 and DB25 connectors.

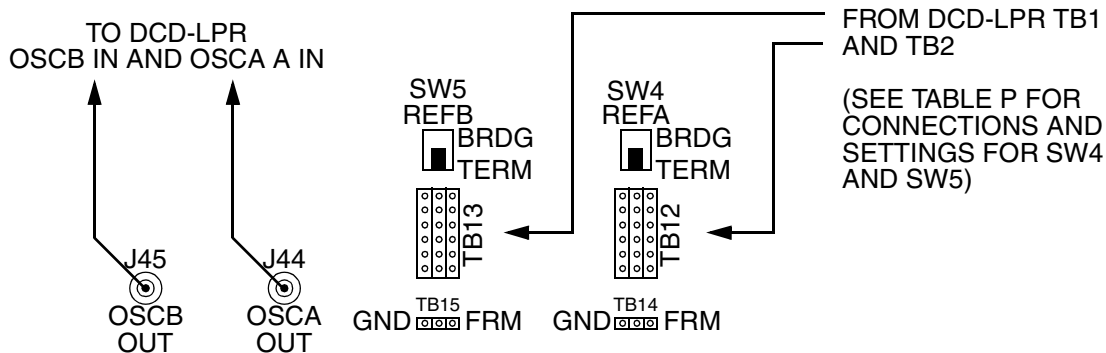


Figure 21. DCD-LPR Connections to DCD-519 HD Rear Shelf

5. POST-TEST CONNECTIONS

A. MIS^{V5} Card in Remote System

5.01 Connect the RS-232 cable between COM3 on each master shelf and expansion shelves.

B. Alarm, Status, and Control Terminations

5.02 The DCD-519 HD shelf has wire-wrap terminals for Office Alarms and Shelf Status indications, Clock Status (A and B) indications, and Control functions. The Office Alarm, Shelf Status, and Clock Status provide loop closures on DCD System alarms for the central office (CO) audible and visual alarm system, and telemetry interface to transport remote alarms via remote telemetry equipment scan-point inputs to a centralized alarm surveillance and control center. The Control terminals connect to remote telemetry equipment control-point outputs for controlling certain control functions on the DCD System, such as operating the alarm cutoff (ACO) on the DCD shelf to silence the CO audible alarm.

5.03 Connect the Office Alarm, Shelf Status, Clock Status A and B, and Control terminals to the CO Audible/Visual Alarm System and remote telemetry equipment as per the following sections.

Office Alarm Connections

5.04 The OFFICE ALARMS terminals on every shelf's rear panel provide relay contact closures for connection to the CO audible and visual alarm systems. The alarms provided indicate critical, major, and minor levels for both the audible and visual alarms. Either normally open (NO) or normally closed (NC) contacts referenced to a common (C) contact are used depending on the type of connection required by the CO alarm system.

5.05 The alarm relays in the shelf are in an operated (latched) state when power is applied to the shelf. In an alarm condition or loss of dc power to the shelf, the normally open contact closes between the NO and C terminals, and opens the normally closed

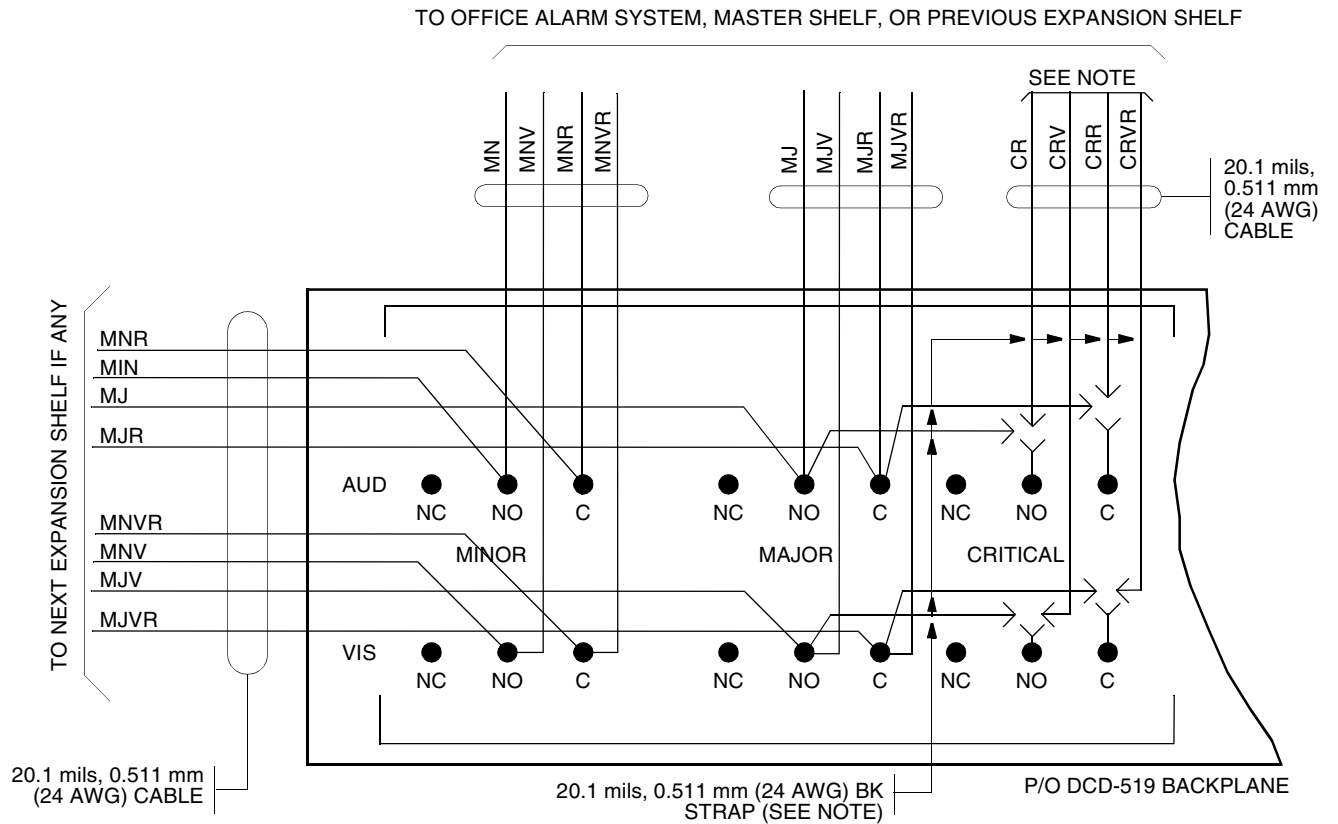
contact between the NC and C terminals. If the C terminal is used as a common between critical, major and minor in a daisy-chain, then tip-ring (T-R) polarity must be observed. The NC terminals cannot be daisy-chained.

5.06 If the CO alarm system accepts only major and minor alarm levels, strap the shelf CRITICAL terminals (Audible and Visual NO and C contacts) to the MAJOR terminals (Audible and Visual NO and C contacts) before cabling to the CO alarm system major terminals.

5.07 Refer to Figure 24 and perform the following to connect the OFFICE ALARM terminals to the CO audible and visual alarm system:

1. Use 20.1 mils, 0.511 mm (24 AWG) tinned solid copper wire and prepare the cable ends for wire-wrapping using local company manual.
2. Connect the master shelf OFFICE ALARMS terminals to the CO alarm audible/visual alarm system per the local company Installation Job Specifications.
3. Bridge together (daisy-chain) the OFFICE ALARMS terminals of the expansion shelves and then connect to the master shelf OFFICE ALARMS terminals. The NC terminals cannot be daisy-chained.
4. When alarm wiring has been completed, test the alarms per the local company Installation Job Specifications. The easiest way to verify the cabling is to put a short across each NO and C terminal pair and verify that the appropriate sound or light occurs.

Note: When installed, two wires attach to each OFFICE ALARMS terminal of each shelf, except the terminals of the last expansion shelf. One wire leads to the next shelf, and the other wire leads to the previous shelf or the CO alarm system.



Note: If the office alarm system is not provisioned for critical alarms, strap the NO and C contacts of CRITICAL to the NO and C contacts of MAJOR (AUD and VIS).

Figure 24. Office Alarms

Shelf Status and Clock Status (A and B) Connections

5.08 The DCD shelf provides SHELF STATUS and CLOCK STATUS A and B closures for connection to remote telemetry equipment for transport to a centralized alarm surveillance and control center. The CRITICAL, MAJOR and MINOR terminals indicate the severity of the disabling or potentially disabling conditions. The CLKL (clock loss), PRTA (port alarm) and BATTALM (battery alarm), as well as the CLOCK STATUS indicators provide indications of the type of conditions associated with the alarms.

Note: There is only one common return (RTN) terminal for each set of CLOCK STATUS A and CLOCK STATUS B terminals. The common RTN terminal is internally connected to battery return (TB1 and TB2 RTN terminals). SHELF STATUS CLKLRTN (clock loss return), PRTARTN (port alarm return) and BATTRTN (battery alarm return) are internally connected to battery return (TB1 and TB2 RTN terminals). CLOCK STATUS A and B HOLDOVER SI terminals have -48 V dc on them through relay windings.

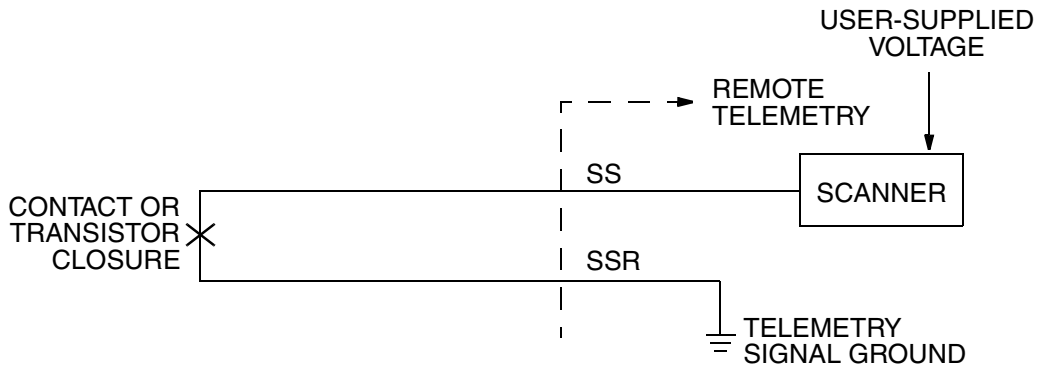
5.09 The CRITICAL, MAJOR, MINOR and BATTALM terminals are relay contact closures. All other terminals are open collector type (PNP Open Collector, -60 V, 500 mA maximum). Open collector terminals are designated SI for the status indicator terminals and SR for the status return terminals.

5.010 Some alarm and SI terminals are “dry” (-48 V dc not present on terminal) and others are “wet” (-48 V dc present on terminal).

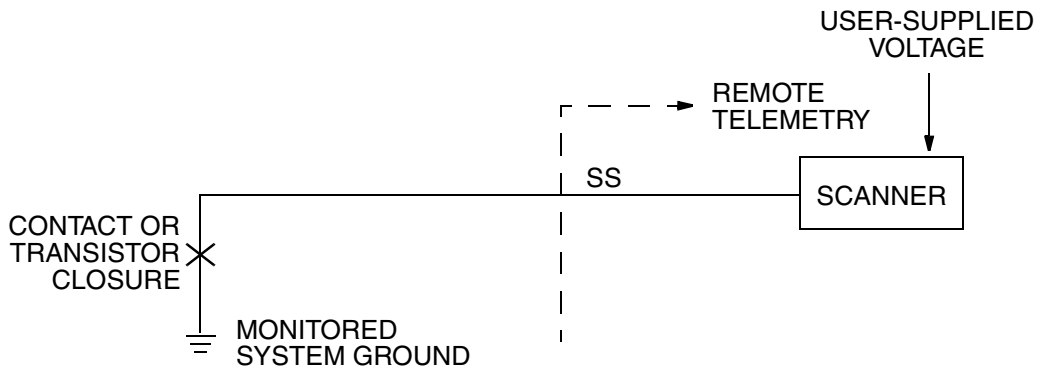
5.11 Wet alarm and SI terminals on the DCD shelf must be assigned to remote telemetry equipment scan-point cards that accept “wet alarms and statuses.” Likewise, dry alarm and SI terminals on the DCD shelf must be assigned to scan-point cards that accept “dry alarms and statuses.” Table S and Figure 25 provide information about alarm and SI terminals conditions (wet or dry) and SS type connection configuration.

Table S. Alarm and SI Terminals, and SS Types

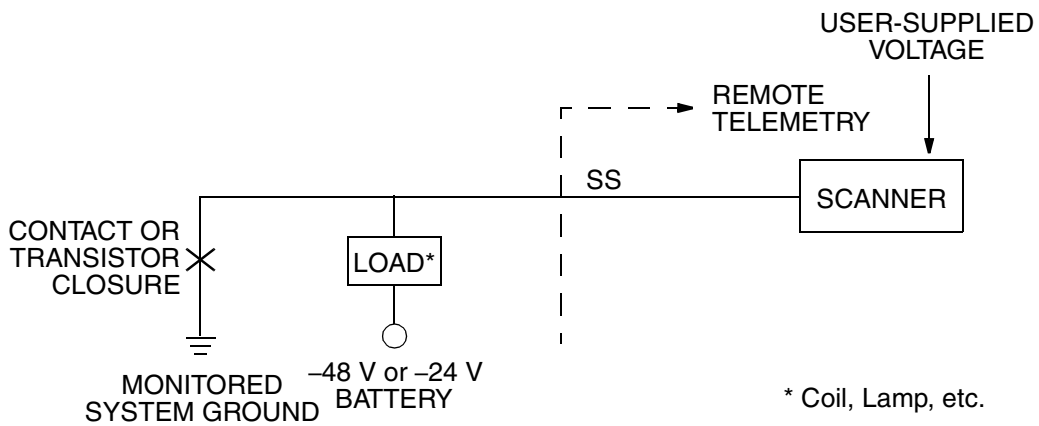
ALARM/ SI	WET/ DRY	SS TYPE	REFER TO
SHELF STATUS			
CRITICAL	DRY	1	Figure 25A
MAJOR	DRY	1	Figure 25A
MINOR	DRY	1	Figure 25A
PRTA	DRY	2	Figure 25B
CLKL	DRY	2	Figure 25B
BATTALM	DRY	2	Figure 25B
BATTALM	WET	3	Figure 25C
CLOCK STATUS A AND B			
LOCK	DRY	2	Figure 25B
LOCK	WET	3	Figure 25C
HOLDOVER	WET	3	Figure 25C
FREERUN	DRY	2	Figure 25B
FREERUN	WET	3	Figure 25C
UNLOCK	DRY	2	Figure 25B
UNLOCK	WET	3	Figure 25C
INPTOL	DRY	2	Figure 25B
INPTOL	WET	3	Figure 25C
Note: Refer to Bellcore Technical Reference PUB 43804 - Network Terminal Equipment Operations Interface Specifications for additional information regarding SS Type 1, 2 and 3 connections.			



A. SS Type 1 - Isolated Loop Closure Inside Building



B. SS Type 2 - Isolated Closure to Ground



* Coil, Lamp, etc.

C. SS Type 3 - Closure to Ground with Load

Note: Refer to Bellcore Technical Reference PUB 43804 - Network Terminal Equipment Operations Interface Specifications for additional information regarding SS Type 1, 2, and 3 connections.

Figure 25. SS Type Connection Configurations

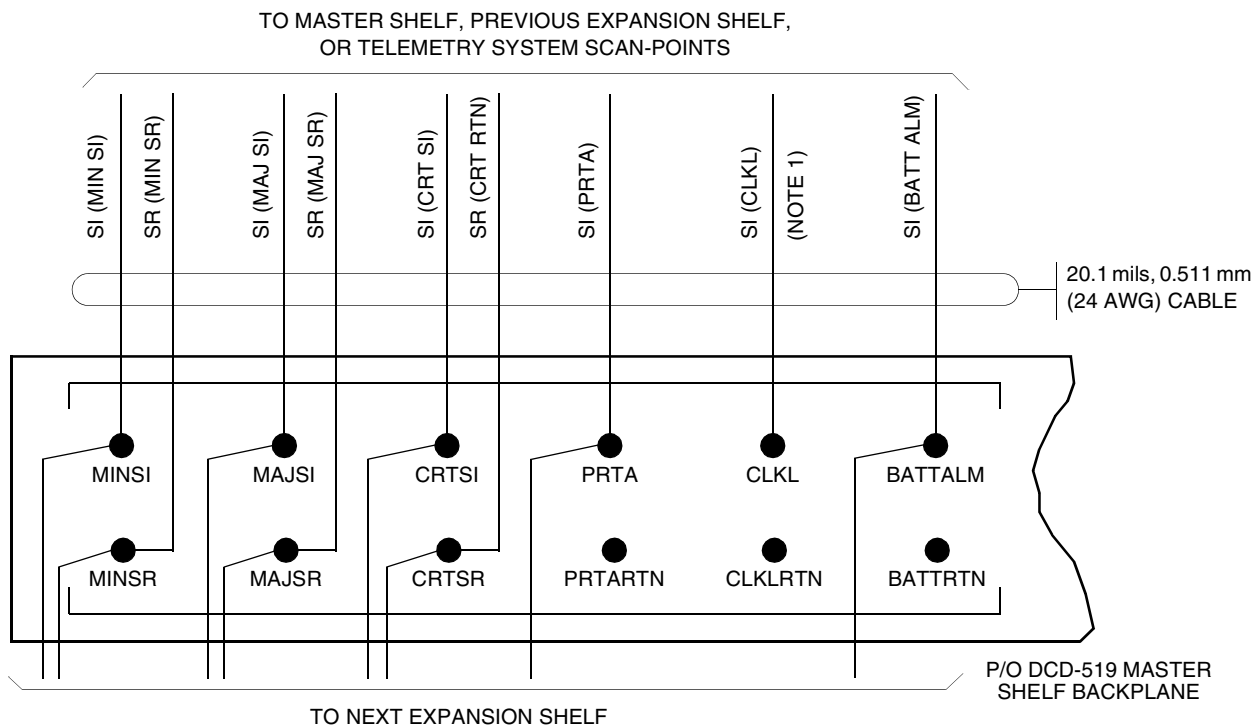
5.12 Refer to Figure 26 and Figure 27 for the SHELF STATUS and CLOCK STATUS indicator terminal connections to remote telemetry equipment scan-point input terminals and perform the following:

1. Use 20.1 mils, 0.511 mm (24 AWG) tinned solid copper wire and prepare the cable ends for wire-wrapping using local company manual.
2. Connect the master shelf SHELF STATUS and CLOCK STATUS A and B terminals to the remote telemetry equipment scan-point terminals per the local company Installation Job Specifications. Refer to Figure 26 for SHELF STATUS connections, and Figure 27 for CLOCK STATUS A and B connections.
3. Bridge together (daisy-chain) the SHELF STATUS CRITICAL, MAJOR, MINOR, PRTA and

BATTALM terminals on the expansion shelves, and then connect to the master shelf SHELF STATUS terminals (see Figure 26).

Note: When installed, two wires are on each SHELF STATUS terminal (except CLKL) of each shelf, except the terminals of the last expansion shelf. One wire leads to the next shelf, and the other wire leads to the previous shelf or the CO alarm system.

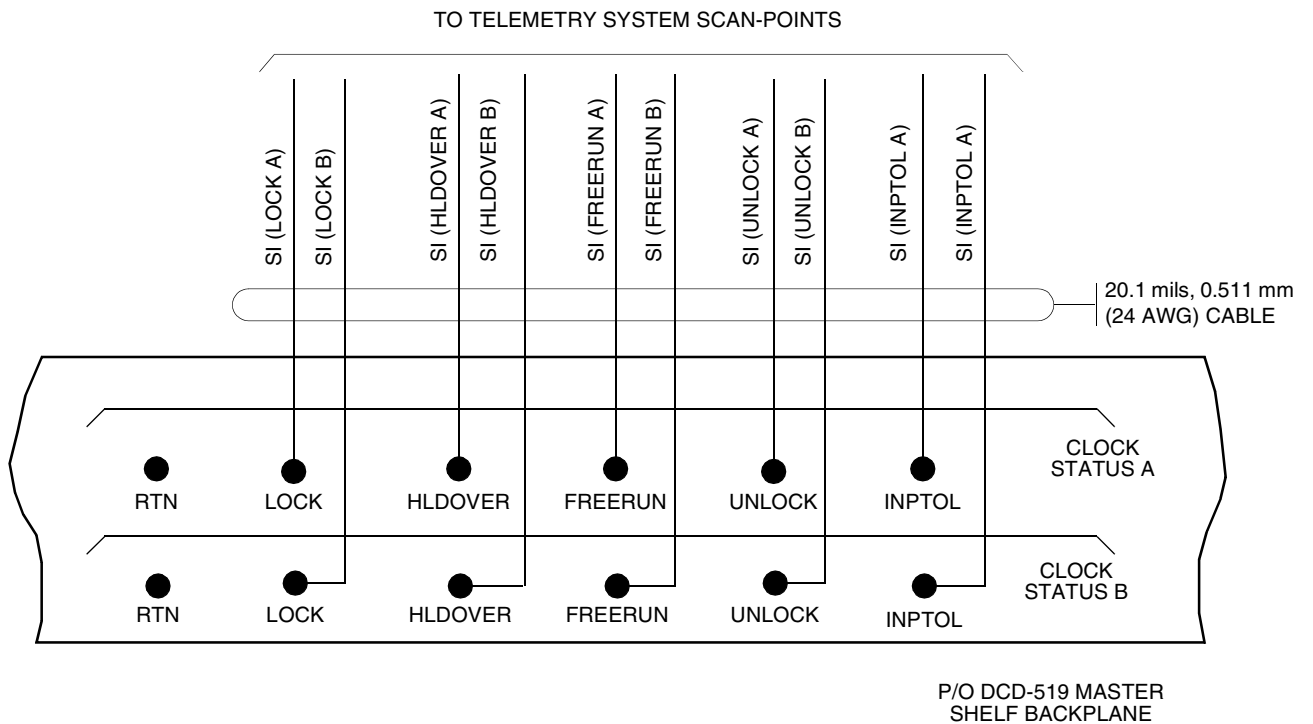
4. After the alarm wiring has been completed, test the alarms per the local company Installation Job Specifications. Each scan-point in the operations system (OS) computer should be programmed with a message that identifies the alarm or status state. Table T contains suggested OS messages, since the available field length may vary among different OS computers.



Notes:

1. Connect CLKL from master shelf only.
2. Status control leads are office assignable at telemetry end by Central Office Engineer.
3. PRTA, CLKL, and BATTALM return (RTN) terminals are connected internally to the shelf's battery return, therefore, RTN connections between the RTN terminals and the remote telemetry equipment scan-points are not required.

Figure 26. Shelf Status Connections



Notes:

1. The RETURN (RTN A and B) (SR) leads are COMMON for all status indicator (SI) leads for each clock status (A and B).
2. The clock status A and B RTN terminal is connected internally to the shelf's battery return, therefore, RTN connections between the DCD-519 Shelf and the telemetry equipment scan-points are not required.
3. Multiple only status control leads MINSI, MAJSI, CRTSI, PRTA, and BATTALM are between master and expansion shelves.
4. Status control leads are office assignable at telemetry end by Central Office Engineer.

Figure 27. Clock Status (Master Shelf Only)

Table T. OS Alarm and Status Messages (Suggested)

ALARM/STATUS TERMINAL	OS MESSAGE
SHELF STATUS	
CRITICAL	CRITICAL - All Sync Output Failed
MAJOR	MAJOR - Sync Potentially Service Affecting
MINOR	MINOR - Sync Non-service Affecting
PRTA	Sync - Timing Output Port Failed
CLKL	Sync - Input Reference Failed
BATTALM	Sync - Blown Fuse A or B/Loss BATT A or B
CLOCK STATUS A	
LOCK	Sync - Clock A Lost Lock With Reference
HOLDOVER	Sync - Clock A in Holdover Mode
FREERUN	Sync - Clock A in Freerun Mode
UNLOCK	Sync - Input Ref A to Ref B has Freq Offset
INPTOL	Sync - Input Ref A to Clk A has Freq Offset
CLOCK STATUS B	
LOCK	Sync - Clock B Lost Lock With Reference
HOLDOVER	Sync - Clock B in Holdover Mode
FREERUN	Sync - Clock B in Freerun Mode
UNLOCK	Sync - Input Ref A to Ref B has Freq Offset
INPTOL	Sync - Input Ref B to Clk B has Freq Offset

CONTROL Terminal Connections

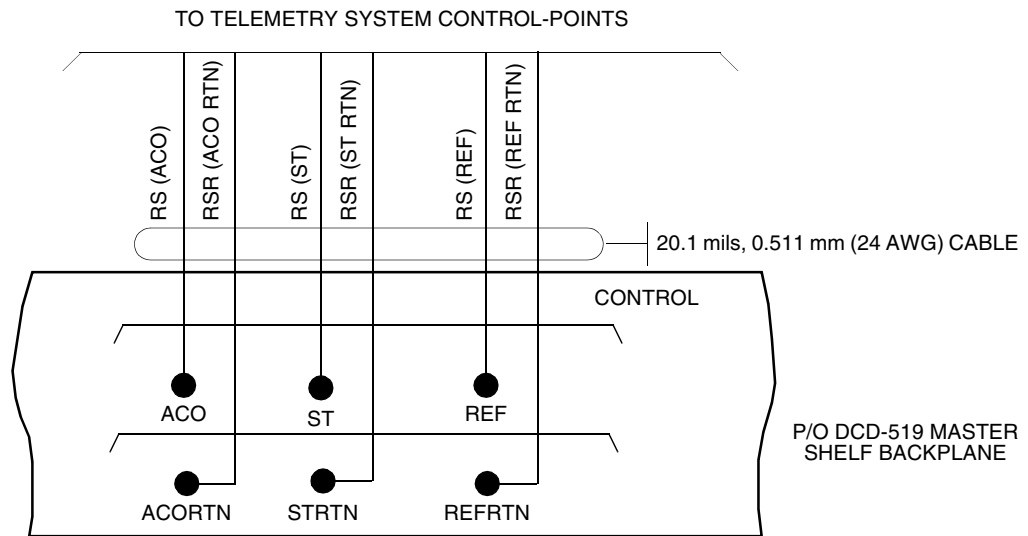
5.13 The CONTROL terminals on the master shelf rear panel are:

- ACO and ACO RTN - Remotely operates the ACO function on the MIS card
- ST and STRTN - Remotely transfers active status from one rubidium clock card to the other (ST2 mode only)
- REF and REFRTN - Used to remotely transfer the source (SRC) active status from one clock input card to the other (ST3 mode only).

Caution: *If CONTROL function terminals are cabled to E2A equipment scan-points, they will cause erroneous alarms on the E2A and the CONTROL functions will not operate.*

5.14 To connect the CONTROL terminals, on the rear panel of the DCD-519 HD master shelf only (Figure 6):

1. Use 20.1 mils, 0.511 mm (24 AWG) tinned solid copper wire and prepare cable ends for wire-wrapping using local company manual.
2. Cable the CONTROL terminals to remote telemetry equipment control-points per the local company Installation Job Specifications (refer to Figure 28).



Note: Status control leads are office assignable at telemetry end by Central Office Engineer.

Figure 28. Control Connections

C. Timing Output Module Connections

5.15 This section provides guidelines and instructions for connecting network elements (NE) to the timing output (TO) modules for the output cards listed in Table U. The local company Installation Job Specifications should specify which timing output port connects to which NEs, the type of cable and connectors to use, and the routing of the cables. If not, this information must be developed before proceeding. Consult the network element manufacturer's documentation for proper connection, termination, and cutover procedures at the network element.

Table U. Timing Output Card Connections

CARD	CARD CONNECTIONS FIGURE
EA10, EA10M	29, 30, 31, 33, 34, 35
EA20, EA20M	29, 33, 35
TOAA	38
TOCA	29, 35
TO-EA5	29, 30, 31, 32, 33, 34, 35
TO-EA	30, 31, 32, 33, 35
TO-EAN	27, 28, 29, 30, 32
TOEA	32, 33, 35
TOGA	32, 33, 34
TOLA	36, 37
TOTA	29, 35
TOTA-5, TOTA-M	29, 35
TOTL	29, 35

Initial Considerations

5.16 All timing output connections on the DCD shelf are made at the interface panel. If the local company Installation Job Specifications do not specify the DCD shelf timing output assignments, a local

assignment plan must be developed before proceeding with the connections. The following information is provided to assist in developing the local output assignment plan.

5.17 Consult the NE manufacturer's equipment manuals to determine the external timing signal type required by the NE, the type of cable needed to make the connection and the type of connectors required for the NE end of the cable. Some timing requirements are:

- Digital Loop Carrier (DLC) systems, e.g., NTI DMS-1 Urban and AT&T SLC Series 5, require 2 TOCA ports per system.
- SDH terminals require 2 TOGA, 2 TOEA, or 2 TO-EA ports per terminal. Two ports per terminal are recommended for diversity.
- Digital Loop Carrier (DLC) systems, e.g., NTI DMS-1 Urban and AT&T SLC Series 5 require 2 TOCA ports per system.
- Some digital switch machines require 2 or 4 TOEA or 2 or 4 TO-EA ports per machine.
- If an NE requires analog sine wave signals, use 1 or 2 TOAA ports per NE.
- SONET OC-n terminals require 2 TOTA ports per terminal or per 6 terminals (vendor specific). Two ports per terminal are recommended for diversity.
- Some digital switch machines and subscriber premise NEs require RS-422 or RS-423 square wave signals, and generally require 2 TOLA ports per switch or NE

5.18 For NEs that require primary and secondary timing references, assign output ports from two separate TO cards of the same type for diversity. For example, assign the primary reference to port 1 on the EA10 card in slot TO1, and the secondary reference to port 1 on the EA10 card in slot TO2.

5.19 The Description and Specifications section of this manual contains information about the number of outputs available from an output card, the length of cable a card can drive, and the type and frequency or bit rate of the outputs.

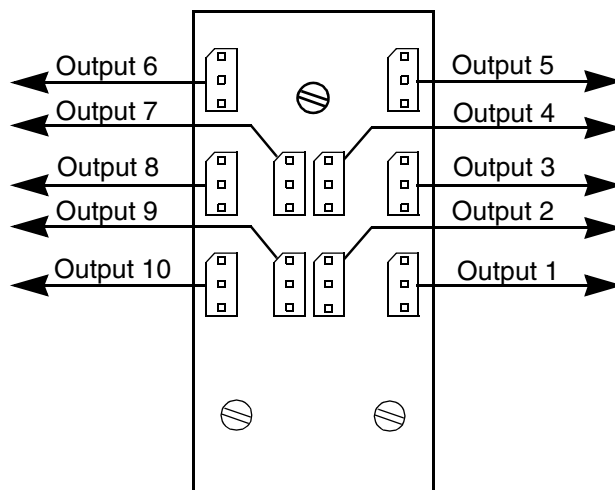
5.20 The Test and Acceptance section of this manual contains information about switch settings for the output cards. Switches set such things as the length of the cable between the DCD-519 HD and the NE, frequency or bit rate choices, and other options.

Connections

5.21 Refer to Figures 29 through 38 and the following to connect to a TO module.

1. Guide the cable ends into the cable duct from either (or both) side(s) of the equipment rack.

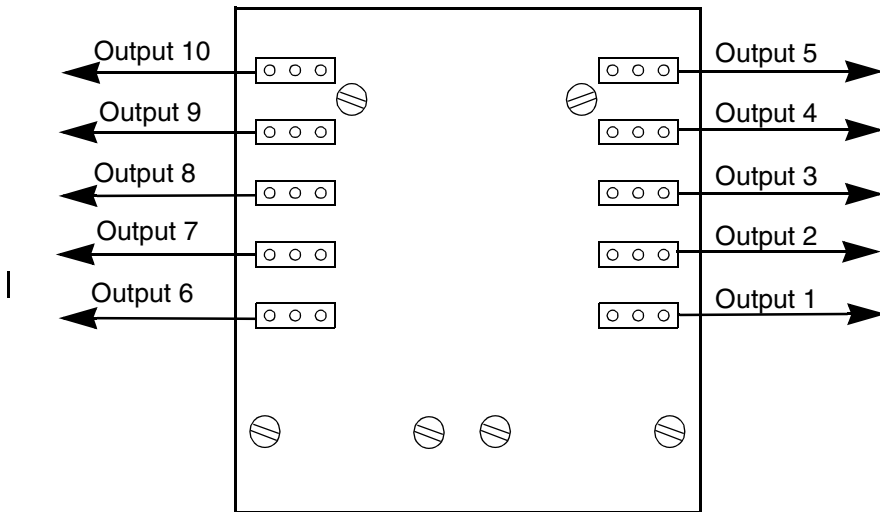
2. Route the cables to the interface modules of the appropriate TO group on the MMP. Tag the cables for identification.
3. If connecting to a wire-wrap interface module, follow local company manuals, use 25.3 mils, 0.643 mm (22 AWG) or 20.1 mils, 0.511 mm (24 AWG) tinned solid copper, shielded twisted pair cable. Prepare cable ends for wire-wrapping. Ensure that no bare wire ends are exposed, and no wires are nicked.
4. Repeat Steps 1 through 3 for each shelf with TO cards and an MMP.



Use With
 EA10
 EA20
 EA10M
 EA20M
 TO-EA5
 TOTA
 TOTA-5
 TOTL
 TOTA-M

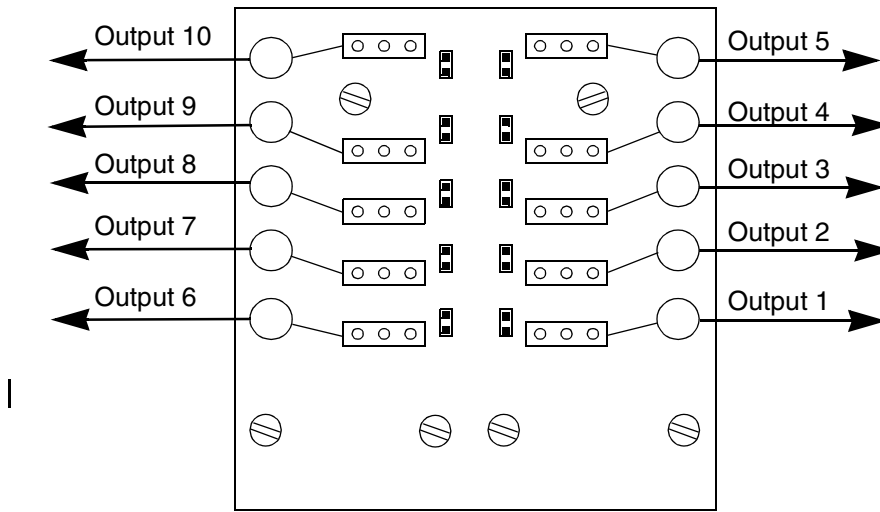
Note: For EA20 and EA20M cards, the module in the odd-numbered position carries outputs 1 through 10, and the module in the even-numbered position carries outputs 11

Figure 29. 990-45105-06 Module



Use With
EA10
EA10M
TO-EA5
TO-EA
TO-EAN
(for redundant pairs)

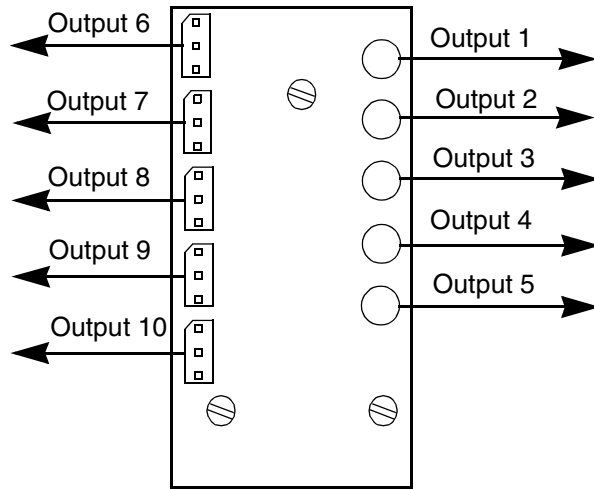
Figure 30. 990-45105-10 Module



Note: Each output may be wire-wrap (jumper on) or Siemens 1.6/5.6 (jumper off).

Use With
EA10
EA10M
TO-EA5
TO-EA
TO-EAN
(for redundant pairs)

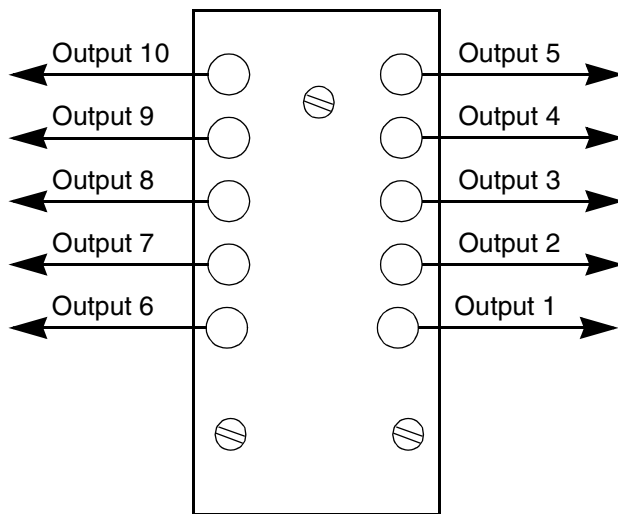
Figure 31. 990-45105-11 Module



Note: Outputs 1 through 5 are Siemens 1.6/5.6, outputs 6 through 10 are wire-wrap.

Use With
 TO-EA5
 TO-EA
 TO-EAN
 TOEA
 TOGA

Figure 32. 990-45105-12 Module



Module Part Numbers:
 990-45105-13 (SMB)
 990-45105-14 (Siemens 1.6/5.6)
 990-45105-15 (Siemens 1.0/2.3)

Use With
 EA10, EA10M
 EA20, EA20M
 TO-EA5
 TO-EA
 TO-EAN
 TOEA
 TOGA

Note: For EA20 and EA20M cards, the module in the odd-numbered position carries outputs 1 through 10, and the module in the even-numbered position carries outputs 11 through 20.

Figure 33. 990-45105-13, -14, -15 Module

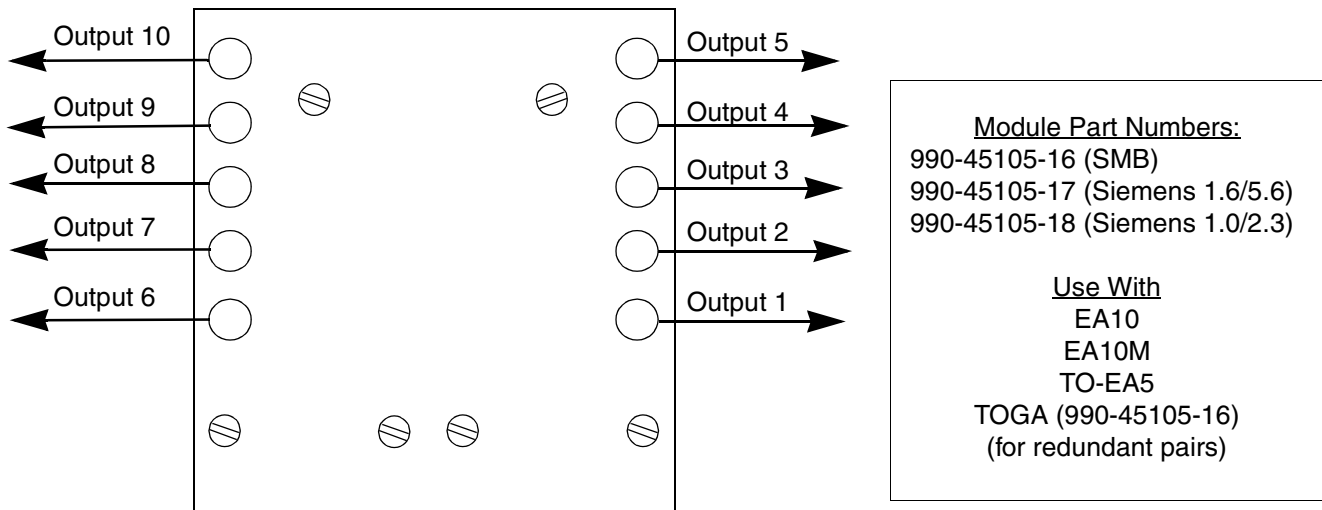
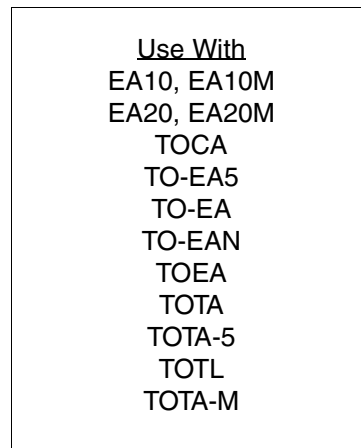
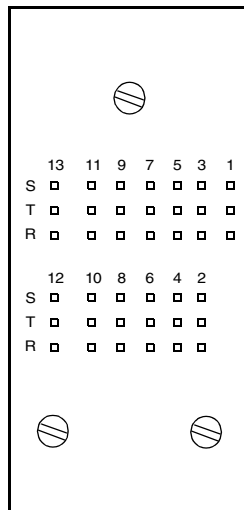


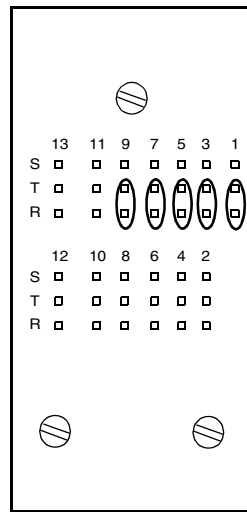
Figure 34. 990-45105-16, -17, -18 Module

Note: The terminal set number is the timing output card port number.



Note: For EA20 and EA20M cards, the module in the odd-numbered position carries outputs 1 through 10, and the module in the even-numbered position carries outputs 11 through 20.

Figure 35. 990-45108-01 Module

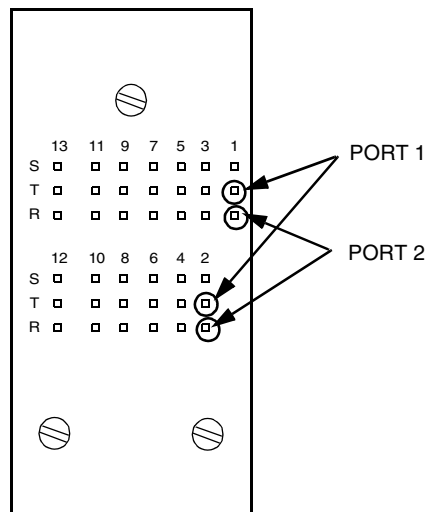


Note: Outputs 1 through 5 are available at the wire wrap terminal sets 1, 3, 5, 7, and 9. The RS-422 (+) driver connects to T and the RS-422 (-) driver connects to R.

Use With
 TOLA (RS-422 signals)
 TOLA (RS-232 signal,
 090-40023-03 card only)

Note: For a 090-40023-03 (RS-232) card, the T pin is the clock, and the R pin is the ground. Terminal set 10 is a test port.

Figure 36. 990-45108-01 Module for TOLA Card with RS-422 and RS-232 Signals

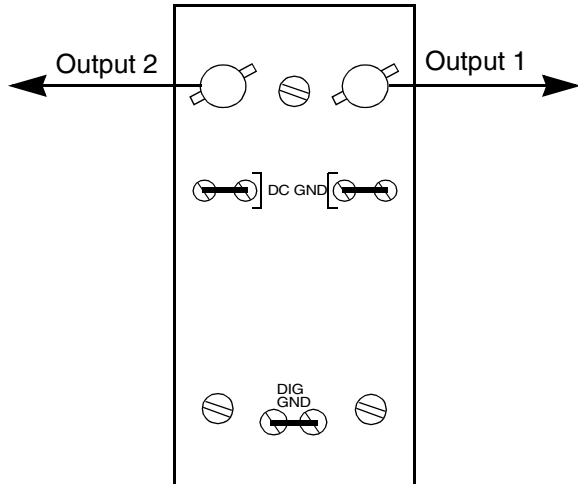


Use With
 TOLA (RS-423 signal)

Note: Port 1 and port 2 are identified to show examples of the pin arrangement of the ports. The list on the right identifies the pins associated with the ports.

Output Port	Signal Lead		Ground Lead	
	Terminal Set	Pin	Terminal Set	Pin
1	1	T	2	T
2	1	R	2	R
3	3	T	4	T
4	3	R	4	R
5	5	T	6	T
6	5	R	6	R
7	7	T	8	T
8	7	R	8	R
9	9	T	10	R
10	9	R	10	R

Figure 37. 990-45108-01 Module for TOLA Card with RS-423 Signals



Note: To isolate DC ground (shield) from DCD equipment, remove jumper (DC GND)

Use With
TOAA

Figure 38. 990-45122-01 Module

D. PSM Module Connections

5.22 Refer to Figure 39 or Figure 40 and the following to connect to a PSM module.

1. Guide the cable ends into the cable duct from either (or both) side(s) of the equipment rack.
2. Route the cables to the interface modules of the appropriate PSM group on the MMP. Tag the cables for identification.

Note: If connecting to a wire-wrap interface module, follow local company manuals, use 25.3 mils, 0.643 mm (22 AWG) or 20.1 mils, 0.511 mm (24 AWG) tinned solid copper, shielded twisted pair cable. Prepare cable ends for wire-wrapping. Ensure that no bare wire ends are exposed, and no wires are nicked.

3. Connect the cables to the PSM/C module.
4. Repeat Steps 1 through 3 for each shelf with PSM cards and an MMP.

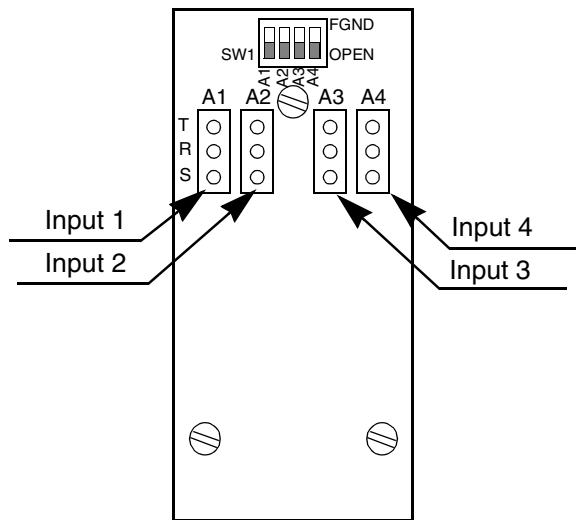


Figure 39. 990-45106-11 PSM Input Module

Use With
 PSM-T
 PSM-T^{V5}
 PSM-E
 PSM-E^{V5}
 PSM-EA
 PSM-EA^{V5}

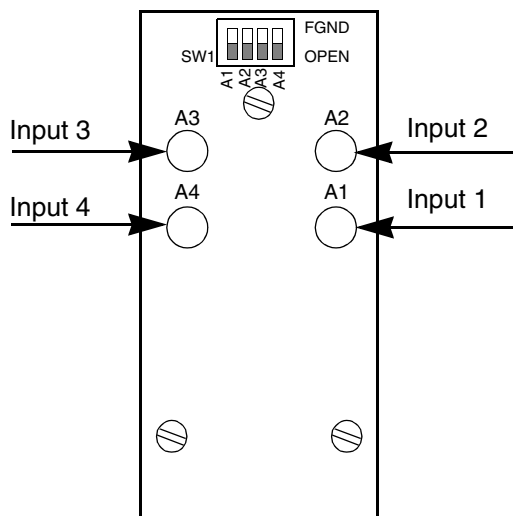


Figure 40. Coaxial PSM Input Module

Module Part Numbers:
 990-45106-12 (Siemens 1.6/5.6)
 990-45106-13 (BNC)
 990-45106-14 (SMB)
 990-45106-15 (Siemens 1.0/2.3)

Use With
 PSM-E
 PSM-E^{V5}
 PSM-EA
 PSM-EA^{V5}

E. Wire-wrap Panel Connections

5.23 The panel has 10 groups of 10 wire-wrap T, R, S terminal sets. Each T, R, S terminal set is a timing port for connecting to a network element. The panel may be used to connect any TO card or PSM card to network elements. Refer to Figure 42 to determine which T, R, S terminal sets to use. To connect the output cables to the wire-wrap panel, use Figure 41, and Figure 42, and perform wire-wrap connections as per the following:

Note: Each group of 10 T, R, S terminal sets on the wire-wrap panel is numbered the same as a single interface module. For example, the illustration shows terminal set 9 of the eighth group of 10 terminal sets. This is the same signal as terminal set 9 on interface module 8.

1. Use 0.643 mm (22 AWG) or 0.511 mm (24 AWG) tinned solid copper, shielded twisted pair cable to make wire-wrap connections as required.

Note: Use local company manual for preparing cable ends for wire-wrap.

2. Repeat Step 1 for each network element to be timed from the master and expansion shelves; use Figure 42 as reference.

NE Connections Test

5.24 After connecting the timing output signals to the NE, verify the integrity of the timing signal from the DCD-519 HD System at the NE. Refer to the NE manufacturer's manual for procedures about installing and verifying input timing signals.

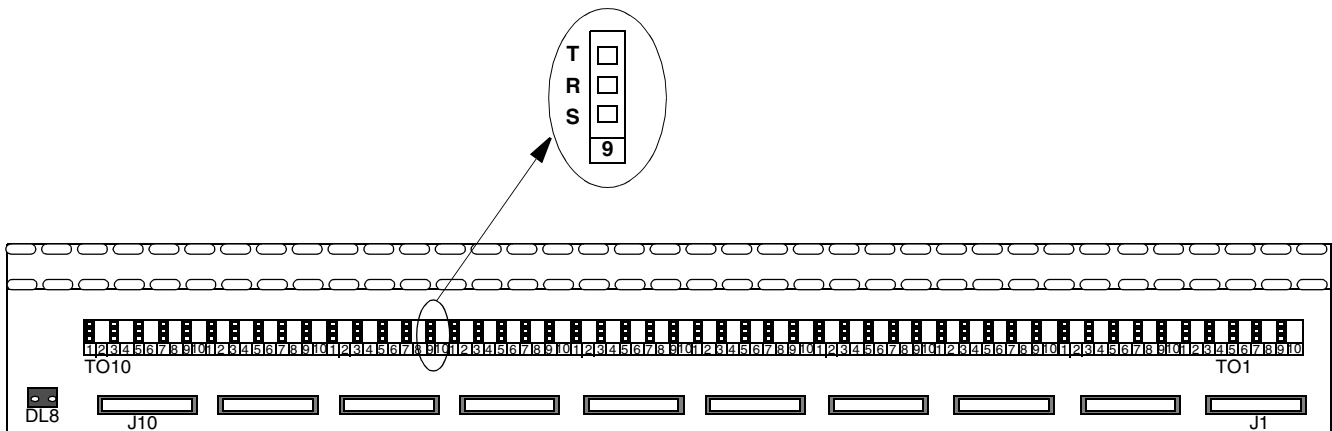
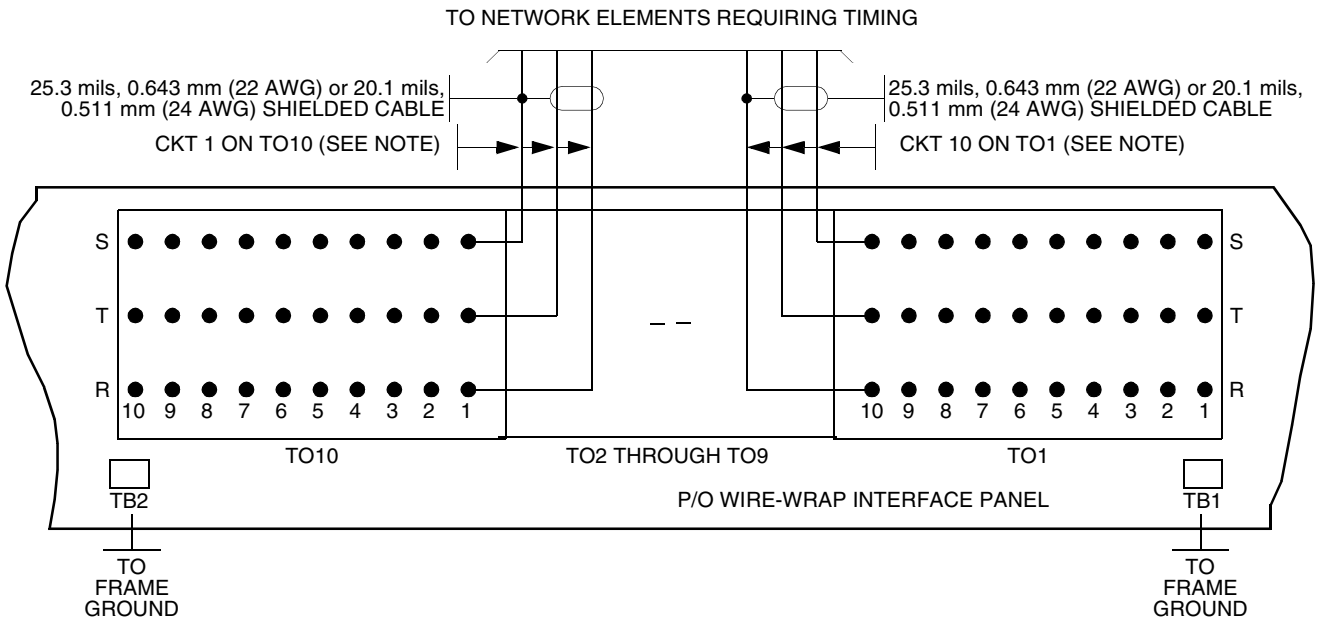
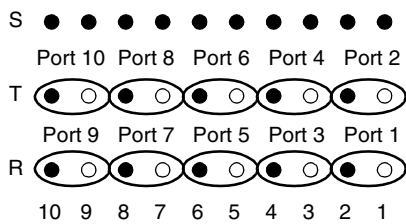


Figure 41. Wire-wrap Interface Panel

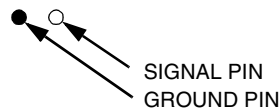


Notes:

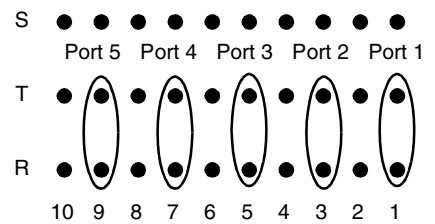
1. This figure illustrates the use of only 1 connection per TO position; a maximum of 10 connections per TO position are possible.
2. When there are 10 output ports in a TO position, the port numbers are the same as the terminal set numbers (port 1 is terminal set 1, port 2 is terminal set 2, etc.).
3. TOLA cards use configurations of the terminal sets within a TO position as shown below.



WHERE:



TOLA Card RS-423 and RS-232 Connections



WHERE:

T PIN IS RS-422+, R PIN IS RS-422-
(TERMINAL SET 10 IS A TEST PORT.)

TOLA Card RS-422 Connections

Figure 42. Wire-Wrap Interface Panel Connections

F. ESCIU and SCIU Connections

5.25 The ESCIU and SCIU cards are different from the TO cards. TO ports provide external reference clock signals for network elements. The ESCIU and SCIU cards insert the DCD clock directly into E1 or DS1 traffic-carrying links.

5.26 The ESCIU and SCIU cards cannot be used in a redundant pair. The ESCIU and SCIU output modules maintain continuity on the traffic spans if the ESCIU or SCIU card fails or is removed from the shelf by a bypass relay which releases and closes contacts for the traffic. Connections for an ESCIU or SCIU card must be at an ESCIU or SCIU module.

5.27 The “A” direction (East to West) of transmission inserts the DCD clock signal into the received traffic span’s bitstream. The “B” direction (West to East) is passed through the ESCIU and SCIU without clock insertion.

5.28 The ESCIU and SCIU cards’ A and B direction output signals conform to CCITT G.703 paragraph 6 specifications, and are designed for connection into the E1 or DS1 bitstream at the digital distribution frame (DDF). The network elements receiving the ESCIU or SCIU output signal must be able to receive signals that conform to CCITT G.703 paragraph 6 specifications.

Connecting at the DDF

5.29 If a standard level DDF (cross-connect point) is available, connect the ESCIU or SCIU module as follows:

1. For 75 Ω impedance, use BT 3002 or equivalent cable (user-supplied), to connect the ESCIU or SCIU module EAST and WEST terminals to the two network elements on the spans; refer to Table V and Figure 43, or Figure 44 and Table W.
2. Repeat Step 1 for each ESCIU or SCIU module installed.

Connecting without a DDF

5.30 If a standard level DDF (cross-connect point) is not available, the ESCIU or SCIU must be connected directly to the line and office network elements’ transmit and receive terminals of the traffic-carrying E1 or DS1 facility as follows:

1. For 75 Ω impedance, use BT 3002 or equivalent cable (user-supplied) to connect the ESCIU or SCIU module EAST and WEST terminals to the two network elements on the spans; refer to Table X.
2. Repeat Step 1 for each ESCIU or SCIU module installed.

Connecting the Alarms

5.31 If the ESCIU or SCIU module is to be cabled to alarm monitoring equipment (consult local company Installation Job Specifications):

1. Use the appropriate cable to connect from the DB9 connector (J2) on the ESCIU or SCIU module to alarm monitoring equipment; refer to Figure 43 or Figure 44 and Table Y.
2. Repeat Step 1 for each ESCIU or SCIU module installed.

Table V. ESCIU and SCIU Module to Access Jack Connections

MODULE	ACCESS JACK*
WEST A IN (J3)	IN Jack #1 (Jack normal side)
WEST B OUT (J6)	OUT Jack #1 (Jack normal side)
EAST B IN (J4)	IN Jack #2 (Jack normal side)
EAST A OUT (J5)	OUT Jack #2 (Jack normal side)
* Jack numbers are for reference only.	

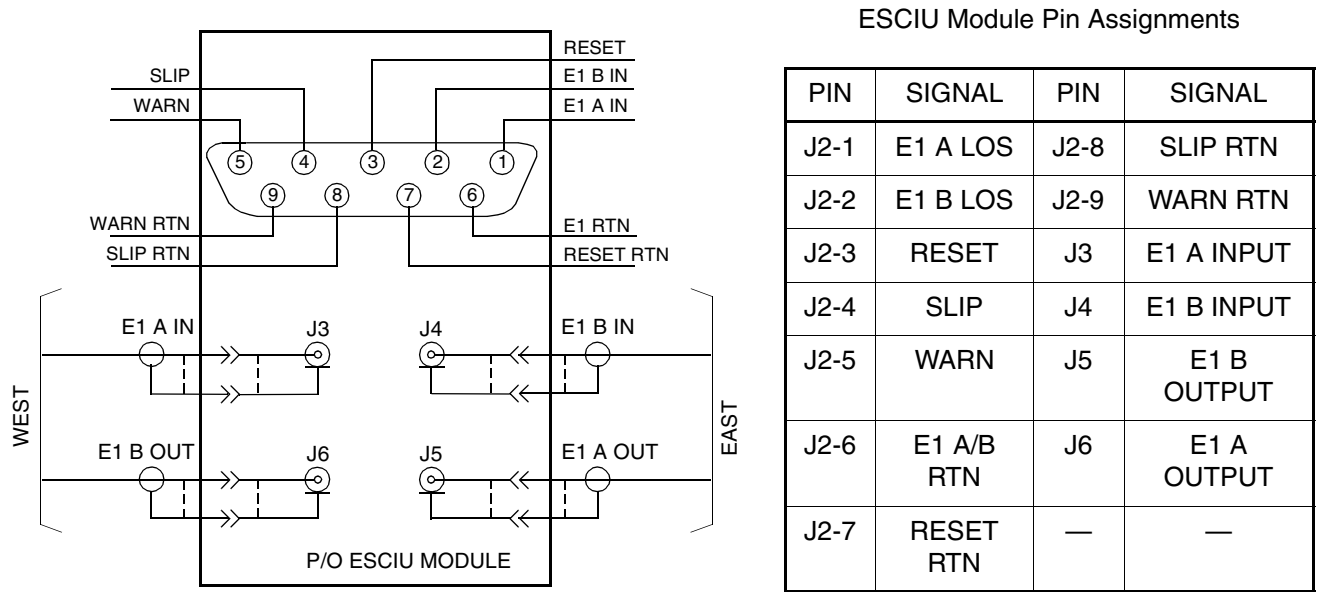


Figure 43. ESCIU Interface Module

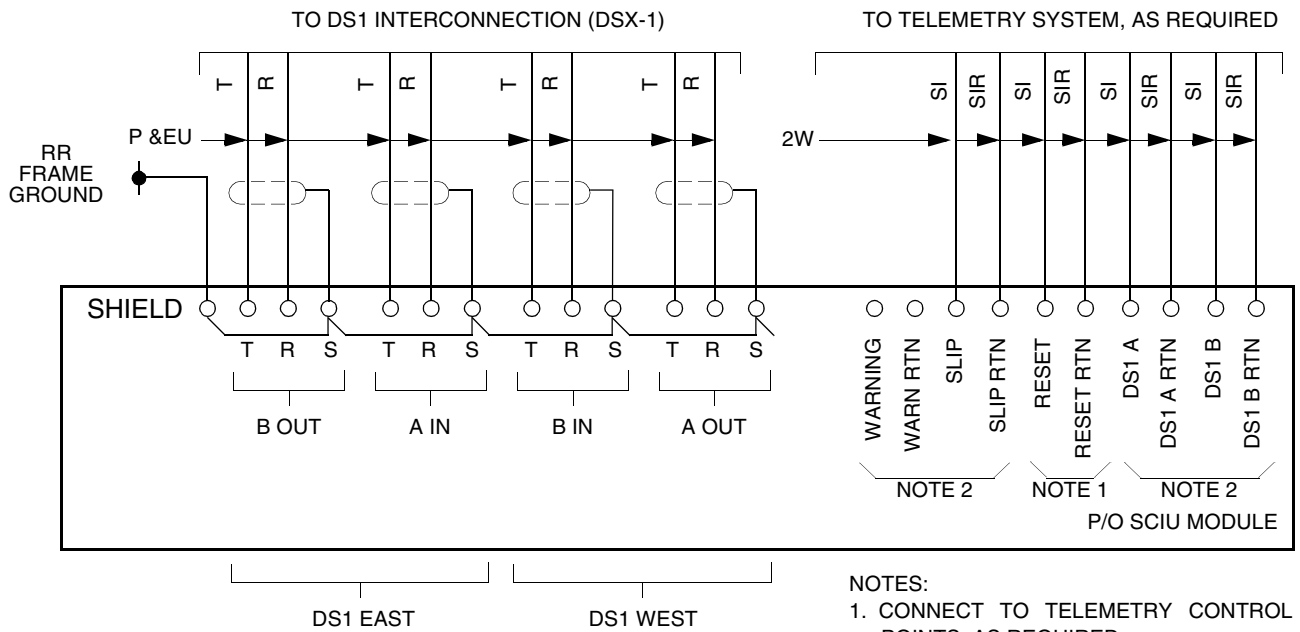


Figure 44. SCIU Interface Module

Table W. SCIU Wire-wrap Connections

WIRE-WRAP LEADS		CONNECTION	LEAD
OUTPUT	PIN		
1	T R S	B OUT	T R S
2	T R S	A IN	T R S
3	T R S	WARNING	SI RTN
4	T R S	SLIP	SI RTN
5	T R S	—	—
6	T R S	UNIT FAIL	SI RTN
7	T R S	DS1B FAIL	SI RTN
8	T R S	DS1A FAIL	SI RTN
9	T R S	B IN	T R S
10	T R S	A OUT	T R S
Legend: T Tip R Ring S Shield* SI Status Indicator RTN Return * It is preferable to ground the shield at the timing source end only, but certain vendor applications may require grounding at the receive end. However, under no circumstances should the shield be connected to frame ground at both ends unless one end is capacitor coupled to ground.			

Table X. ESCIU and SCIU Module to NE Connections

MODULE	NETWORK ELEMENT (NE)*
WEST A IN (J3)	Transmit or OUT side of the NE link to be retimed from the DCD
WEST B OUT (J6)	Receive or IN side of the NE being retimed from the DCD
EAST B IN (J4)	Transmit or OUT side of the NE that has been retimed from the DCD
EAST A OUT (J5)	Receive or IN side of the NE connected to EAST A IN.
* Transmit or OUT is transmission <u>towards</u> the output module. Receive or IN is transmission <u>from</u> the output module.	

Table Y. ESCIU and SCIU Alarm and Control Connections

TERMINAL SETS	COMMENTS
WARN (Alarm)	Do not cable
SLIP (Alarm)	Cable to E2A telemetry equipment scan-point
RESET (Control)	Cable to E2A telemetry equipment control-point
E1 or DS1 A (Alarm)	Cable to E2A telemetry equipment scan-point
E1 or DS1 B (Alarm)	Cable to E2A telemetry equipment scan-point

G. ESCIU and SCIU Cutover Procedures

5.32 The ESCIU and SCIU card must be cabled into the bitstream of a traffic-carrying E1 or DS1 system. This procedure assumes that the installation cabling was completed according to instructions in this section, and the test and acceptance was completed per the Test and Acceptance section of this manual.

Out-of-Service Equipment

5.33 If DDF access jack sets *are not* cabled to the ESCIU or SCIU module, the following out-of-service cutover procedure must be used. Consult the local company Installation Job Specifications to ensure that the network element to be retimed from the DCD-519 HD shelf clock will be connected to the ESCIU or SCIU module correctly. Refer to Figure 45 or Figure 46 for the following procedure:

1. Remove from service (turn down) the traffic trunks on the E1 or DS1 system to be cutover to the ESCIU or SCIU module.
2. Remove the existing cabling between the line NE and office NE transmit (OUT) and receive (IN) terminals, including:
 - Transmit (OUT) on the line NE terminals to receive (IN) on the office NE terminals
 - Receive (IN) on the line NE terminals to transmit (OUT) on the office NE terminals
3. Connect the new ESCIU or SCIU module cables per the following:
 - WEST IN terminals on the module to transmit (OUT) terminals on the NE not being timed from the DCD-519 HD shelf
 - WEST B OUT terminals on the module to receive (IN) terminals on the NE not being timed from the DCD-519 HD shelf
 - EAST A IN terminals on the module to transmit (OUT) terminals on the NE being timed from the DCD-519 HD shelf
 - EAST B OUT terminals on the module to receive (IN) terminals on the NE being timed from the DCD-519 HD shelf
4. Verify that there are no alarms on the NEs on the E1 or DS1 system. If there are alarms, recheck the new cabling between the NEs and the ESCIU or SCIU module.
5. Restore (turn up) the traffic trunks to service.
6. Repeat Steps 1 through 5 for each ESCIU or SCIU installed in the DCD-519 HD shelf.

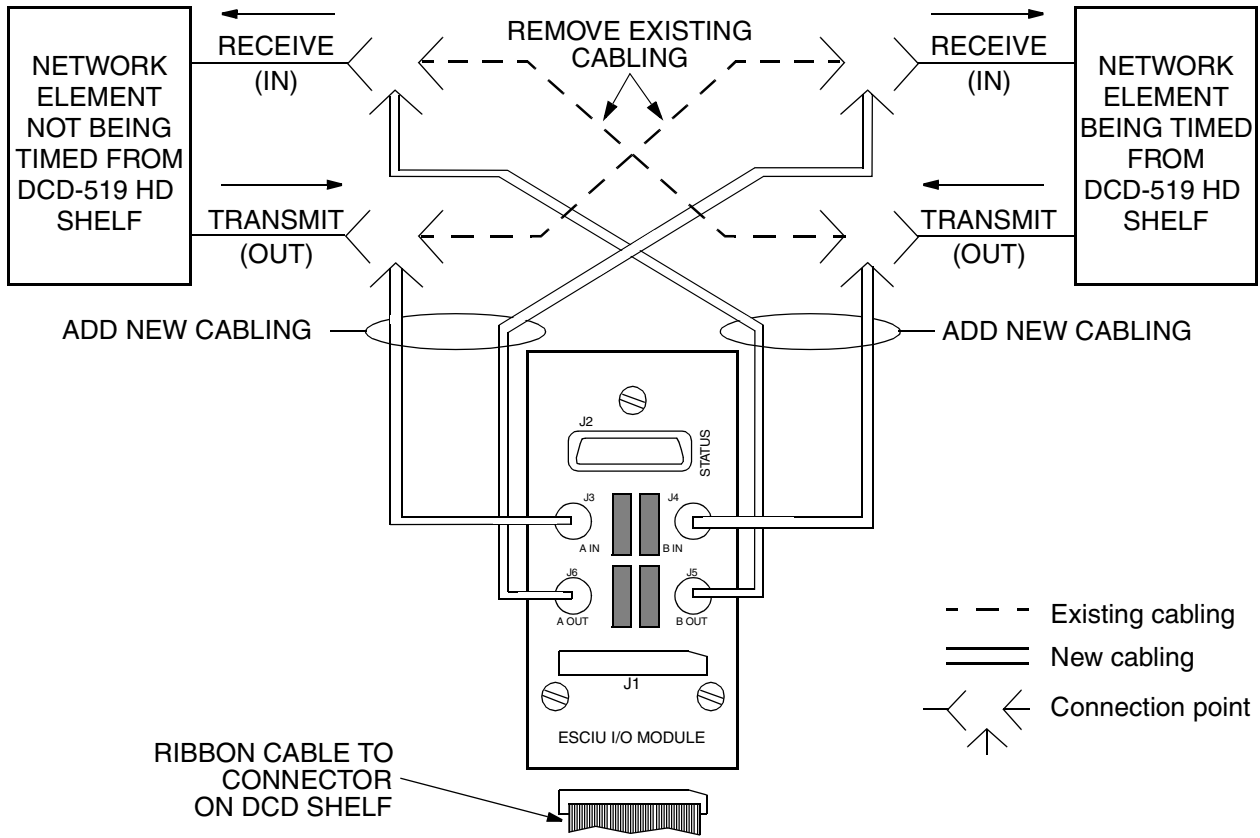


Figure 45. ESCIU Cutover without Jacks (Out-of-Service)

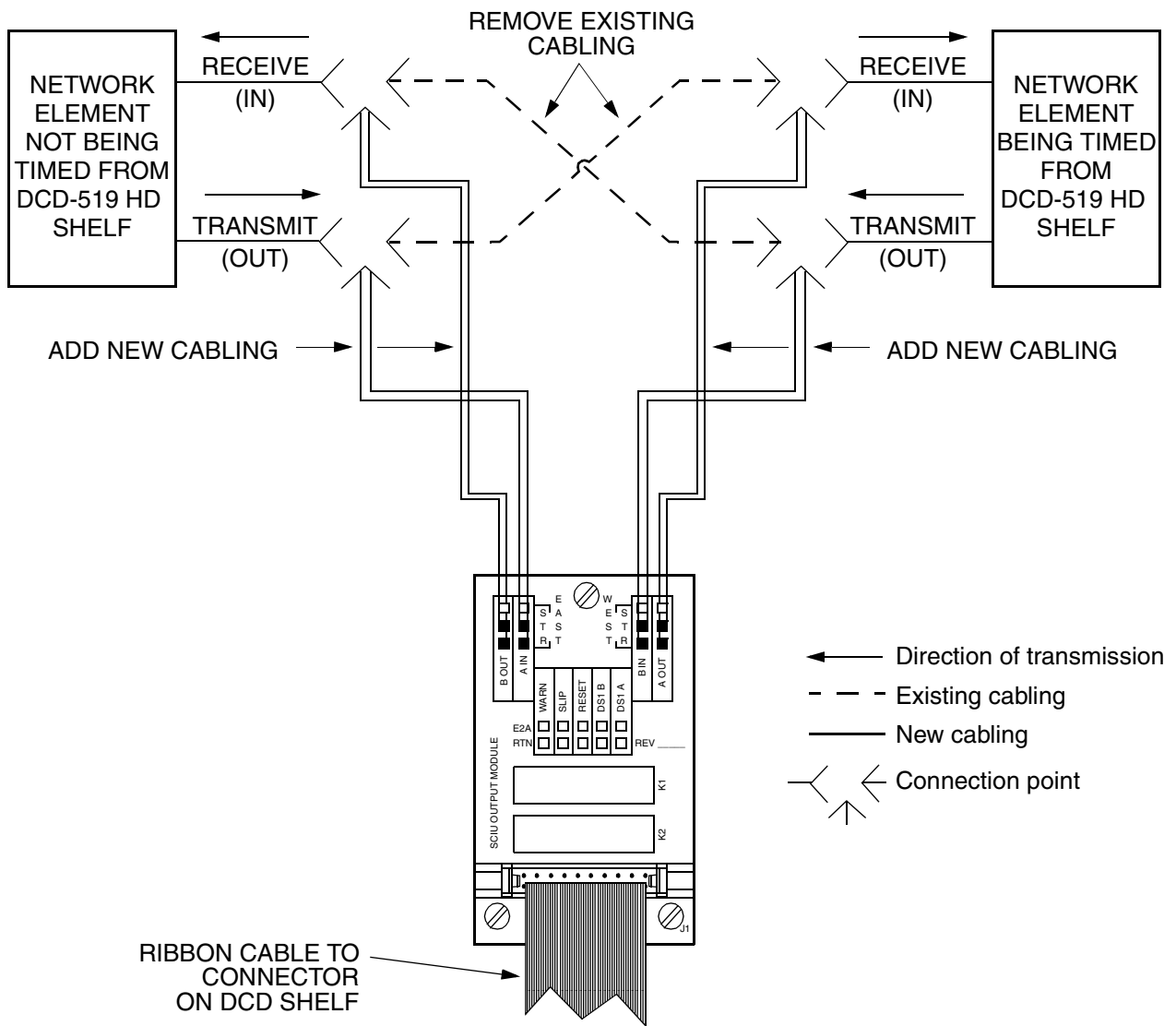


Figure 46. SCIU Cutover without Jacks (Out-of-Service)

In-Service Equipment

5.34 If standard digital signal level access jack sets, such as DSX-1 jacks, were cabled to the ESCIU or SCIU module, the following in-service cutover procedure must be used. Consult the local company Installation Job Specifications to ensure that the network element to be retimed from the DCD-519 HD shelf clock (BITS) will be connected to the ESCIU or SCIU module WEST A OUT terminals (see Figure 43). Refer to Figure 47 or Figure 48 for the following procedure:

1. Patch a bridging repeater from the MON jack of one NE to the IN jack of the other NE in both directions of transmission on the E1 or DS1 system to be cutover. Place a 75 Ω (E1) or 50 Ω (DS1) termination plug in the OUT jack in each direction.
2. Remove the cross-connect wiring from the OUT to IN jacks (off-normal side of jacks) in both directions of transmission.
3. Install new cross-connect wiring from the ESCIU or SCIU jack sets to the NEs as follows:
 - EAST A IN jack on the module to OUT jack on the NE not being timed from the DCD-519 HD shelf
 - EAST B OUT jack on the module to IN jack on the NE not being timed from the DCD-519 HD shelf
 - WEST B IN jack on the module to OUT jack on the NE being timed from the DCD-519 HD shelf
 - WEST A OUT jack on the module to IN jack on the NE being timed from the DCD-519 HD shelf
4. Remove the 75 Ω (E1) or 50 Ω (DS1) termination plug from the OUT jack and patch cords from the NE IN jack. The E1 or DS1 system bitstream is now going through the ESCIU or SCIU card.
5. Verify that there are no alarms on the NEs on the E1 or DS1 system. If there are alarms, reinsert patch cords in the IN jack and the termination plugs in the OUT jack. Recheck the cross-connect wiring just installed, and repeat Step 4.
6. Remove the remaining patch cords from the NE MON jack.
7. Repeat Steps 1 through 6 for each ESCIU and SCIU card installed in the DCD-519 HD shelf.

Note: Consult Symmetricom CTAC for additional information regarding system cutovers.

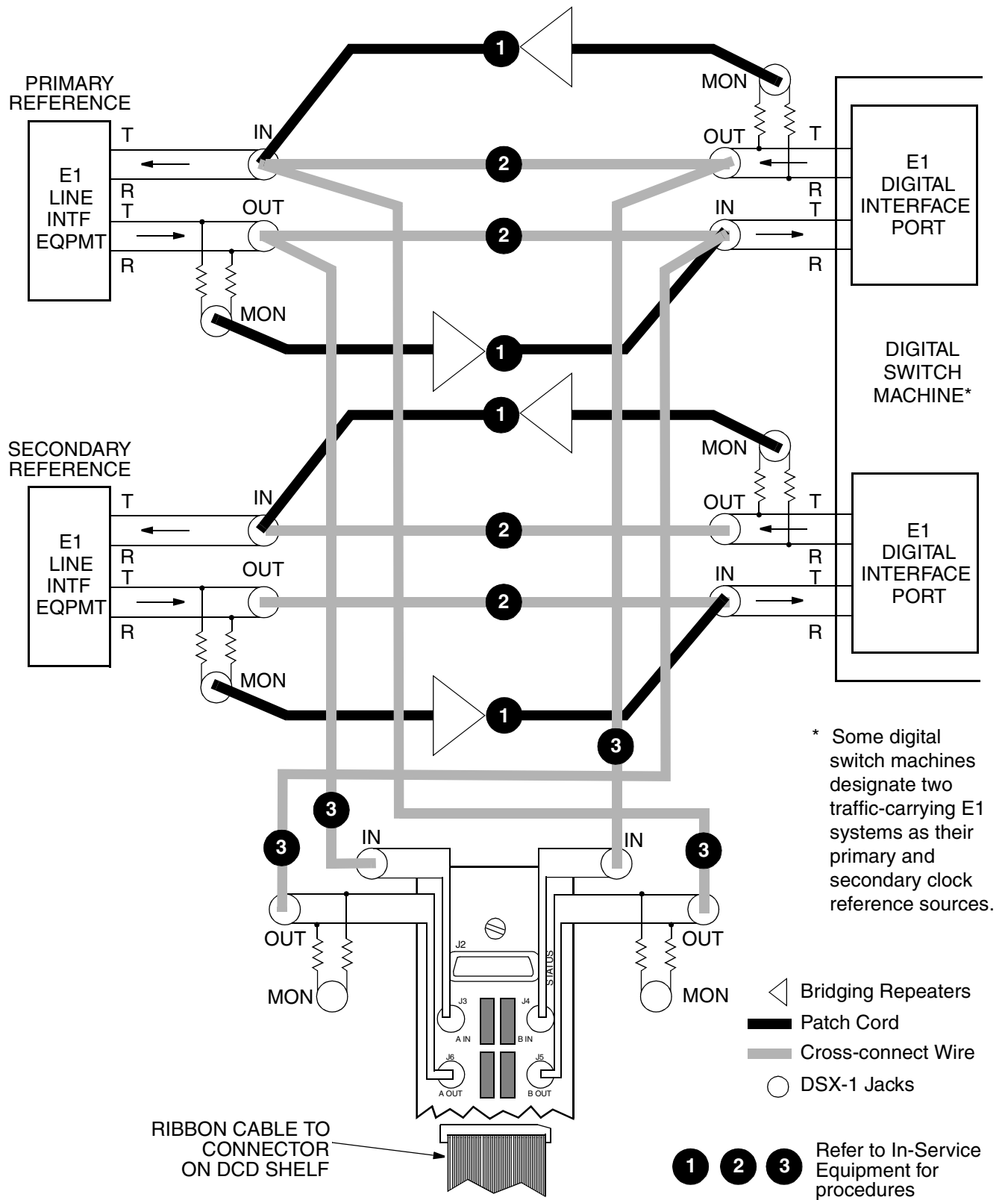


Figure 47. ESCIU Cutover with Jacks (In-Service)

