

DIGITAL CLOCK DISTRIBUTOR

519

INSTALLATION

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1. GENERAL

1.01 This section provides instructions for installing the Digital Clock Distributor 519 (DCD-519) System.

1.02 This section has been reissued for the reasons listed below. Changes and additions are marked with change bars.

- Added TO-EAN card.
- Replaced master/expansion shelf ribbon cables p/n 060-40004-01 and p/n 060-40004-10 with master/expansion shelf ribbon cables p/n 060-40004-12 and p/n 060-40004-14, respectively.
- Replaced standard MRC-EA card and standard MRC-T card with MRC-EA^{V5} card and MRC-T^{V5} card throughout document.
- Replaced standard PSM-E card, standard PSM-EA card, and standard PSM-T card with PSM-E^{V5} card, PSM-EA^{V5} card, and PSM-T^{V5} card throughout document.
- Replaced standard MIS card with MIS^{V5} card throughout document.

- Replaced “connectorless” with “ANSI-class” throughout document.
- Added Figures 21, 22, and 23.
- Updated Figures 20, 38, 39, 40, 41, and 43, and Tables C, D, E, F, and X.

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
DDF	Digital Distribution Frame
DS1	Digital service, level 1 (1.544 Mb/s)
DSX-1	Digital cross-connect, Level 1
E1	European Signal, Level 1 (2.048 Mb/s)
ESCIU	E1 Synchronous Clock Insertion Unit
ESD	electrostatic discharge
HS	hot spare card or slot
LNC	Local Node Clock
LOS	loss of signal
SCIU	Synchronous Clock Insertion Unit
T1	1.544 Mb/s pulse code modulation system (U.S.A.)
TL1	Transaction Language 1
TNC	Transit Node Clock
TO	Timing output card or slot

Notes:

1. Where information is common to the MRC-EA^{V5} (p/n 090-45010-56, -57), MRC-T^{V5} (p/n 090-45010-53, -54), MRC-EA (p/n 090-45010-06, -09), MRC-T (p/n 090-45010-03, -08), 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^{V5}, MRC-T^{V5}, MRC-EA, and MRC-T cards, these cards are collectively referred to as MRC cards.

3. Where information is common to the MIS^{V5} (p/n 090-45018-05) and MIS (p/n 090-45018-04 and 090-45018-14) cards, these cards are collectively referred to as MIS cards.
4. Where information is common to the PSM-E^{V5} (p/n 090-45025-52), PSM-EA^{V5} (p/n 090-45025-54), PSM-T^{V5} (090-45025-51), PSM-E (p/n 090-45025-02), and PSM-T (p/n 090-45025-01 and 090-45025-53) cards, these cards are collectively referred to as PSM cards.
5. Where information is common to the TNC-E, TNC, LNC, ST2E, and the ST3E cards, these cards are collectively referred to as clock cards.
6. Where information is common to the TNC-E and the ST2E cards, these cards are collectively referred to as rubidium clock cards.
7. Where information is common to the TNC, LNC, and ST3E cards, these cards are collectively referred to as quartz clock cards.
8. “Interface panel” is used when referring to either the input/output panel of the master shelf or the output panel of the expansion shelf.
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.

1.05 The DCD-519 may be purchased as individual shelves for installation into a standard ETSI (535 mm), ANSI (21 in), or 19 in rack with either 44 mm (1.7 in) or 51 mm (2 in) 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 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.

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

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

2.03 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 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. Visually 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 System should not be installed near large motors, generators, transformers, or other equipment which radiate strong magnetic fields. Placing the DCD-519 near such equipment will not ensure proper operation.

2.05 This section assumes that a site survey was performed and Installation Job Specifications were developed by the local company as supplements to this section. 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
- Which timing outputs will time which 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 (master and expansion) consists of a shelf and an interface panel (see Figure 1). Additional interface panels may be added to each shelf as required.

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 documents for ribbon cable runs between equipment bays, if permitted.

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: In the next step, consider mounting the DCD-519 in a position to allow for future enhancements to the system (e.g., the addition of a DCD-LPR).

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

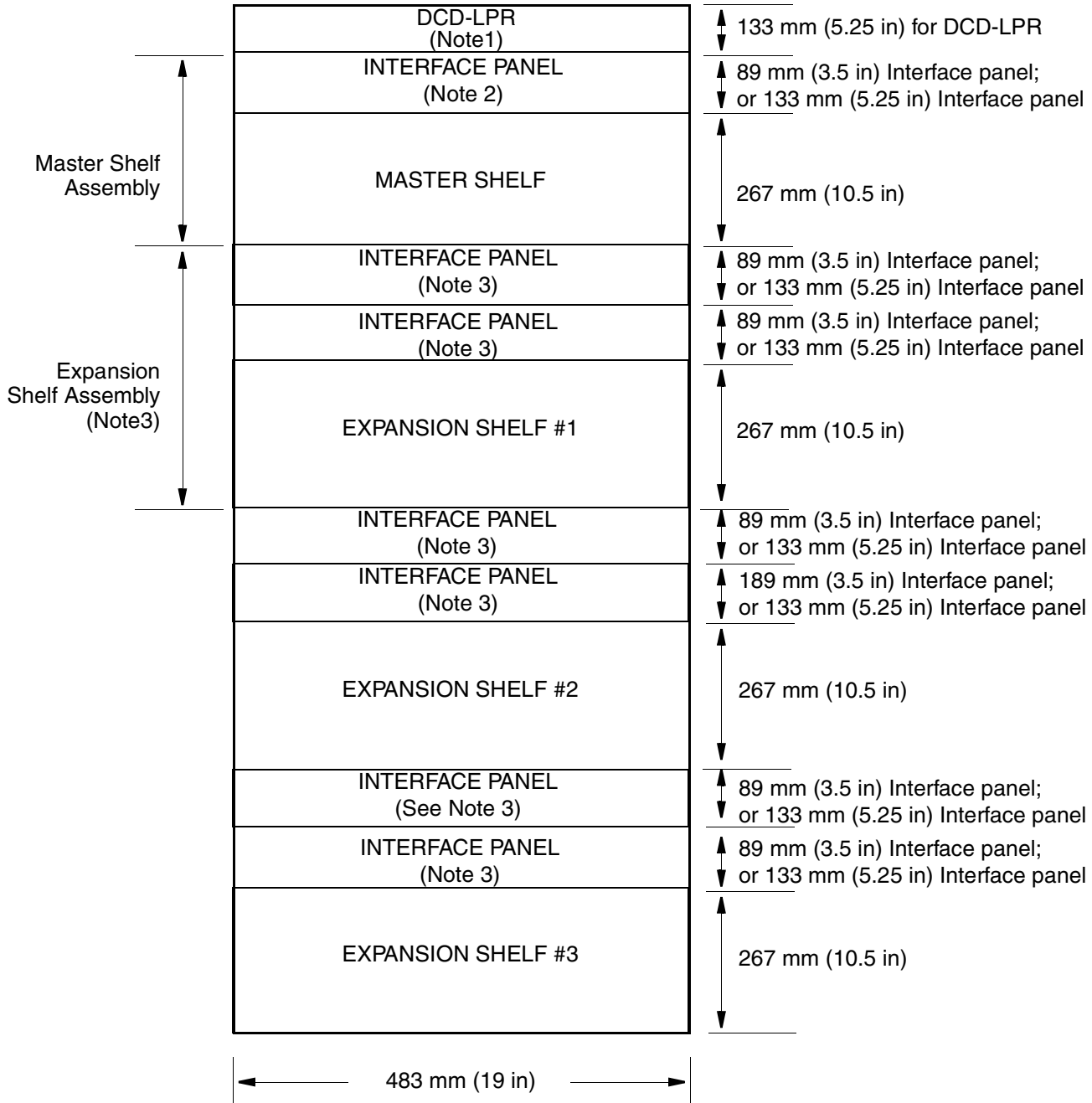
2. Align the mounting holes so that at least four screws on each side can be installed, and attach using the provided screws.
3. Mount the interface panel and shelf for the first expansion shelf directly under the master shelf. Air circulation is provided by the grill on the bottom of the shelf. (See Figures 3 through 6 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 capacity required exceeds one rack for the DCD-519 System, set up a slave remote DCD-519 System with the appropriate number of output slots. See Part 3C, Master System to Remote System Connections.

E. Shelf Switch Settings

Master Shelf Switches

2.11 Consult the local company Installation Job Specifications to set switches SW1 through SW7 (Figure 7) on the master shelf rear panel per the following:

- SW1 selects the clock operation for the shelf. Set SW1 to the ST2 position if one or more ST2E, ST2, or TNC-E clock cards, or 090-45010-08, -09, -54, and -57 MRC cards will be installed in the shelf. Set SW1 to the ST3 position if no ST2E, ST2, or TNC-E clock cards will be installed in the shelf (the default setting is ST2).
- SW2 causes the system to generate a major or minor alarm in the event of a power (battery) loss (A or B). Set SW2 to MAJ if a major alarm is to be generated; set to MIN for a minor alarm (the factory setting is MAJ).
- SW3 causes the system to generate a major or minor alarm in the event both clock cards enter holdover mode. Set to MAJ if a major alarm is to be generated; set to MIN for a minor alarm (the factory setting is MAJ).



Notes:

1. The optional DCD-LPR is typically mounted at the top of the rack.
2. A fully equipped master shelf with TNC, LNC, or ST3E cards requires two interface panels.
3. A fully equipped unprotected expansion shelf requires two interface panels.
4. The rack need not be equipped with all the shelves shown in this figure.

Figure 1. DCD-519 Rack Layout

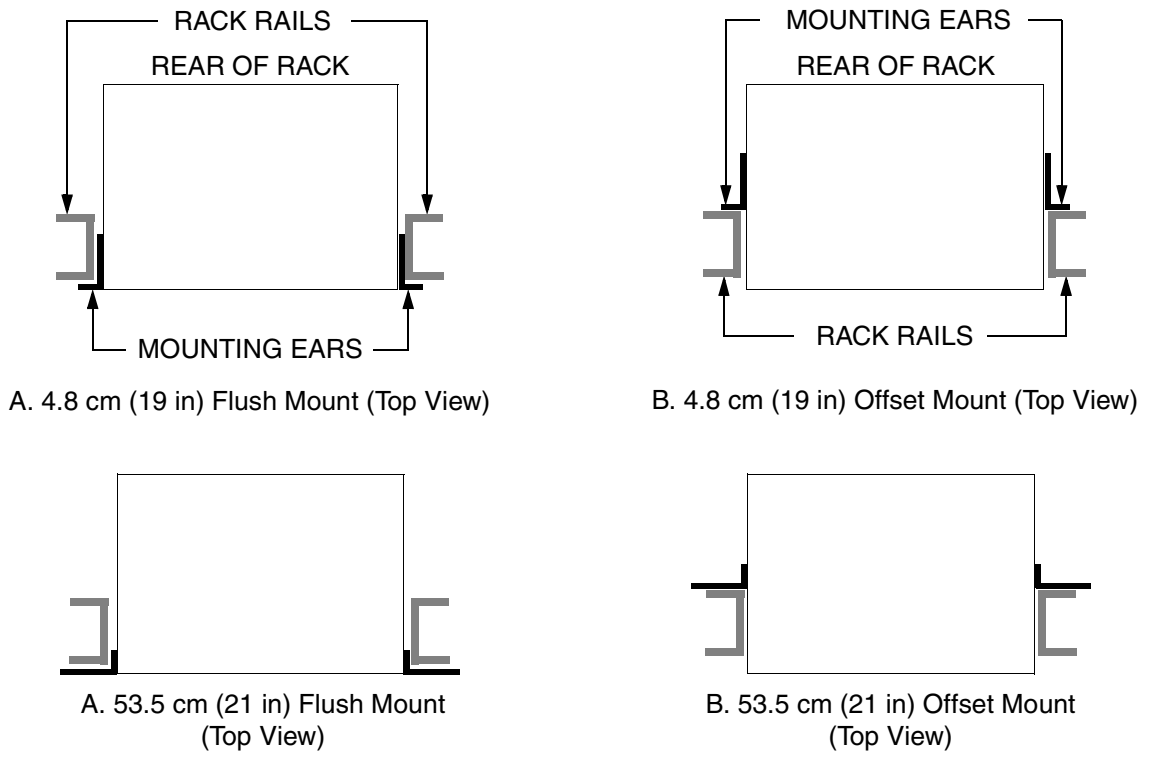


Figure 2. Rack Mounting Positions

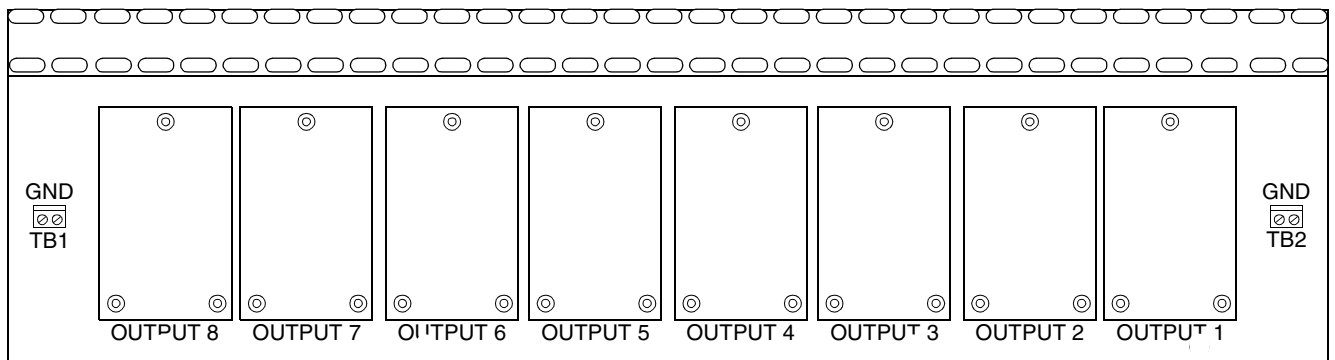


Figure 3. ANSI-Class MMP

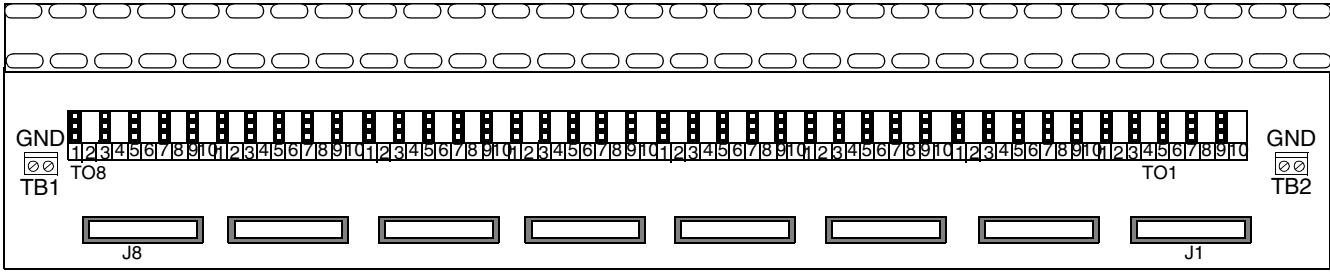


Figure 4. Wire-Wrap Panel

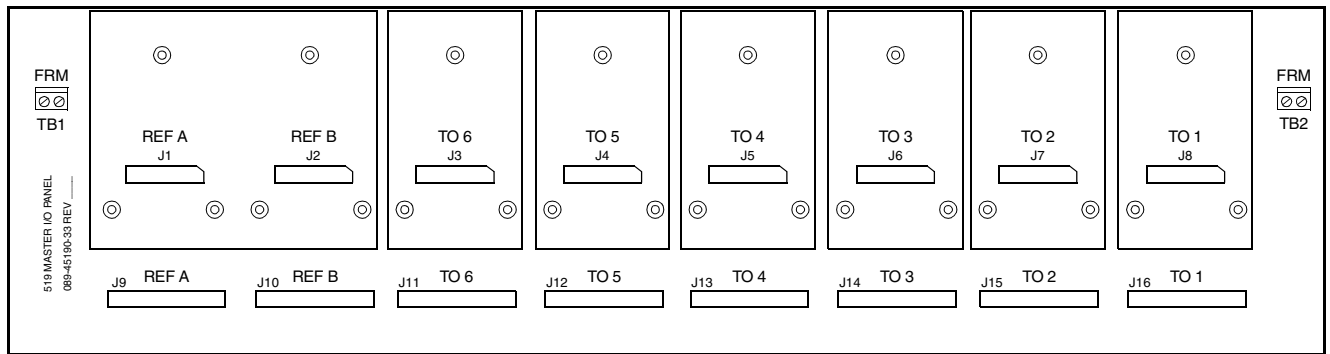


Figure 5. ITU-Class I/O MMP

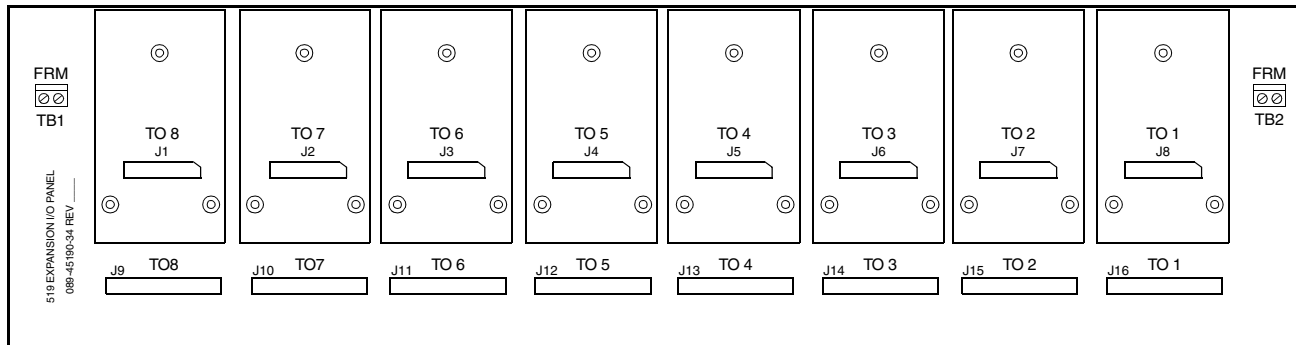


Figure 6. ITU-Class Output MMP

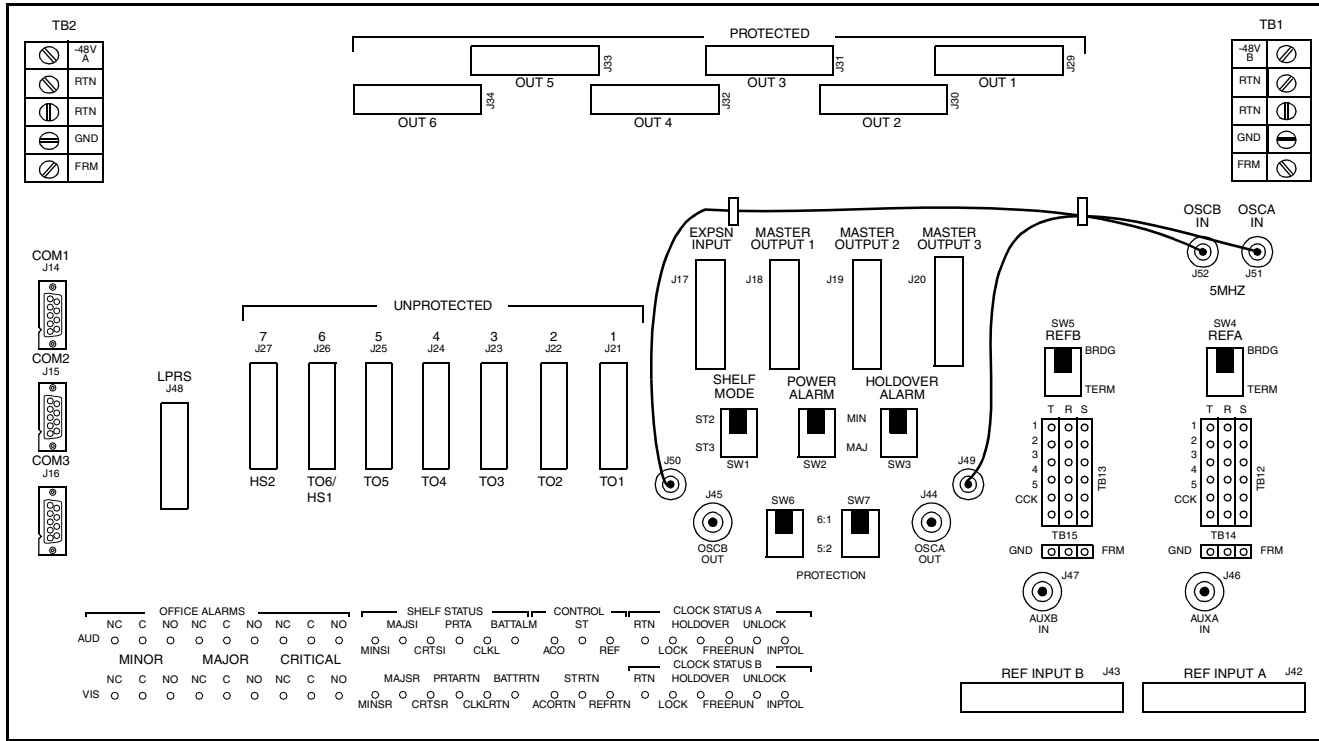


Figure 7. Master Shelf (Rear View)

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

- SW4 and SW5 set the input at row 4 of terminal block REF A and REF B to accommodate a bridged or terminated input; SW4 is for REF A, SW5 is for REF B. Set to BRDG if using –20 dB DSX level reference input; set to TERM if using 0 dB DSX level reference input (the default setting is TERM).

Notes:

1. SW4 and SW5 are particularly important when installing a remote master shelf.
2. Switches SW6 and SW7 listed below do not have any effect on redundant or 1:N output protection. Redundant protection is configured via the installation of the appropriate redundant TO card pair and cabling using the three-connector cable.
- SW6 and SW7 select 5:2 or 6:1 protection switching. Both switches must be set to enable the option (the factory setting is 5:2).
 - a. 5:2 configures the DCD-519 master shelf to support five TO/ESCIU/SCIU cards and two HS TO cards. This allows up to two different HS TO card types
 - b. 6:1 configures the TO6/HS1 slot to act as a TO/ESCIU/SCIU slot, thereby providing six TO/ESCIU/SCIU slots and one HS TO slot. If this is the case, all TO card types must match the HS TO card type if protection is required
1. Using Figure 7 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.

2. Repeat Step 1 for each remote system master shelf in the building.

Expansion Shelf Switches

2.12 Switches SW1, SW4, and SW5 on the rear panel of the expansion shelf are not used unless a clock input card is installed. Set switch SW2 to the same position as the master shelf. Consult the local company Installation Job Specifications to set switches SW1 and SW2, and SW4 and SW5 (Figure 8) on the expansion shelf rear panel per the following:

- SW1 selects the clock input mode for the shelf. ST2 mode makes both clock input cards active and not phase aligned (this is not a recommended mode for the expansion shelf). ST3 mode causes only one clock input card to be active at a time and phase aligned (the factory setting is ST3).
 - SW2 causes the system to generate a major or minor alarm in the event of a power (battery) loss (A or B). Set SW2 to MAJ if a major alarm is to be generated; set to MIN for a minor alarm (the factory setting is MAJ).
 - SW4 and SW5 set the reference input terminations to bridged or terminated; SW4 is for reference A4, SW5 is for reference B4. Set to BRDG if using –20 dB DDF level reference input; set to TERM if using 0 dB DDF level reference input (the factory setting is TERM).
1. Using Figure 8 and Table B as reference, set switches SW1 through SW5 on the rear panel of the expansion shelf assembly per local company Installation Job Specifications.
 2. Repeat Step 1 for each remote system expansion shelf in the building.

Table A. Master Shelf Switches

SWITCH	SETTING	FUNCTION	FACTORY SETTING
SW1	ST2	Clock option set for ST2E/ST2/TNC-E clock operation	—
	ST3	Clock option set for ST3E/ST3/TNC/LNC clock operation	X
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	Identifies reference input signal at input 4 of REF A as bridged (–20 dB input level)	—
	TERM	Identifies reference input signal at input 4 of REF B as terminated (0 dB input level)	X
SW5	BRDG	Identifies reference input signal at input 4 of REF A as bridged (–20 dB input level)	—
	TERM	Identifies reference input signal at input 4 of REF B as terminated (0 dB input level)	X
SW6 and SW7 (Note 1)	5:2	Configures the DCD-519 master shelf to support five TO/ESCIU/ SCIU cards and two HS TO cards (SW6 and SW7 must be set to the same position)	X
	6:1	Configures the TO6/HS1 slot to act as a TO/ESCIU slot, thereby providing six TO/ESCIU/SCIU slots and one HS TO slot (SW6 and SW7 must be set to the same position)	—
<p>Notes:</p> <ol style="list-style-type: none"> SW6 and SW7 do not have any effect on 1:1 or 1+1 output protection. Redundant 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. 			

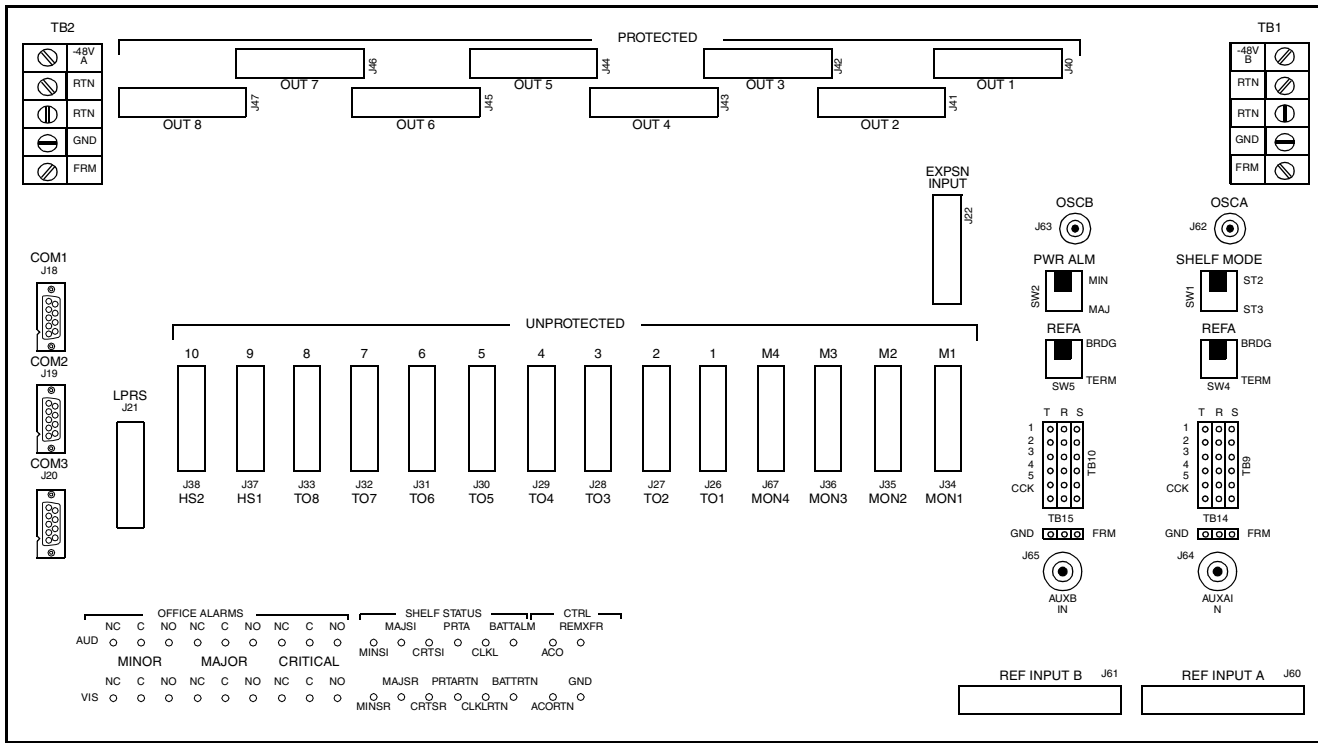


Figure 8. Expansion Shelf (Rear View)

Table B. Expansion Shelf Switches

SWITCH	POSITION	FUNCTION	FACTORY SETTING
SW1	ST2	Makes both clock input cards active and not phase aligned	—
	ST3	Makes only one clock input card active at time and phase aligned	X
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)	—
SW4	BRDG	Sets reference input A4 termination as bridged (-20 dB DDF level)	—
	TERM	Sets reference input A4 termination as terminated (0 dB DDF level)	X
SW5	BRDG	Sets reference input B4 termination as bridged (-20 dB DDF level)	—
	TERM	Sets reference input B4 termination as terminated (0 dB DDF level)	X

F. Interface Module Installation

2.13 Interface modules (Tables C through F) 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 Shelf input or output signals. Use an appropriate module for each 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 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 the appropriate interface module for each output card to be installed (refer to Tables C through F) on the master shelf.
 - 2-port BNC interface module (Figure 9): 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 the 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 9): if required to isolate DC ground (SHIELD) from DCD equipment, remove jumper(s) (DC GND), J1 and/or J2.
 - Reference input modules (all) (Figure 10): 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 10): 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 11): determine which external equipment is 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.
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.

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.

Table C. Clock Input Modules for ITU-Class MMPs

FOR INPUT CARD	USE INPUT 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 inputs 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: 0.1V to 0.35 V b-p BRDG: CC: 1.5 V to 4.0 V p-p	4 (Use A3)
CI-EA (Connect inputs 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 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 (A3 only) BRDG: E1: 0.1 V to 0.35 V b-p (A3 only)	4 (Use inputs listed)

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

FOR INPUT CARD	USE INPUT 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 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 D. PSM Modules for ITU-Class MMPs

FOR INPUT CARD	USE INPUT MODULE				
	PART NUMBER	CONNECTOR TYPE	IMPEDANCE	INPUT SIGNAL LEVEL	NO. OF INPUTS
PSM-T PSM-T ^{V5}	990-45106-11	Wire-wrap (Note 2)	100 Ω (balanced)	T1: 0.1V to 3.5 V b-p	4
	990-40011-10 (Note 1)				
PSM-E	990-45106-12	Siemens 1.6/5.6	75 Ω (unbalanced)	E1: 0.1 V to 3.5 V b-p	4
PSM-E (Issue A)	990-45106-11	Wire-wrap (Note 2)	120 Ω (balanced)	E1: 0.1 V to 3.5 V b-p	4
	990-45106-13	BNC	75 Ω (unbalanced)	E1: 0.1 V to 3.5 V b-p	4
	990-45106-14	Siemens 1.6/5.6	75 Ω (unbalanced)	E1: 0.1 V to 3.5 V b-p	4
PSM-E ^{V5} PSM-EA ^{V5}	990-45106-11	Wire-wrap (Note 2)	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
Notes: 1. 990-40011-10 is for the ANSI-class MMP only. 2. Use this module for E1 or T1 signals only. 3. DCD rear panel switches SW4 and SW5 must be in the BRDG position. 4. Part numbers shown are for ordering purposes; part numbers on modules start with 089 instead of 990.					

Table E. 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	090-45021-10	Wire-wrap (Note 1)	100 Ω (balanced)	I/O for 2-way T1
ESCIU	Stand-alone	090-45021-11	SMB	75 Ω (unbalanced)	I/O for 2-way E1
		090-45021-12	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 E. 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 E. 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 (Do not mix redundant and 1:N in the same shelf) TO-EAN (Do not mix 1+1 and 1:N in the same shelf)	Stand-alone, 1:N	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	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, 1:N	990-45105-12	Wire-wrap and Siemens 1.6/5.6	E1: 120 Ω (balanced) or E1: 75 Ω (unbalanced)	5 Wire-wrap and 5 Siemens 1.6/5.6
			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 E. 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 (Do not mix 1+1 and 1:N in the same shelf)	1:N, 1+1, 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
TOCA	1:N, Stand-alone	990-45108-01	Wire-wrap (Note 1)	CC: 133 Ω (balanced)	10 (Do not use 11, 12, 13)
TOTA TOTL	1:N, 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)
TOLA	1:N, 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-M (Do not mix redundant and 1:N in the same shelf)	Stand-alone	990-45105-06	Wire-wrap (Note 1)	T1: 100 Ω (balanced)	10
	1:N, Stand-alone	990-45108-01	Wire-wrap (Note 1)	T1: 100 Ω (balanced)	10 (Do not use 11, 12, 13)
TOAA (except 090-40028-10)	1:N, 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

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

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
TOAA (090-40022-02)	1:N, 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
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.					

Table F. Timing Output Modules for ANSI-Class MMPs

FOR OUTPUT CARD	USE MODULE				
	PROTECTION TYPE	USE PART NUMBER:	CONNECTOR TYPE	IMPEDANCE	NO. OF OUTPUTS
TOAA (except 090-40028-10)	1:N, Stand-alone	990-40022-10	BNC	Analog: 75 Ω (unbalanced) (includes 0, 3.0, 3.5, 30.0, 60.0 dB pads)	2
TOAA (090-40022-02)	1:N, Stand-alone	990-40022-10	BNC	Analog: 50 Ω (unbalanced) (includes 0, 3.0, 3.5, 30.0, 60.0 dB pads)	2
TOCA	1:N, Stand-alone	990-40023-10	DB9	CC: 133 Ω (balanced)	5
		990-40011-10	Wire-wrap (Note 1)	CC: 133 Ω (balanced)	10
TOEA TOGA	1:N, Stand-alone	990-40022-11	BNC	E1 or Analog: 75 Ω (unbalanced)	10
TOLA	1:N, Stand-alone	990-40023-10	DB9	TTL: 100 Ω (balanced)	5
		990-40011-10	Wire-wrap (Note 1)	RS-422: 100 Ω (balanced) RS-423 (TTL): 450 Ω (unbalanced)	10
TOTA TOTA-5 TOTL TOTA-M	1:N, Stand-alone	990-40023-10	DB9	T1: 100 Ω (balanced)	5
		990-40011-10	Wire-wrap (Note 1)	T1: 100 Ω (balanced)	10
SCIU	Stand-alone	990-40021-10	Wire-wrap (Note 1)	T1: 100 Ω (balanced)	I/O for one SCIU card
ESCIU	Stand-alone	990-40021-10	Wire-wrap (Note 1)	E1: 120 Ω (balanced)	I/O for one ESCIU card

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.

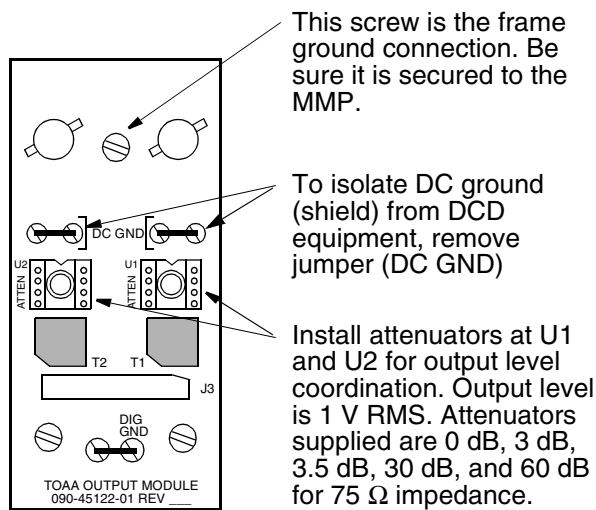


Figure 9. TOAA 2-port BNC Interface Module

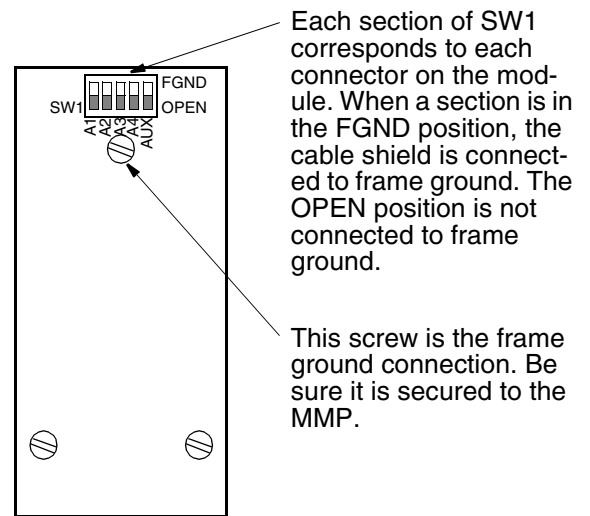


Figure 10. Reference and PSM Input Module Switches

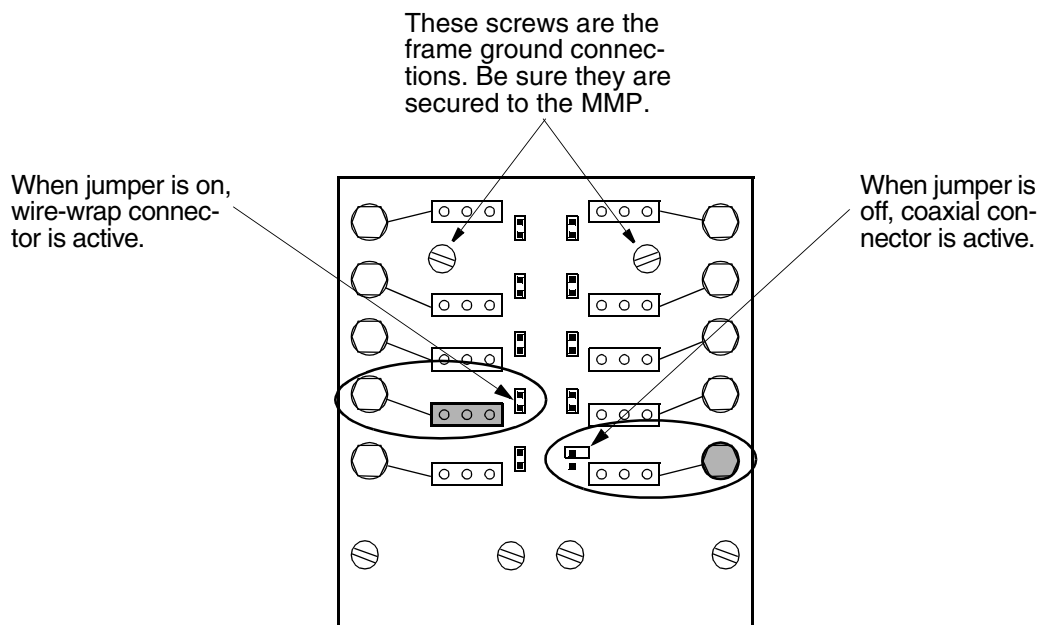
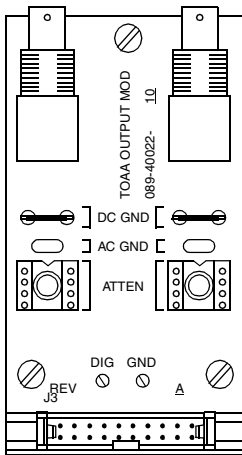
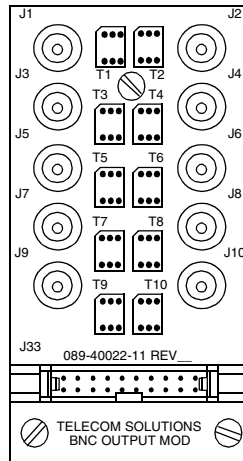


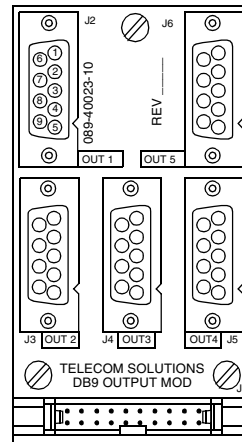
Figure 11. 990-45105-11 Module Jumpers



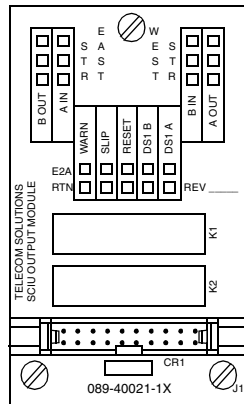
2-Port BNC Module
090-40022-10



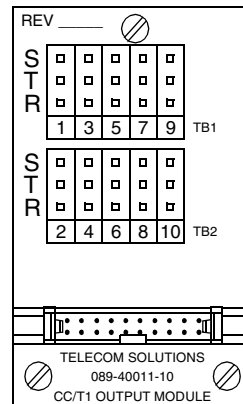
10-Port BNC Module
090-40022-11



DB9 Module
090-40023-10



SCIU Wire-wrap Module
090-40021-10



Wire-wrap Module
090-40011-10

Figure 12. Modules for the ANSI-Class MMP

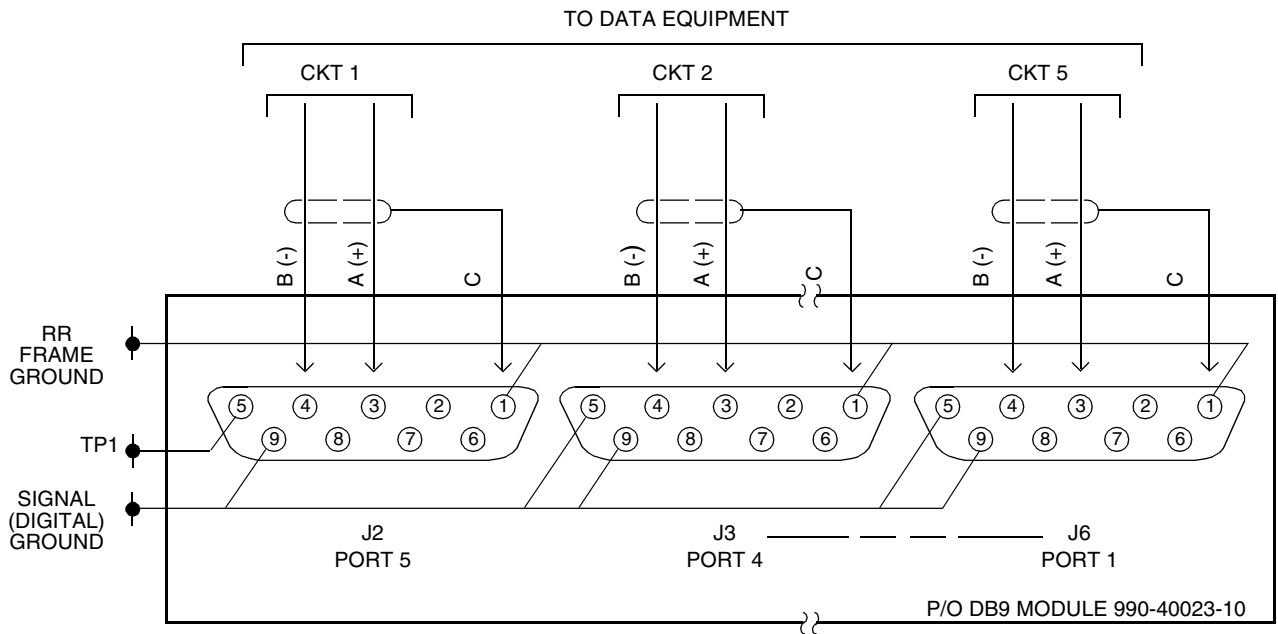


Figure 13. DB9 Module (RS-422) (For TOLA Card)

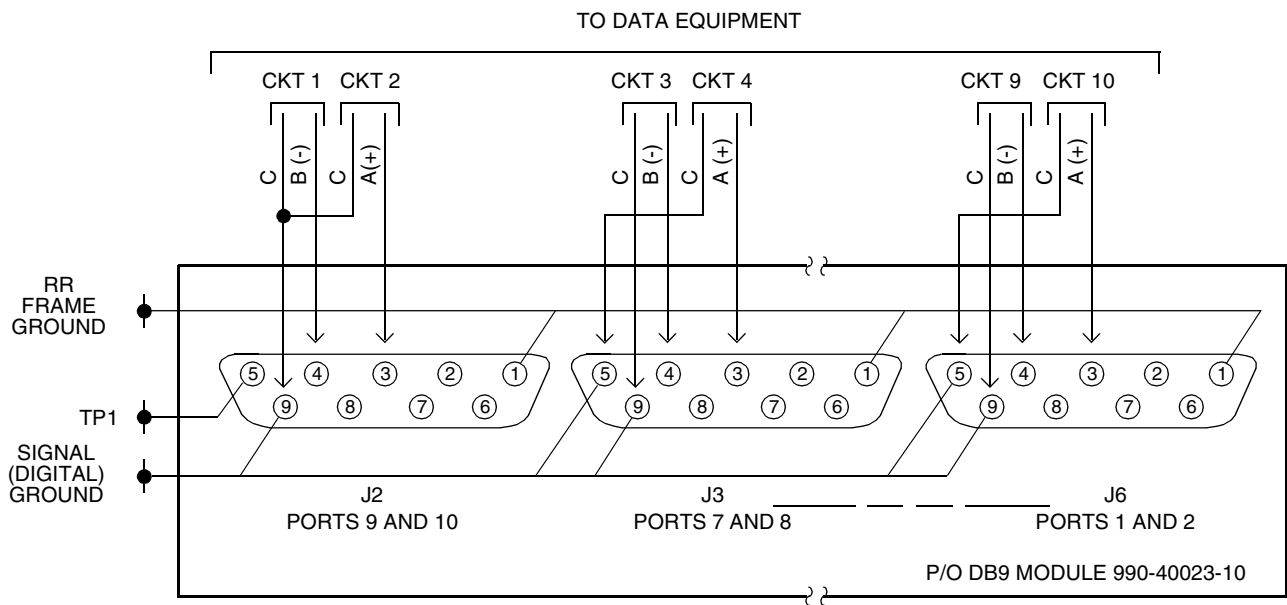


Figure 14. DB9 Module (RS-423) (For TOLA Card)

Table G. 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 H. 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 I. 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 J. 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 K. 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.

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 15 illustrates the DCD-519 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.

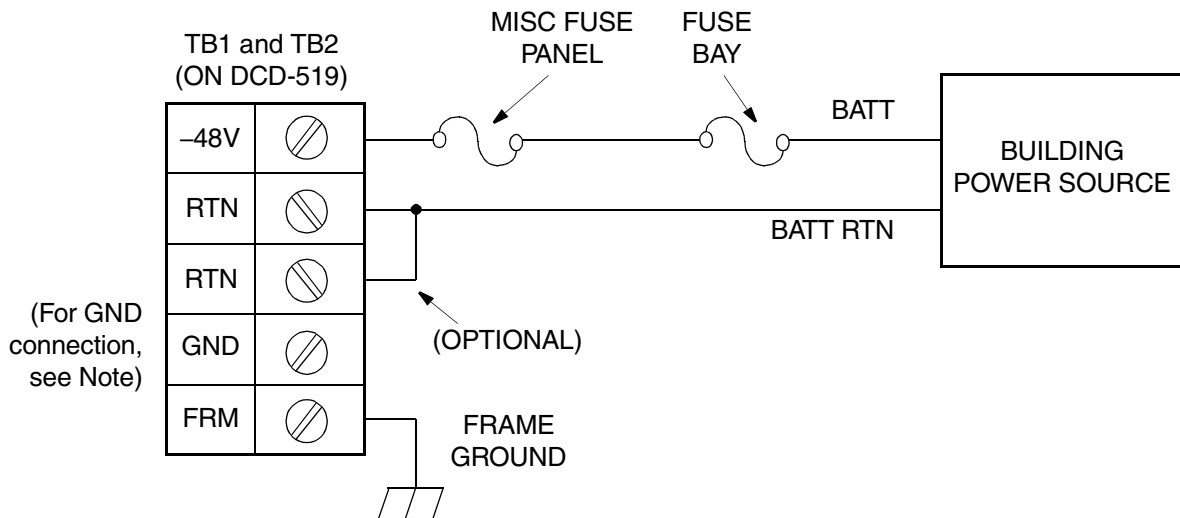
Note: Ensure the ground source is low noise.

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.



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 15. Ground and Power Connections

7. Repeat Steps 1 to 6 for remote systems if applicable.

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 50.8 mils, 1.29 mm (16 AWG) 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 through 4 for each shelf and interface panel in the system that uses a rack as a frame ground.
6. Repeat Steps 1 through 5 for remote systems if applicable.

H. Power Connections (Battery and Return Leads)

2.20 Connect power to TB1 and TB2 (Figure 7 and Figure 15) of the shelf rear panel. The DCD-519 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 runs are as diverse as possible. Do not install any type of redundant lead lying parallel and adjacent in the same cable rack. Leads A and B must be run down separate sides of each shelf. If the site only has one power source, run 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 Volt Connections

2.21 Use the stranded wire to connect office battery supply leads from the power source to the terminals on the DCD-519 rear panel (Figure 7 and Figure 15). The –48 V dc A and –48 V dc B input voltage supplies can be either 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.

Note: Be sure the –48 V dc source is electrically 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 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 as specified in the local company Installation Job Specifications.

Note: If power sources are direct from the BDFB, then a separate, detailed Method of Procedure (MOP) to cut leads into the BDFB should be developed and cut during non-busy hours.

9. Reinstall battery source fuses in the rack fuse bay.
10. Using a multimeter, verify that the input voltage level is between -42 V dc 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 user may select whether to connect the battery return wiring 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 rear panel.

3. PRE-TEST CONNECTIONS

A. Shelf to Interface Panel Connections

3.01 Make connections between interface panel connectors (or interface module connectors if ANSI-class MMP) and either PROTECTED or UNPROTECTED shelf connectors (Figure 7 and Figure 8) as specified in the local company Installation Job Specifications

3.02 The local company Installation Job Specifications should specify the type of reference input cards to use, as well as which timing output slots (TO_n, where n is 1 through 6 for the master shelf, and 1 through 10 for the expansion shelf) are to be configured as protected or unprotected. Typically, protected output connections are used for TO cards with 1:N protection. Unprotected outputs are for TO cards with redundant protection, ESCIU or SCIU cards, and unprotected TO cards.

Note: TO6/HS1 on the master shelf can function as an output slot or as an HS slot. HS2 can only function as an HS slot.

3.03 Each interface module provides a different type of connector for the DCD-519 Shelf input or output signals. 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 Refer to Table L, Figure 16, and the following procedure for instructions on shelf to wire-wrap panel connections.

Table L. Master Shelf to Wire-wrap Panel Connections

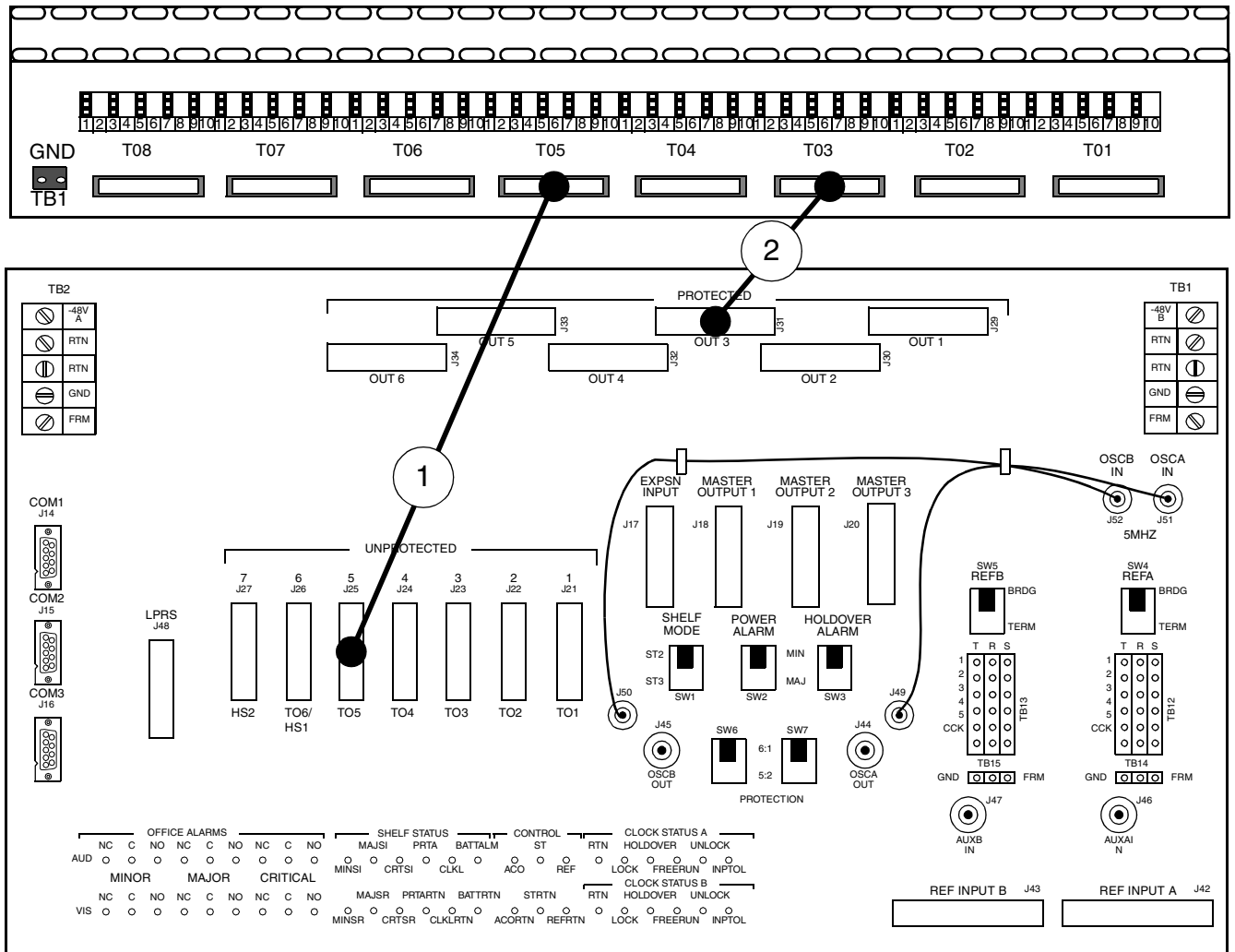
CARD SLOT	SHELF CONNECTOR	INTERFACE PANEL
PROTECTED OUTPUT		
TO1	J29	TO1
TO2	J30	TO2
TO3	J31	TO3
TO4	J32	TO4
TO5	J33	TO5
TO6/HS1	J34	TO6
UNPROTECTED OUTPUT		
TO1	J21	TO1
TO2	J22	TO2
TO3	J23	TO3
TO4	J24	TO4
TO5	J25	TO5
TO6/HS1	J26	TO6
HS2	J27	TO7

1. On the master shelf, determine whether TO6/HS1 is to be configured as an output slot or an HS slot. (This should be determined in the local company Installation Job Specifications.). Then, perform one of the following:
 - a. To configure the TO6/HS1 slot to act as a protected output slot, set switches SW6 and SW7 on the shelf rear panel to 6:1.
 - b. To configure the TO6/HS1 slot to act as a HS slot, set switches SW6 and SW7 on the shelf rear panel to 5:2.
2. Connect the 20-pin locking timing output connectors (PROTECTED outputs J29 - J34; UNPROTECTED outputs J21 - J27) on the shelf rear panel to the corresponding connectors on the wire-wrap panel (TO1 through TO7, respectively). Refer to Table L and Figure 16 for connections.

Note: For protected output slots, 16.5 centimeter (6.5 inch) ribbon cables (p/n 060-40001-01) are supplied with the wire-wrap panel. For unprotected output slots, 102 centimeter (40 inch) ribbon cables (p/n 060-40001-11) must be ordered from Symmetricom; order one cable for each unprotected output slot.
3. Dress the cable per local company practice.
4. Use a 1.29 mm (16 AWG) green insulated wire to connect TB1 (GND) on the rear of the interface

panel to the rack frame ground. To do this, perform one of the following:

- Note:** Use a 25 W soldering iron to ensure the #6 rod is heated sufficiently to prevent a cold solder connection.
- a. Solder the ground wire to one of the #6 frame ground rods on the side of the rack, if provided. Two methods are acceptable for soldering the 1.29 mm (16 AWG) wire to the #6 rod:
 - Crimp an appropriate-size spade lug to the 1.29 mm (16 AWG) wire, bend the lug around the #6 rod and solder.
 - Strip enough insulation from the 1.29 mm (16 AWG) wire to permit three complete turns around the #6 rod and solder.
 - b. If #6 ground rods are not provided on the rack, crimp an appropriate-size spade lug to the 1.29 mm (16 AWG) wire and screw the lug to a screw hole on the rack. Remove the paint and sand the area around the screw hole to ensure proper conductivity.
 - c. Strip 4.7625 mm (0.1875 inch) of insulation from the other end of the 1.29 mm (16 AWG) wire, and insert in one of the holes above the two set screws on TB1. Tighten the set screw with a small flat-bladed screwdriver.



- ① Outputs of slot TO5 connected for unprotected operation, also SCIU or ESCIU connection, and PSM card connection
- ② Outputs of slot TO3 connected for 1:N protection

Note: The connections indicate the end points of the wiring only – cable routing is not shown.

Figure 16. Master Shelf to Wire-wrap Interface Panel Connections

- Repeat Steps 2 through 4 for each expansion shelf in the system, with the following change:

Connect the 20-pin locking timing output connectors (PROTECTED outputs J40 through J47; UNPROTECTED outputs J26 through J33, and J37 and J38) on the shelf rear panel to the corresponding connectors on the wire-wrap panel. Refer to Table M and Figure 17 for connections.

Note: J34, J35, J36, and J67 (MON1 through MON4) are not recommended for use as unprotected outputs; these slots are designated for future use.

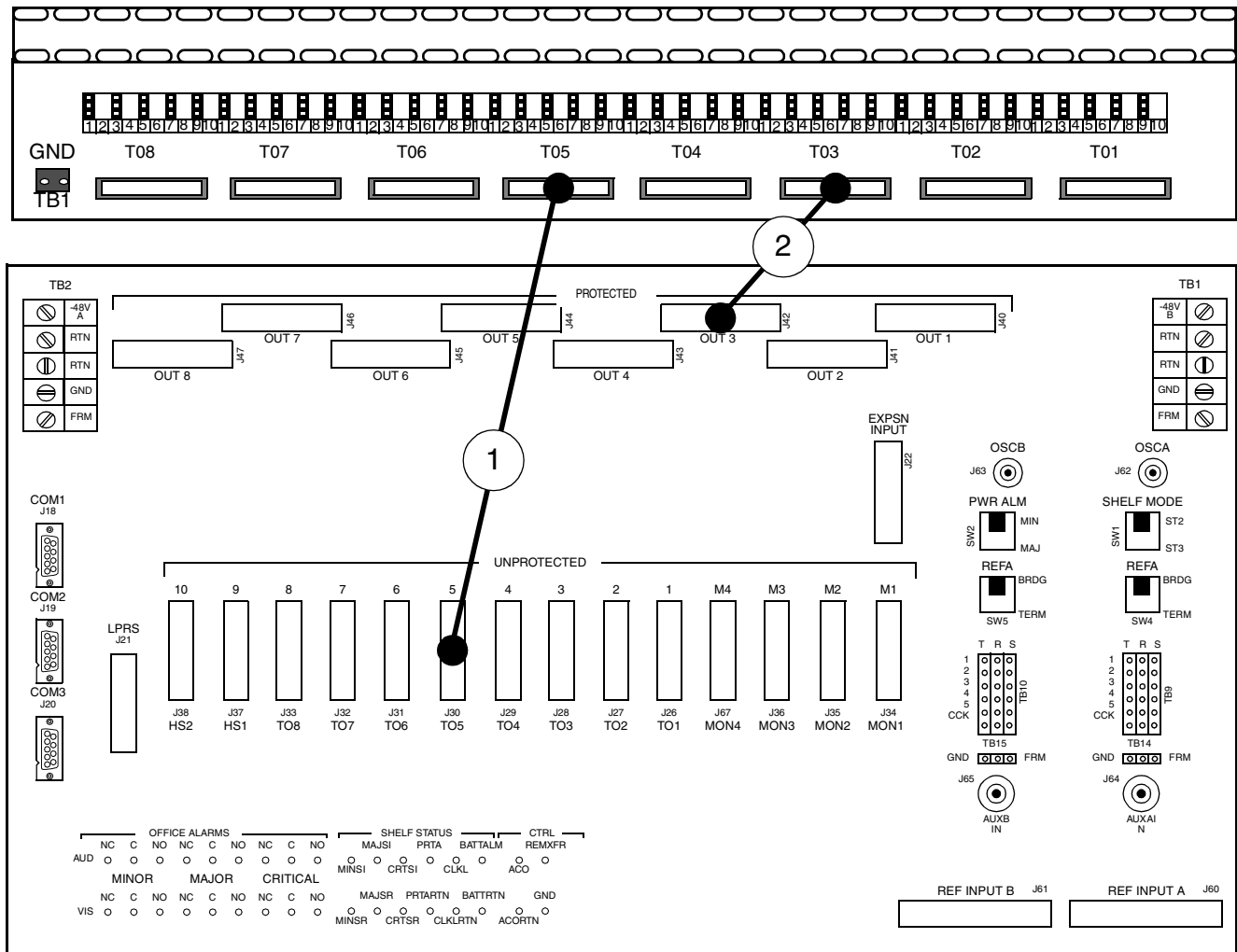
Note: If a shelf assembly is equipped with two wire-wrap panels, the bottom panel connectors (TO1 through TO8) are for slots TO1 through TO8, respectively. The top panel connectors (TO1 and TO2) are used for the HS1 and HS2 slots, respectively.

Note: The two-panel arrangement is only required when all slots are used in the unprotected mode.

- Repeat Steps 1 through 5 on the remote system.

Table M. Expansion Shelf to Wire-wrap Panel Connections

CARD SLOT	SHELF CONNECTOR	INTERFACE PANEL	
		BOTTOM	TOP
PROTECTED OUTPUT			
TO1	J40	TO1	—
TO2	J41	TO2	—
TO3	J42	TO3	—
TO4	J43	TO4	—
TO5	J44	TO5	—
TO6	J45	TO6	—
TO7	J46	TO7	—
TO8	J47	TO8	—
UNPROTECTED OUTPUT			
TO1	J26	TO1	—
TO2	J27	TO2	—
TO3	J38	TO3	—
TO4	J29	TO4	—
TO5	J30	TO5	—
TO6	J31	TO6	—
TO7	J32	TO7	—
TO8	J33	TO8	—
HS1	J37	—	TO1
HS2	J38	—	TO2
MON1	MON1 through MON4 are not recommended for use as unprotected output slots; these are designated for future use.		
MON2			
MON3			
MON4			



- ① Outputs of slot TO5 connected for unprotected operation, also SCIU or ESCIU connection, and PSM card connection
- ② Outputs of slot TO3 connected for 1:N protection

Note: The connections indicate the end points of the wiring only – cable routing is not shown.

Figure 17. Expansion Shelf to Wire-wrap Interface Panel Connections

Modular Mounting Panel

3.05 To connect the shelf to the modular mounting panel (MMP), perform the following:

Note: 16.5 centimeter (6.5 inch) (p/n 060-40001-01) and 102 centimeter (40 inch) ribbon cables (p/n 060-40001-16) are shipped with each MMP.

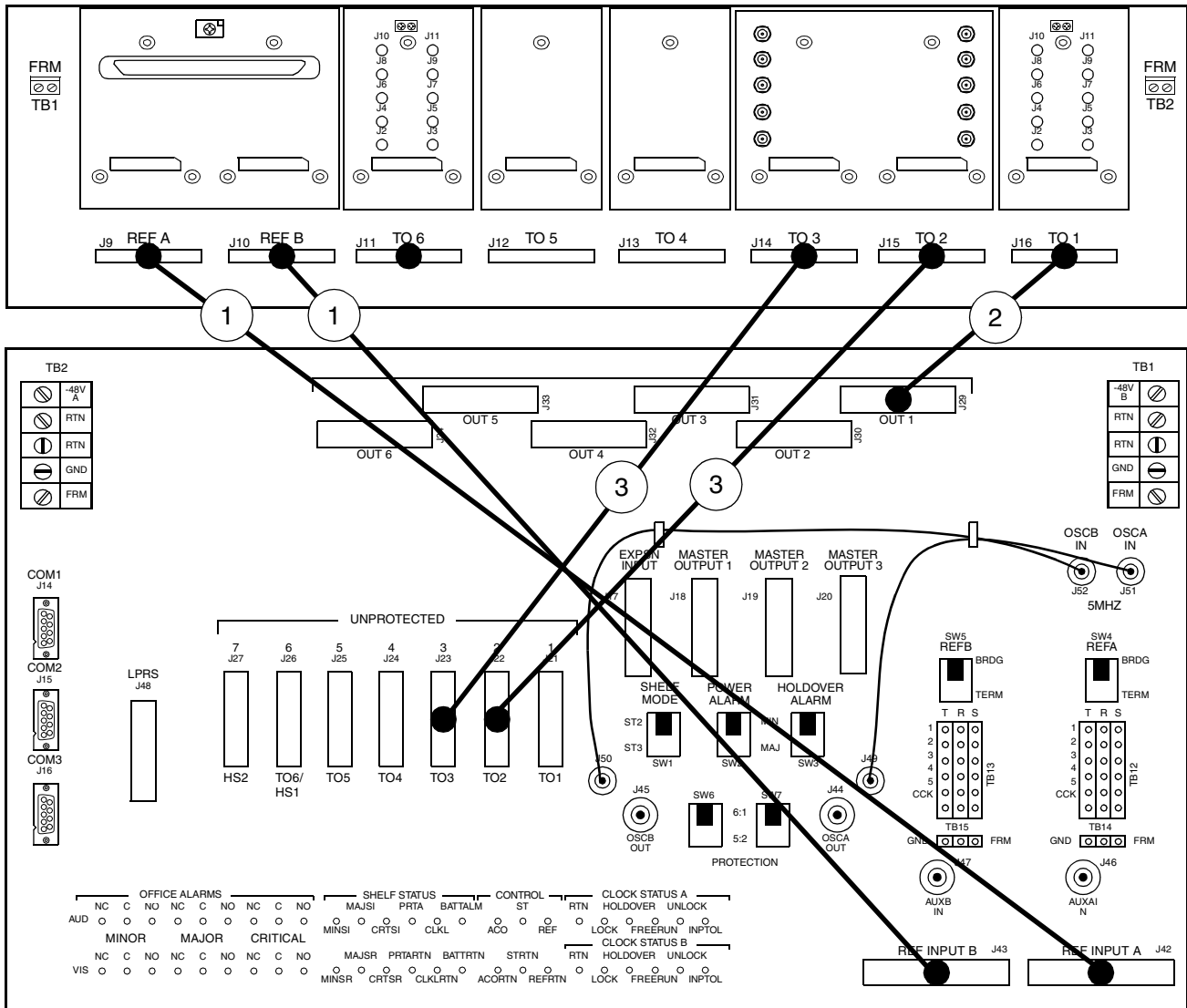
1. On the master shelf, determine whether TO6/HS1 is to be configured as an output slot or an HS slot. (This should be determined in the local company Installation Job Specifications.) Then, perform one of the following:
 - a. To configure the TO6/HS1 slot to act as a protected output slot, set switches SW6 and SW7 on the master shelf rear panel to 6:1 (see Figure 7).
 - b. To configure the TO6/HS1 slot to act as an HS slot, set switches SW6 and SW7 on the master shelf rear panel to 5:2 (see Figure 7).
2. Connect the 20-pin locking slot connectors labeled PROTECTED or UNPROTECTED (refer to Figure 18 and Table N for the master shelf, and Table O and Figure 19 for the expansion shelf) on the rear panel of the shelf to the corresponding connectors on the MMP. Figure 18

shows the connections for unprotected cards, cards in a 1:1 and 1+1 protection mode, and the cabling options for dual-redundant TOGA cards.

3. If modules are used for reference inputs, connect the REF INPUT A and REF INPUT B 20-pin locking connectors on the rear panel of the shelf to the corresponding connectors on the MMP.
4. Dress the cables per local company practice.
5. Repeat Steps 1 and 2 for each expansion shelf in the system (refer to Figure 18).

Note: If a shelf assembly is equipped with two modular mounting panels, the bottom panel module mounting positions are for slots TO1 through TO10, respectively. The two positions on the right side of the top panel are used for signals from the unprotected cards in the HS1 and HS2 slots, respectively; the other positions are not used. The two-panel arrangement is only required when all TO slots are filled in a shelf that does not use 1:N protection.

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



- ① Reference input connections
- ② Output of slot 1 connected for 1:N protection
- ③ Outputs of slots 2 and 3 connected for redundant protection

Notes:

1. The connections indicate the end points of the wiring only – cable routing is not shown.
2. **1:N protection cannot be used in the same shelf at the same time as 1:1 or 1+1 protection; these connections are shown for illustration only.**
3. When 1+1 or 1:1 protection is used, the cards must be installed in adjacent slots and the odd-numbered slot must be the highest number; i.e., use TO2 and TO3 slots.

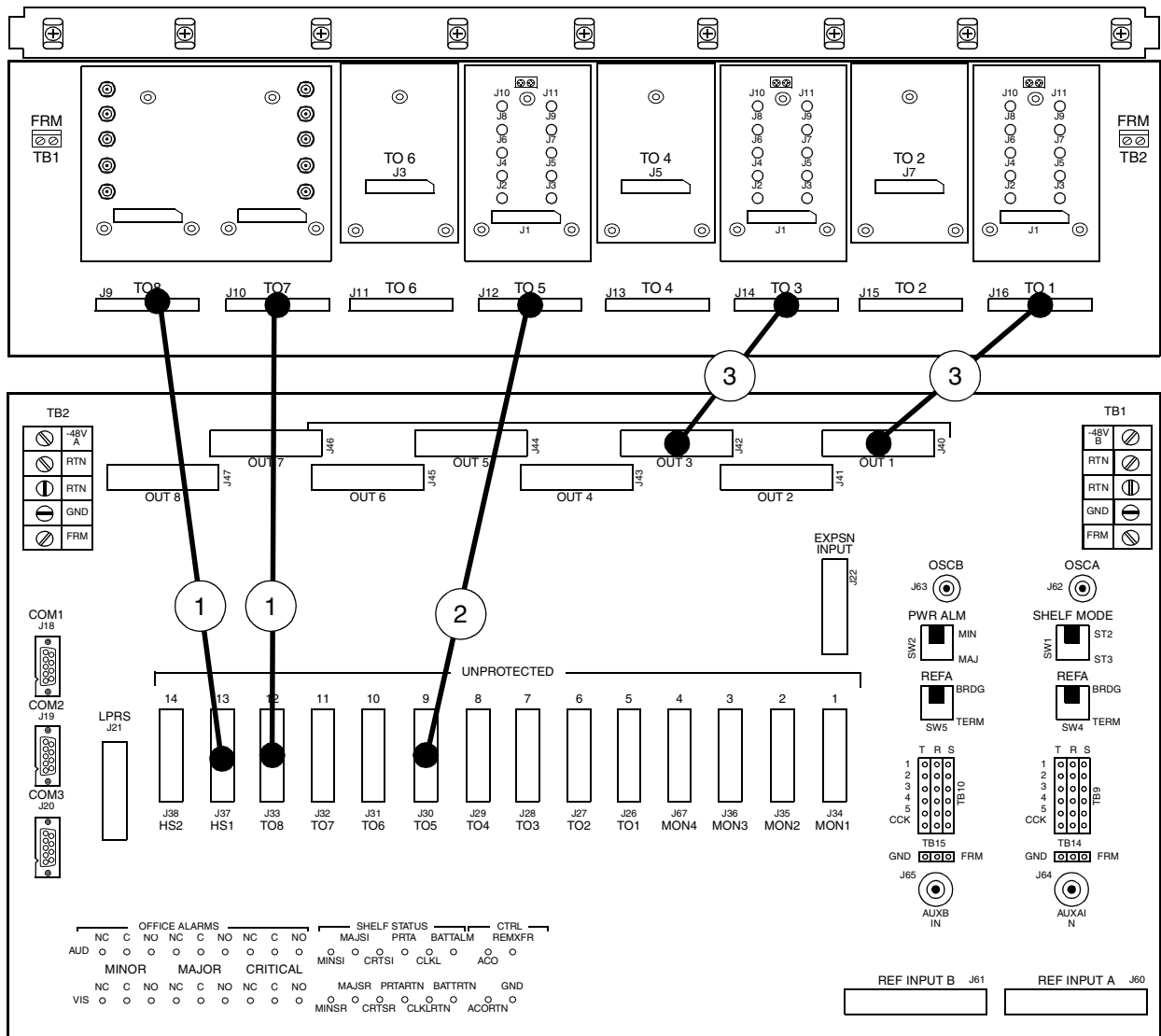
Figure 18. (Example of) Master Shelf to Master Interface Panel Connections

Table N. Master Shelf to Master Interface Panel Connections

CARD SLOT	SHELF	INTERFACE PANEL
PROTECTED OUTPUT		
TO1	J29	TO1
TO2	J30	TO2
TO3	J31	TO3
TO4	J32	TO4
TO5	J33	TO5
TO6/HS1	J34	TO6
UNPROTECTED OUTPUT		
TO1	J21	TO1
TO2	J22	TO2
TO3	J23	TO3
TO4	J24	TO4
TO5	J25	TO5
TO6/HS1	J26	TO6
HS2 (Note)	J27	TO1 (on Interface Panel #2)
<p>Note: It is recommended that HS2 be used as an HS slot only, and not as an output slot. If used as an output slot, a second interface panel must be installed and the output will be unprotected.</p>		

Table O. Expansion Shelf to Expansion Interface Panel Connections

CARD SLOT	SHELF CONNECTOR	INTERFACE PANEL
PROTECTED OUTPUT		
TO1	J40	TO1
TO2	J41	TO2
TO3	J42	TO3
TO4	J43	TO4
TO5	J44	TO5
TO6	J45	TO6
TO7	J46	TO7
TO8	J47	TO8
UNPROTECTED OUTPUT		
TO1	J26	TO1
TO2	J27	TO2
TO3	J28	TO3
TO4	J29	TO4
TO5	J30	TO5
TO6	J31	TO6
TO7	J32	TO7
TO8	J33	TO8
HS1 (Note 1)	J37	TO1 (Interface Panel #2)
HS2 (Note 1)	J38	TO2 (Interface Panel #2)
<p>Notes:</p> <ol style="list-style-type: none"> 1. It is recommended that HS1 and HS2 be used as HS slots only and not as output slots. If used as output slots, a second interface panel must be installed and all outputs will be unprotected. 2. MON1 through MON4 slots are designated for future use. 		



- ① Outputs of slot TO7 and TO8 connected for redundant protection
- ② Outputs of slot TO5 connected for no protection
- ③ Outputs of slots TO1 and TO3 connected for 1:N protection

Notes:

1. The connections indicate the end points of the wiring only – cable routing is not shown.
2. 1:N protection and redundant protection cannot be used in the same shelf at the same time; these connections are shown for illustration only.

Figure 19. (Example of) Expansion Shelf to Expansion Interface Panel Connections

B. Master to Expansion Shelf Interconnections

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

3.06 To connect the master and expansion shelves, refer to Figures 7, 8, 20, 21, 22, Table P, 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 practice for running ribbon cables between racks.
2. To connect a DCD-519 master shelf to a DCD-519 expansion shelf, use the provided 1.8 meter (60 inch) master/expansion shelf ribbon cable labeled 060-40004-12. Connect the master shelf to each expansion shelf according to the instructions in Figure 20.
3. To connect a DCD-519 master shelf to a DCD-400, DCD-ST2, or DCD-CIM expansion shelf,

use the provided 1.8 meter (60 inch) master/expansion shelf ribbon cable labeled 060-40004-14. Connect the master shelf to each expansion shelf according to the instructions in Figure 21.

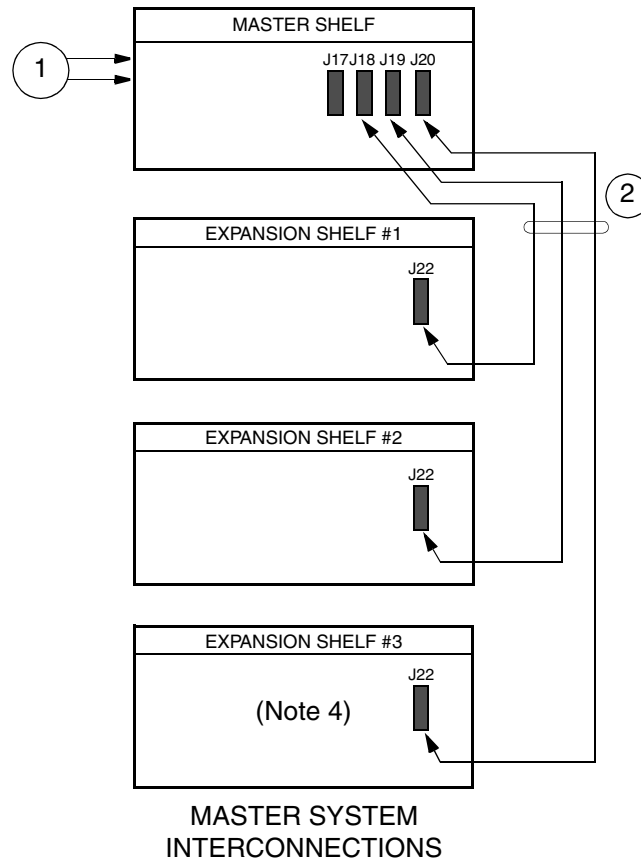
4. To connect a DCD-400, DCD-ST2, or DCD-CIM master shelf to a DCD-519 expansion shelf, use the provided 1.8 meter (60 inch) master/expansion shelf ribbon cable labeled 060-40004-14. Connect the master shelf to each expansion shelf according to the instructions in Figure 22.

Note: Cable routings shown in and are for reference only, and are not to be considered as recommended cable placement. Cable runs should be as short and straight as possible.

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

Table P. 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

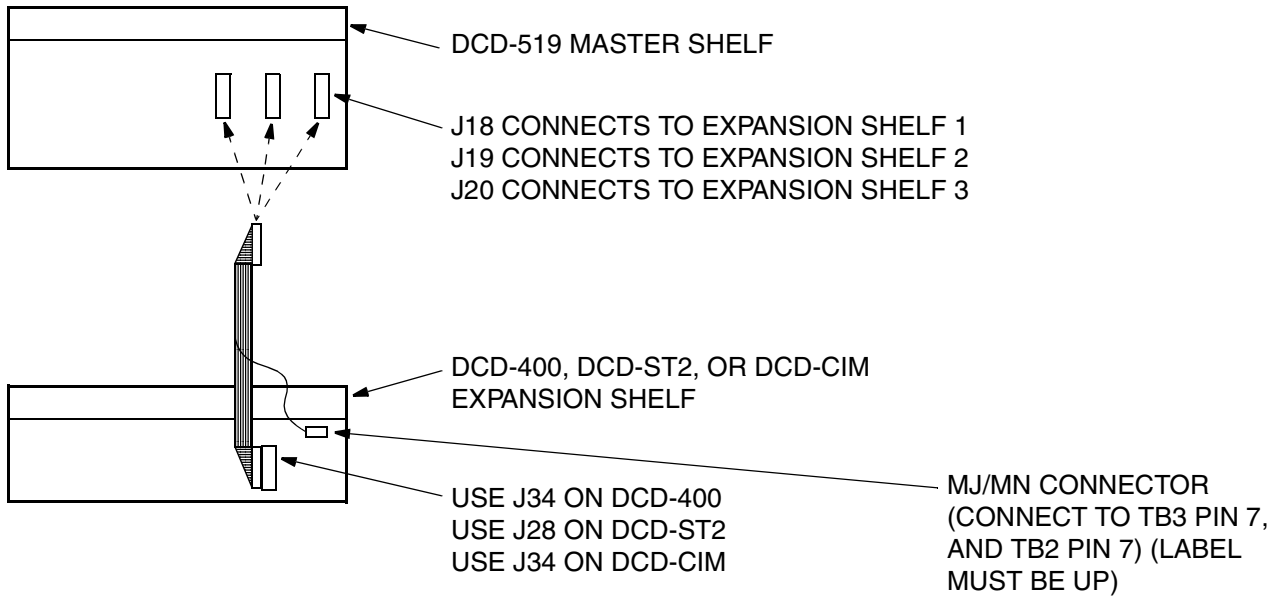


- ① Upstream reference
- ② Expansion ribbon cables (Note 3)

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 20. System and Shelf Connections



Note: Connect the expansion shelf alarm ground pins together (TB3 pin 8 to TB2 pin 8 to TB2 pin 14). Use 0.643 mm (22 AWG) or 0.511 mm (24 AWG) green insulated wire.

Figure 21. Cabling a DCD-519 Master Shelf to a DCD-400, DCD-ST2, or DCD-CIM Expansion Shelf

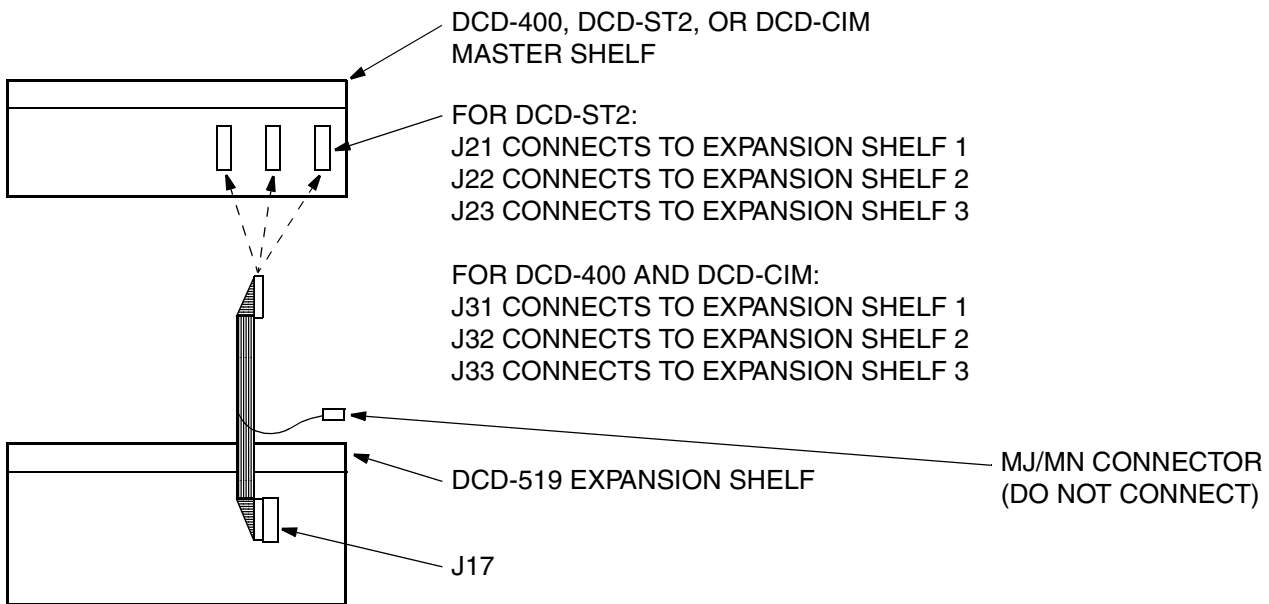


Figure 22. Cabling a DCD-400, DCD-ST2, or DCD-CIM Master Shelf to a DCD-519 Expansion Shelf

C. Master System to Remote System Connections

3.07 The DCD-519 master and expansion shelf outputs can drive inputs to remote shelf systems within the building. A remote shelf system can consist of a remote master shelf and up to three remote expansion shelves.

3.08 Cable distance between phase-aligned systems can be up to 455 meters (1500 feet) in length, allowing the remote system to be in a different part of the building.

Note: The maximum distance may be increased to approximately 910 meters (3000 feet) by special cable compensation option settings on the TOCA cards (see TOCA option settings in the Test and Acceptance section of this manual).

3.09 Refer to Figure 23 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).

Requirements for Phase-aligned Systems

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

Requirements for G.703 Systems

3.11 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, TOEA, TO-EA5, TO-EA, or TO-EAN card in one shelf, and another output from another TOGA,

TOEA, TO-EA5, TO-EA, or TO-EAN card in a different shelf.

- Remote system: master shelf requires a CI-EA clock input card for TOEA, TO-EA, or TO-EAN inputs from the master system, or an ACI clock input card for TOGA inputs. One or two LNC or 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.

Connecting the Systems

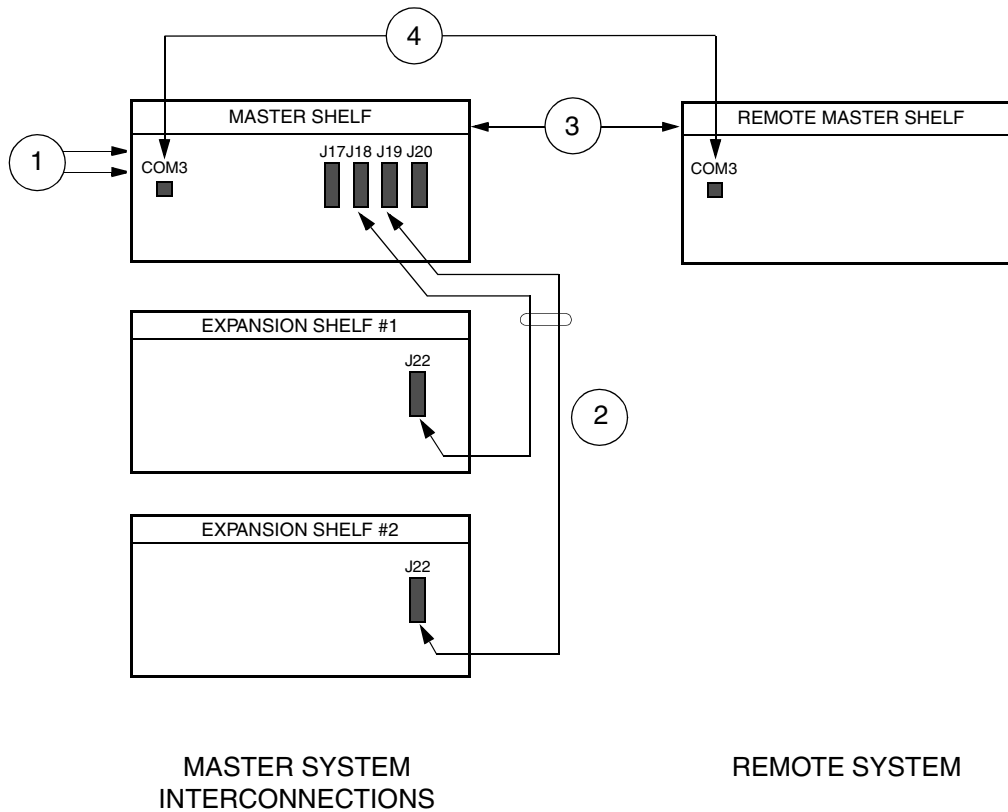
3.12 Refer to Figures 7, 8, and 23 to connect the master system to the remote system as follows:

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. Set up and mount a DCD-519 System in the same manner as a master system (Parts 2A through 3A) at a remote site in the building.
2. 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 23).

Or, connect from two TOGA or TOEA outputs on the master system to CCK inputs 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.

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 digital distribution frame [DDF]), 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.



- 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 23. Remote System and Shelf Connections

Note: It is recommended that outputs from two different TOCA, TOGA, or TOEA cards in the master system be used for diversity.

D. Bridging Isolator Installation

3.13 The bridging isolator (Figure 24) is inserted in a cable to bridge a reference input signal or traffic-carrying E1/CEPT to the DCD Shelf. A connection from the bridging isolator may be used as a reference input for a clock input card, or as an input for a PSM card.

3.14 Figure 24A shows a block diagram of the bridging isolator. The bridging isolator provides one or three 75 Ω high-impedance bridged connections

which have 20.8 dB isolation from the through signal. The signal grounds are carried through the bridging isolator for both the through signal and the bridged signal. This prevents the bridging cable or equipment from loading or distorting the signal.

3.15 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 24B. The bridging isolator may be connected to the rack, 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 Shelf input must be <100 meters (<328 feet).

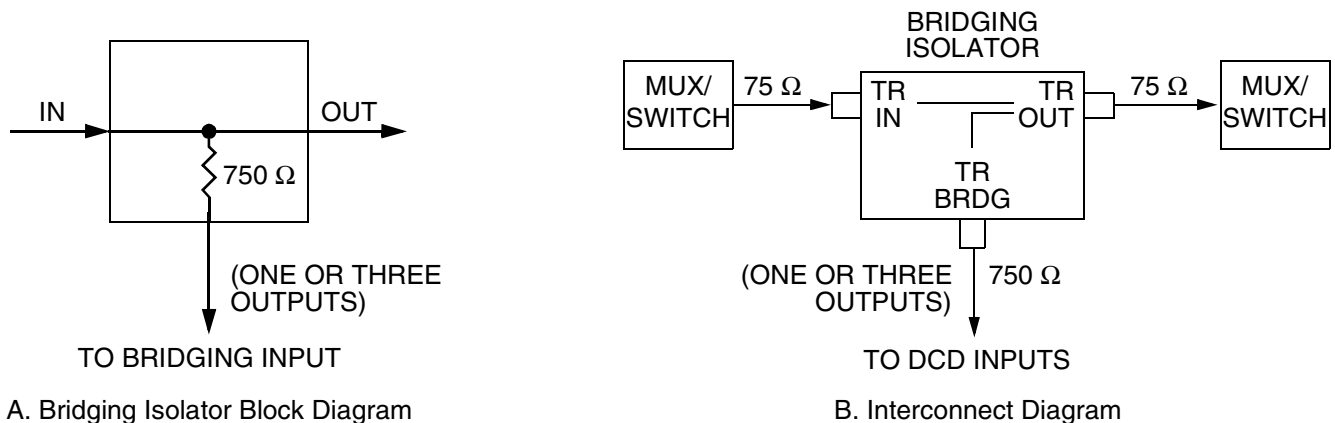


Figure 24. Bridging Isolator

E. Reference Input Connections

Installation Considerations

3.16 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. The following information is provided to assist in developing a plan:

- Do not run 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 Shelf, connect the cable shield first. Use CCK only for composite clock input applications.
- Ensure that reference input cables are run 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.
- Keep all reference input cables unbroken. Do not use tie cables or otherwise break the shield between the DCD-519 System and the device delivering the clock input. If broken, the shield leads must be bonded.
- Reference input connections to the DCD Shelf are made at the terminal sets of TB12 and TB13, J46 (AUX A IN) and J47 (AUX B IN) (see Table S), or at an interface module. There are six sets of T, R, and S wire-wrap terminals on TB12 and TB13; the terminal sets are labeled 1 through 5 and CCK.
- When mixing rubidium clocks with quartz clocks in the same shelf, the shelf mode switch (SW1) must be in the ST2 position, and the rubidium clock card switch SW1, section 2, must be in the ON position.
- When a shelf is to contain both a TNC-E clock and an ST3E clock, see Table Q for information.

Table Q. 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 R for information.

Table R. 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 Signal Cable Shield Grounding Considerations

3.17 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.

3.18 The following items pertain to grounding the reference input signal cable shields:

Note: It is preferable to ground the shield at the timing source end only, but certain vendor applications may require grounding at the receive end. However, under no circumstances should the shield be connected to frame ground at both ends unless one end is capacitor coupled to ground.

3.19 The SW1 switch on input and PSM modules is used to determine whether or not to tie the shield to frame ground. Tying the shield to ground is ordinarily not required, but may be used in noisy environ-

ments to reduce noise. Set the switch for each input as follows:

1. Set the switch to FGND to tie the cable shield to frame ground.
2. Set the switch to OPEN to leave the cable shield open (floating).

3.20 As shown in Figure 1, the interface panel is located above each master and each expansion shelf. The interface panel provides connection to the backplane via reference input modules.

Rear Panel Reference Input Connections

3.21 Use these instructions to connect reference inputs to the REF A and REF B section of the rear panel (Figure 25). Input references for the MRC-T and DCIM-T cards must be connected at the REF A and REF B connectors. The next section provides instructions for connecting reference inputs to interface modules.

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. Improper connection may result in improper operation.

Caution: Do not connect a signal to the Row 4 connectors and the AUX connector simultaneously. The connectors are connected inside the DCD Shelf. Improper operation may result.

3.22 Connect wire-wrap input signals to the connectors on the rear panel according to Table S.

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.

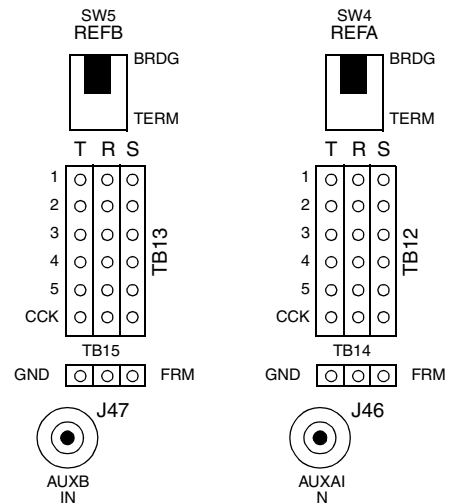


Figure 25. Rear Panel Reference Input Connectors

Table S. 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:

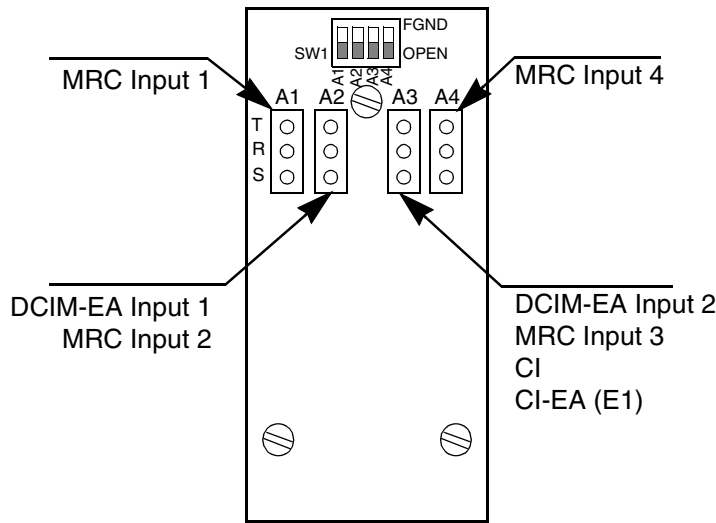
1. Connectors listed in the same row in this table are connected to the same port (Row 2 and A1, Row 3 and A2, etc.). Do not connect an input to the rear panel and a module simultaneously.
2. Row 1 carries signals for an MRE card (obsolete).
3. SW4 affects only rear-panel connector 4 and module connector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

Reference Input Connections at an Input Module

3.23 Connect reference input signals to interface modules according to Figure 26 or Figure 27.

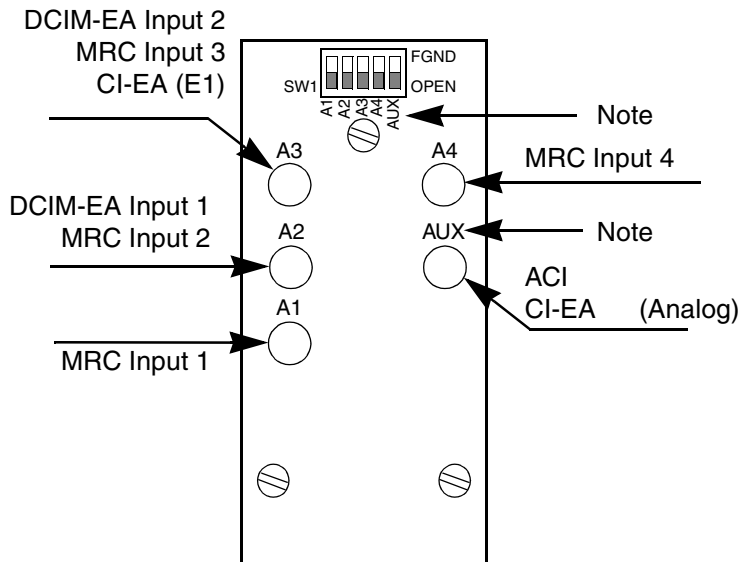
3.24 Connect only one input to a module for an ACI, CI-EA, or CI card as shown.

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).



Use With
 CI
 CI-EA
 MRC-EA
 DCIM-EA

Figure 26. 990-45107-06 Module



Module Part Numbers:
 990-45107-02 (SMB)
 990-45107-03 (Siemens 1.6/5.6)
 990-45107-04 (Siemens 1.0/2.3)

Use With
 ACI
 CI-EA
 MRC-EA
 DCIM-EA

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

Figure 27. Coaxial Clock Input Module

F. 5 MHz Stratum Connections

3.25 Two SMB connectors on the master shelf backplane (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.)

3.26 Two BNC connectors, J44 (OSC A OUT) and J45 (OSC B OUT) (Figure 28), 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 Shelf and the DCD-LPR Shelf.

G. Communications Port Connections

3.27 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 backplane, or the RJ45 LOCAL COMM connector on the faceplate of the MIS card.

Note: COM2 is recommended for connection to a centralized surveillance and control center.

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.

3.28 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 an MIS card is provided.

3.29 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 T and Figure 29 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.

3.30 Use a DCE-to-DCE cable (Black Box Corporation p/n B1BA22722) or equivalent cable to connect from the COM connector on the backplane to the communications device (refer to Table U and Figure 30). The DCE-to-DCE cable is a 1.8 meter (6 foot) cable with male DB9 and DB25 connectors.

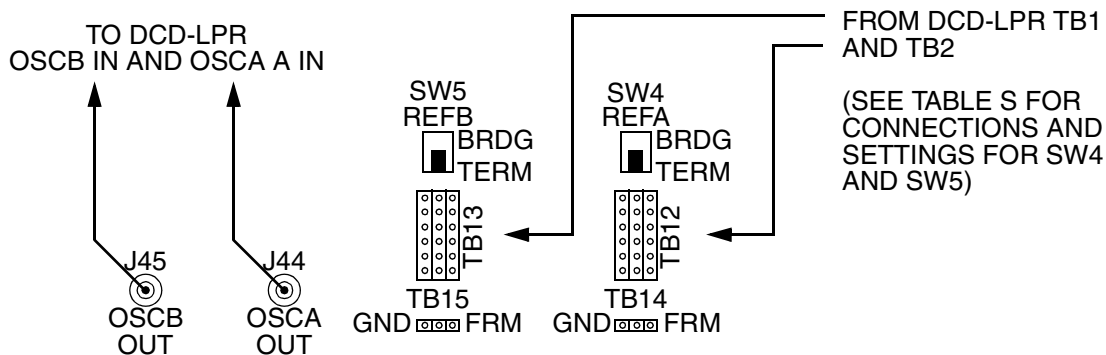


Figure 28. DCD-LPR Connections to DCD-519 Rear Shelf

Table T. RJ45 Modular Jack Pin Assignments (MIS Card)

PIN	DIRECTION (FROM MIS)	FUNCTION
1	N/A	NC (No Connection)
2	Out	Tx (Transmit Data)
3	In	Rx (Receive Data)
4	In	DSR (Data Set Ready)
5	In/Out	GND (Ground)
6	Out	DTR (Data Terminal Ready)
7	In	CTS (Clear To Send)
8	Out	RTS (Request To Send)

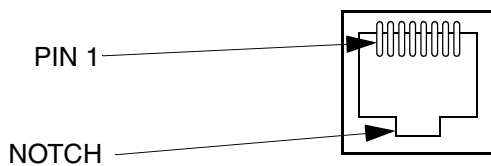
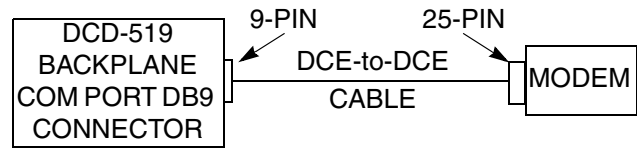


Figure 29. RJ45 Modular Jack

Table U. DB9 COMM Connector Pin Assignments

PIN	DIRECTION (FROM MIS)	FUNCTION
1	N/A	NC (No Connection)
2	In	Rx (Receive Data)
3	Out	Tx (Transmit Data)
4	Out	DTR (Data Terminal Ready)
5	In/Out	GND (Ground)
6	In	DSR (Data Set Ready)
7	Out	RTS (Request To Send)
8	In	CTS (Clear To Send)
9	N/A	NC (No Connection)



Note: Use a DCE-to-DCE cable with DB9 and DB25 male connectors between the backplane and the 25-pin connector on a modem.

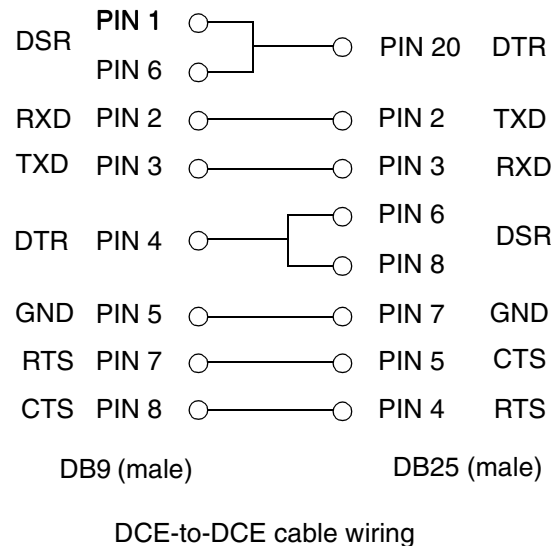


Figure 30. Data Communications Connection

4. TEST AND ACCEPTANCE

4.01 Refer to the Test and Acceptance section of this manual for instructions on installing and testing the DCD-519 cards, as well as instructions for performing a test and acceptance of the system.

4.02 After the test and acceptance has been completed (as instructed), proceed to the next section.

Caution: Ensure that the procedures in the Test and Acceptance section of this manual have been completed before making the connections in the remainder of this section. Failure to observe this caution may result in a service interruption if the alarm or timing outputs have to be removed to complete the testing.

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 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 per the following sections.

Office Alarm Connections

5.04 The OFFICE ALARMS terminals on every shelf's backplane provide relay contact closures for connection to the CO audible/visual alarm system. 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 con-

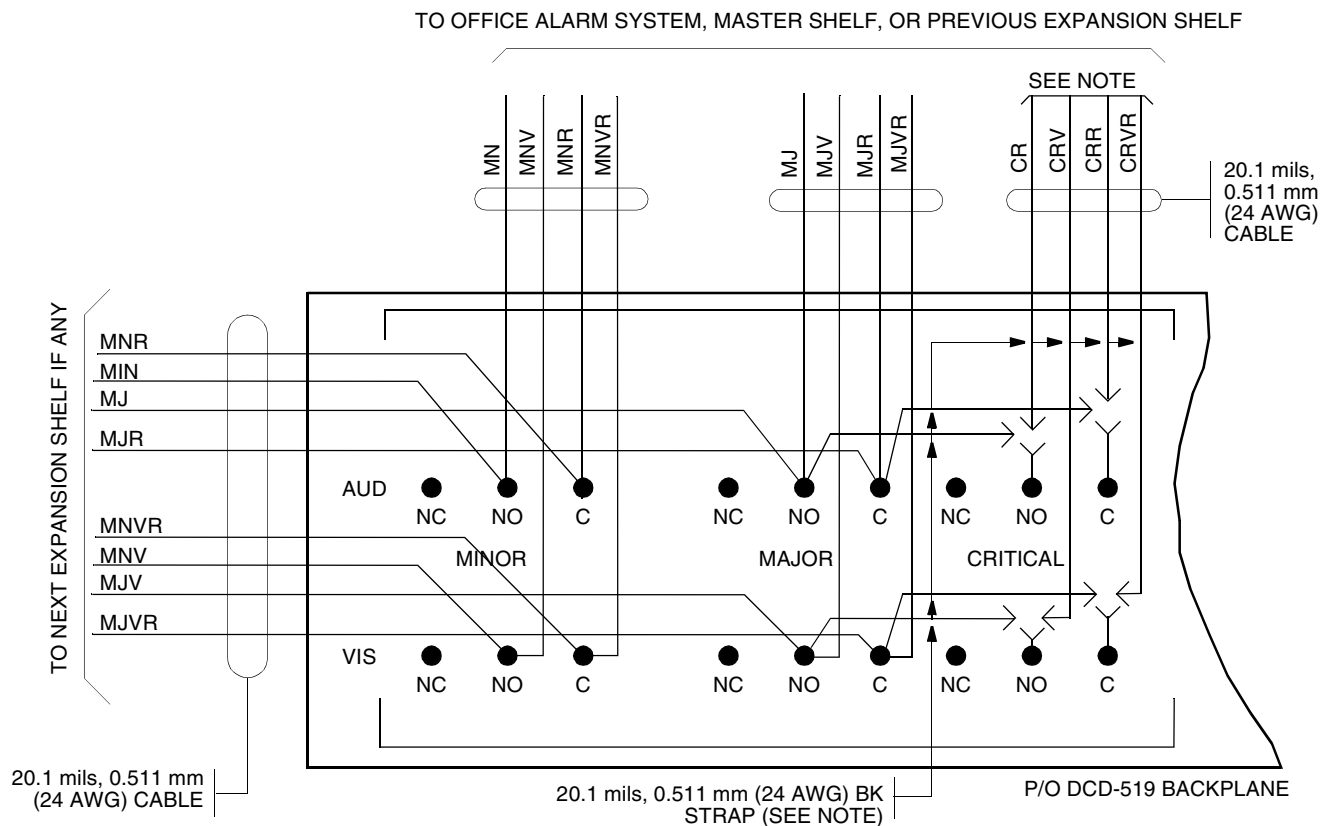
tact between the NC and C terminals. If the "C" is used as a common between critical, major and minor in a daisy-chain, tip-ring (T-R) polarity must be observed. The NC terminals cannot be daisy-chained.

5.06 The DCD Shelf provides critical, major, and minor levels of alarms. If the CO alarm system accepts only major and minor alarms 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 31 and perform the following to connect the OFFICE ALARM terminals to the CO audible/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 practice.
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 are on 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 31. 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), BATTALM (battery alarm), and CLOCK STATUS indicators indicate 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 CLKLRN (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.

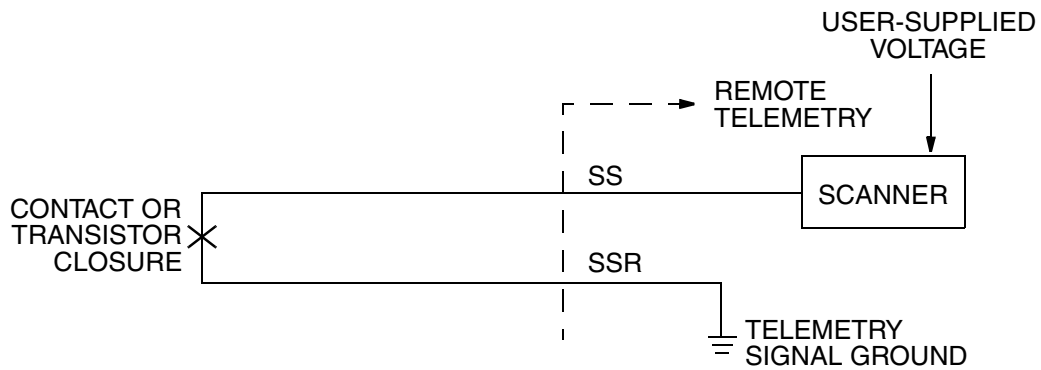
5.10 Some alarm terminals and SI terminals are “dry” (-48 V dc not present on the terminal) and others are “wet” (-48 V dc present on terminal), regardless of the type of alarm card (SAI or MIS) used in the DCD Shelf. Other alarm and SI terminals are “dry” if the DCD Shelf is equipped with an SAI card,

and become “wet” when the shelf is equipped with an MIS card.

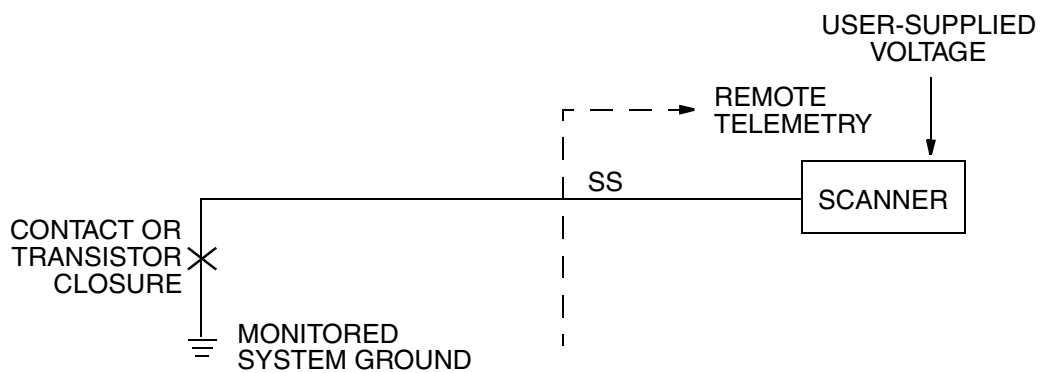
5.11 Wet alarm and SI terminals on the DCD Shelf must be assigned to remote telemetry equipment scan-point cards that accept “wet alarms and statuses.” Likewise, dry alarm and SI terminals on the DCD Shelf must be assigned to scan-point cards that accept “dry alarms and statuses.” Table V and Figure 32 provide information as to when alarm and SI terminals conditions (wet or dry) and SS type connection configuration.

Table V. Alarm and SI Terminals, and SS Types

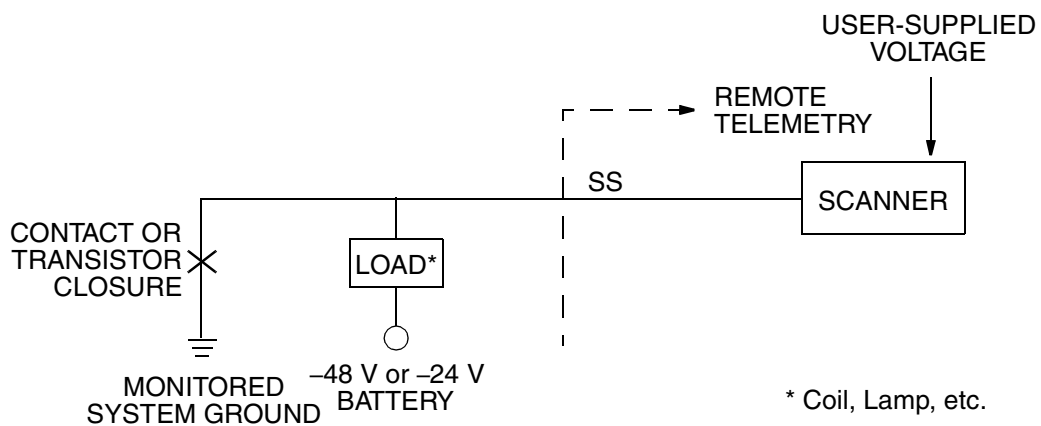
ALARM/SI	MIS CARD INSTALLED	SAI CARD INSTALLED	WET/DRY	SS TYPE*	REFER TO
SHELF STATUS					
CRITICAL	YES	YES	DRY	1	Figure 32A
MAJOR	YES	YES	DRY	1	Figure 32A
MINOR	YES	YES	DRY	1	Figure 32A
PRTA	YES	YES	DRY	2	Figure 32B
CLKL	YES	YES	DRY	2	Figure 32B
BATTALM	NO	YES	DRY	2	Figure 32B
BATTALM	YES	NO	WET	3	Figure 32C
CLOCK STATUS A AND B					
LOCK	NO	YES	DRY	2	Figure 32B
LOCK	YES	NO	WET	3	Figure 32C
HOLDOVER	YES	YES	WET	3	Figure 32C
FREERUN	NO	YES	DRY	2	Figure 32B
FREERUN	YES	NO	WET	3	Figure 32C
UNLOCK	NO	YES	DRY	2	Figure 32B
UNLOCK	YES	NO	WET	3	Figure 32C
INPTOL	NO	YES	DRY	2	Figure 32B
INPTOL	YES	NO	WET	3	Figure 32C
* 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 32. SS Type Connection Configurations

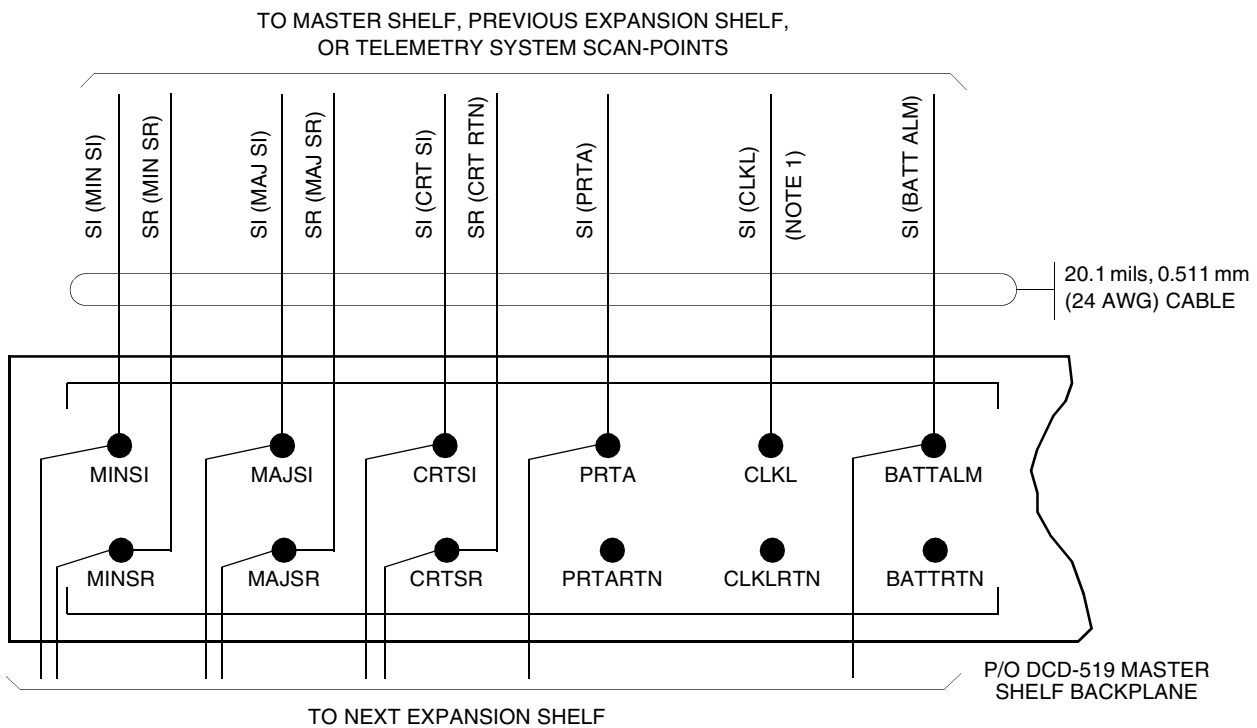
5.12 Refer to Figure 33 and Figure 34 for the SHELF STATUS and CLOCK STATUS indicator terminal connections to remote telemetry equipment scan-point input terminals, and perform the following:

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 practice.
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 33 for SHELF STATUS connections, and Figure 34 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 together, then connect to the master shelf SHELF STATUS terminals (see Figure 33).

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.

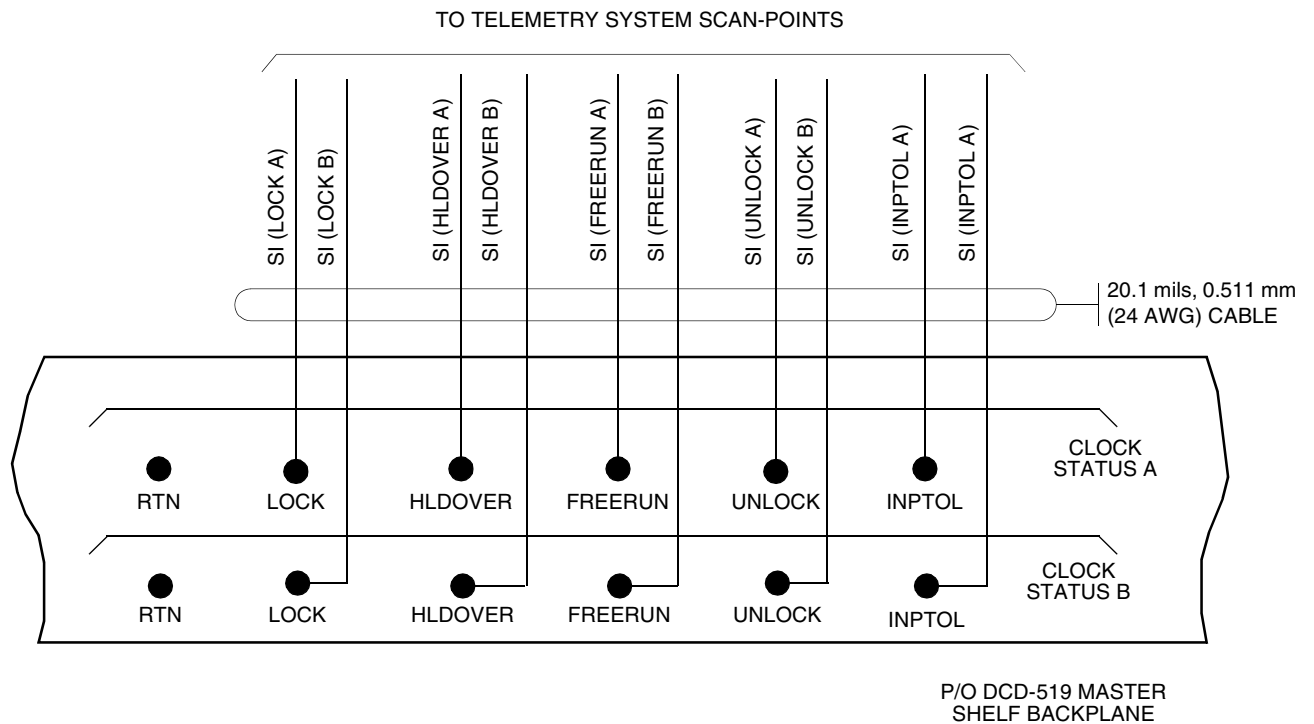
4. After the alarm wiring has been completed, test the alarms per the local company Installation Job Specifications. Each scan-point in the operations system (OS) computer should be programmed with a message that identifies the alarm or status state. Since the available field length may vary between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



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 33. Shelf Status



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 34. Clock Status (Master Shelf only)

Table W. 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 backplane are used for:

- ACO and ACO RTN - Used to remotely operate the ACO function on the SAI/MIS card
- ST and STRTN - Used to remotely transfer 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 backplane of the DCD-519 master shelf only (Figure 7):

1. Use 20.1 mils, 0.511 mm (24 AWG) tinned solid copper wire and prepare cable ends for wire-wrapping using local company practice.

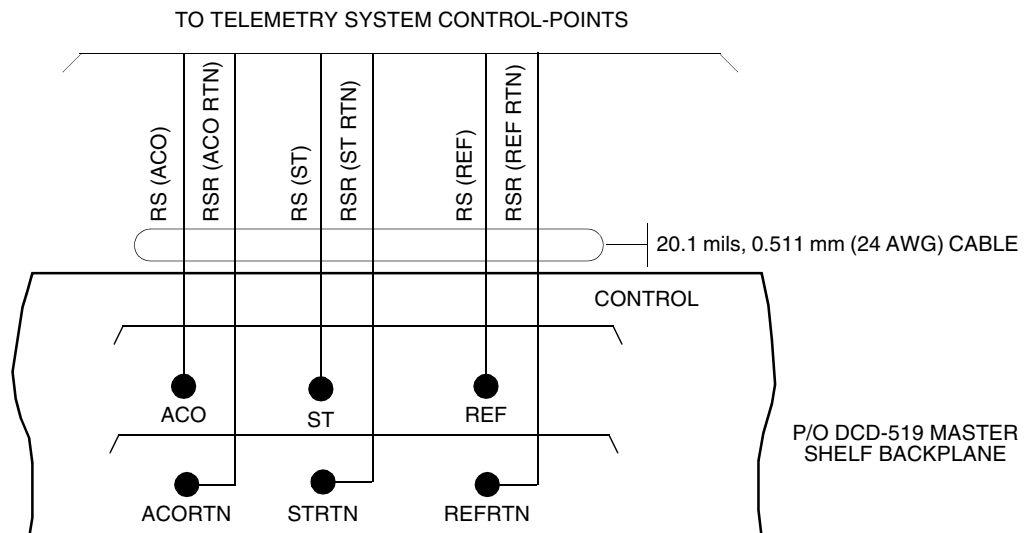
2. Cable the CONTROL terminals to remote telemetry equipment control-points per the local company Installation Job Specifications (refer to Figure 35).

5.15 The CONTROL terminals on the expansion shelf backplane are used for:

- ACO and ACO RTN - Used to remotely operate the ACO function on the SAI/MIS card
- REMXFR and GND - Used to remotely transfer the source (SRC) active status from one clock input card to the other (ST3 mode only)

5.16 To connect the CONTROL terminals (Figure 8), on the backplane of the DCD-519 expansion shelf:

1. Use 20.1 mils, 0.511 mm (24 AWG) tinned solid copper wire and prepare cable ends for wire-wrapping, using local company practice.
2. Cable the CONTROL terminals to remote telemetry equipment control-points per the local company Installation Job Specifications (refer to Figure 36).



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

Figure 35. Control Connections (Master Shelf)

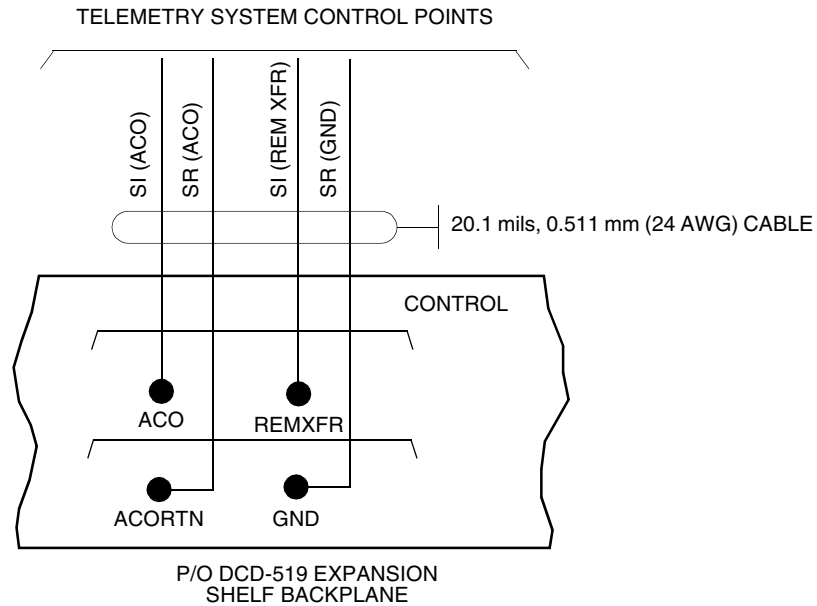


Figure 36. Control Connections (Expansion Shelf)

C. Timing Output Module Connections

Caution: Read all of this section **BEFORE** attempting to connect the DCD-519 System to any timed equipment. Fully understand the principles behind the procedure. These procedures minimize interruptions to service.

5.17 This section provides guidelines and instructions for connecting network elements (NE) to the timing output (TO) modules for the output cards listed in Table X. 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 X. Timing Output Card Connections

CARD	CARD CONNECTIONS FIGURE
EA10, EA10M	37, 38, 39, 41, 42, 43
TOAA	46
TOCA	37, 43
TO-EA5	37, 38, 39, 40, 41, 42, 43
TO-EA	38, 39, 40, 41, 43
TO-EAN	33, 34, 35, 36, 38
TOEA	40, 41, 43
TOGA	40, 41, 42
TOLA	43, 44, 45
TOTA	37, 43
TOTA-5, TOTA-M	37, 43
TOTL	37, 43

Initial Considerations

5.18 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 assists in developing the local output assignment plan.

5.19 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:

- D4 and SLC channel banks (and AT&T 1A ESS switch DTC) require 1 TOCA port per bay (DTC requires 2 per frame).
- 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, e.g., AT&T 4ESS and 5ESS switches, require 2 or 4 TOTA or TOTA5 ports per machine.
- Some digital switch machines, e.g., NTI DMS-10/100/200, SC DCO, GTD-5, etc., use 2 traffic DS1 system for external timing extraction and require 1 SCIU per DS1 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 six 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/NE.

5.20 For NEs that require two timing references (primary and secondary), assign output ports from two separate TO cards of the same type for diversity, i.e., assign the primary reference to port 1 on the TOEA or TO-EA card in slot TO1, and the secondary reference to port 1 on the TOEA or TO-EA card in slot TO2.

5.21 Assign each NE to an appropriate TO port/slot. Refer to the Interconnect Drawings section of this manual for assignment sheet tables; use the tables to aid in assigning NEs to TO port/slot.

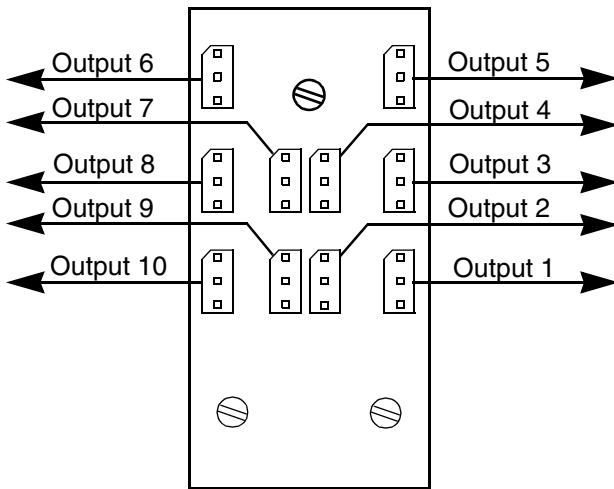
5.22 The Description and Specifications section of this manual contains information about such things as the number of outputs available from an output card, the length of cable a card can drive, and the type and frequency or bit rate of the outputs.

5.23 The Test and Acceptance section of this manual contains information about option switch settings for the output cards. These switches set the length of the cable between the DCD-519 and the NE, frequency or bit rate choices, and other options.

Connections

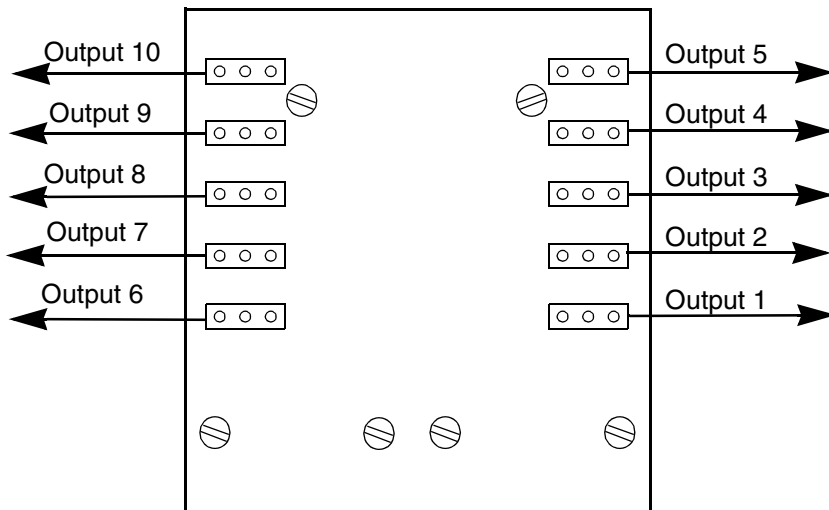
5.24 Refer to Figures 37 through 46 and the following to connect to a TO module.

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 practice and 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.



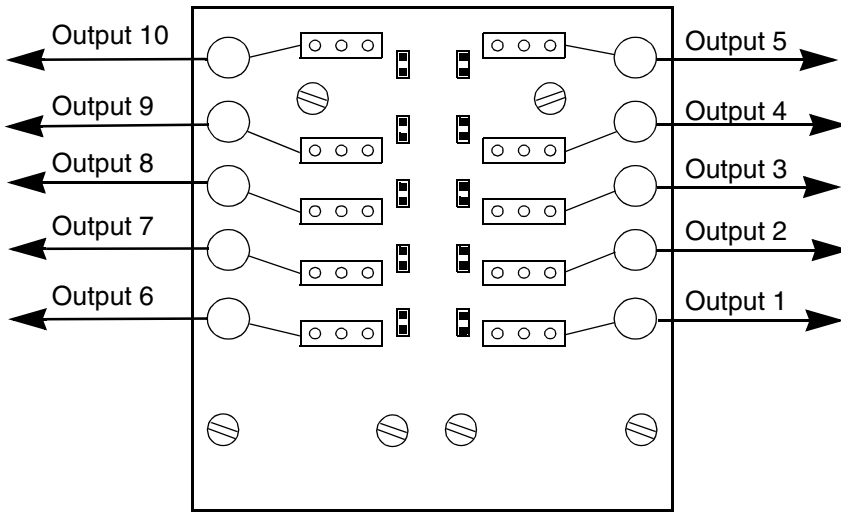
Use With
 EA10
 EA10M
 TO-EA5
 TOTA
 TOTA-5
 TOTA-M
 TOTL

Figure 37. 990-45105-06 Module



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

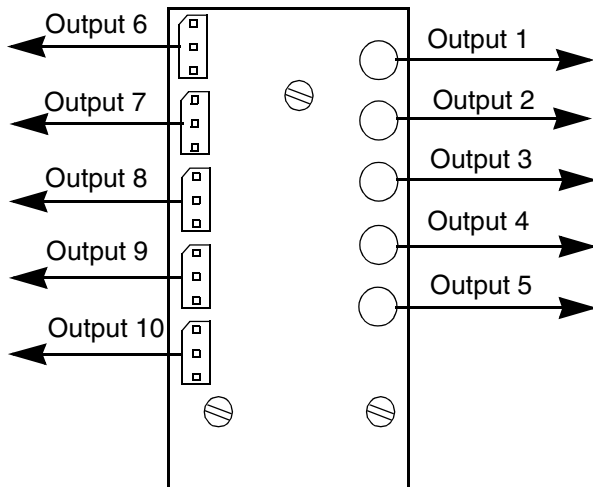
Figure 38. 990-45105-10 Module



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)

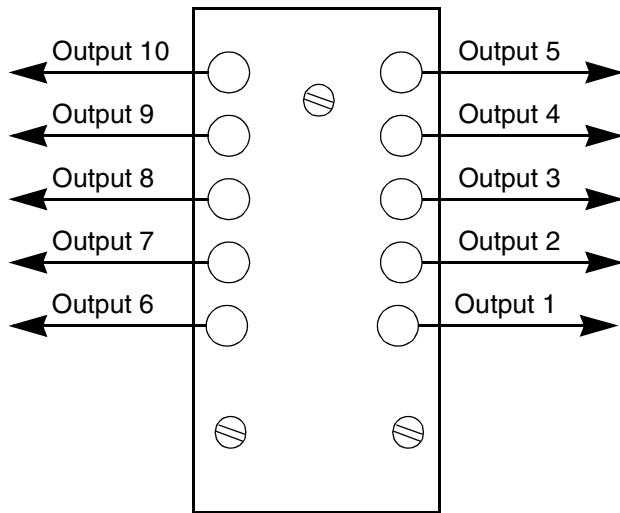
Figure 39. 990-45105-11 Module



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

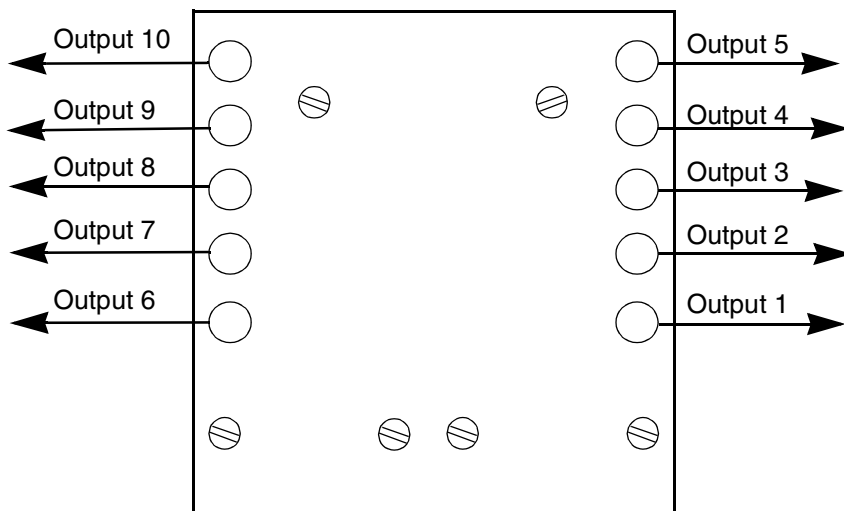
Figure 40. 990-45105-12 Module



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
 TO-EA5
 TO-EA
 TO-EAN
 TOEA
 TOGA

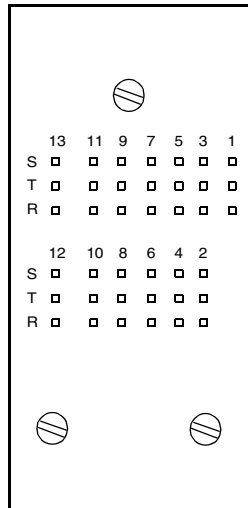
Figure 41. 990-45105-13, -14, -15 Module



Module Part Numbers:
 990-45105-16 (SMB)
 990-45105-17 (Siemens 1.6/5.6)
 990-45105-18 (Siemens 1.0/2.3)

Use With
 EA10
 EA10M
 TO-EA5
 TOGA (990-45105-16)
 (for redundant pairs)

Figure 42. 990-45105-16, -17, -18 Module



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

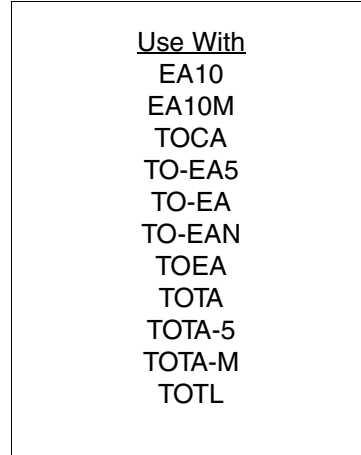
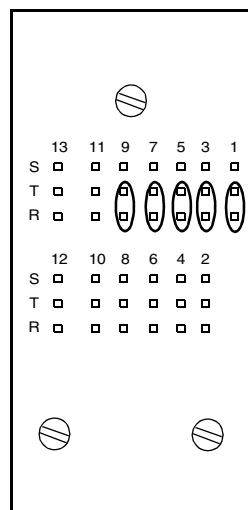
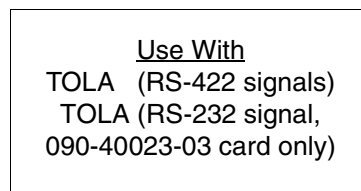


Figure 43. 990-45108-01 Module



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.



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 44. 990-45108-01 Module for TOLA Card with RS-422 and RS-232 Signals

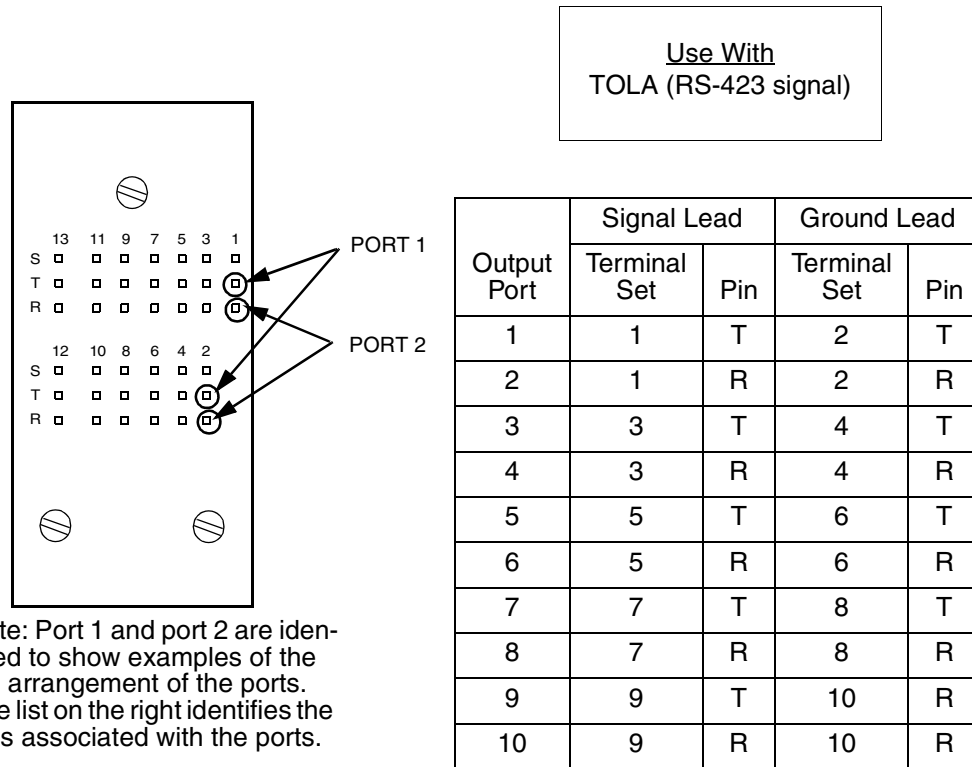


Figure 45. 990-45108-01 Module for TOLA Card with RS-423 Signals

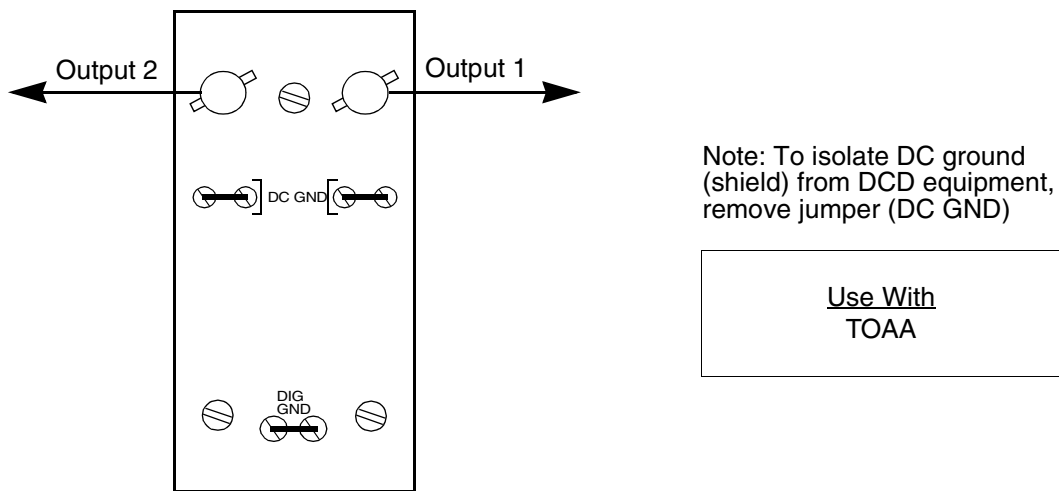


Figure 46. 990-45122-01 Module

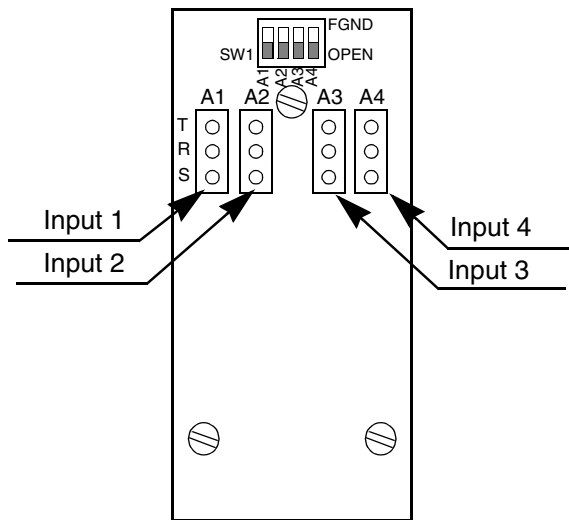
D. PSM Module Connections

5.25 Refer to Figure 47 or Figure 48 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.

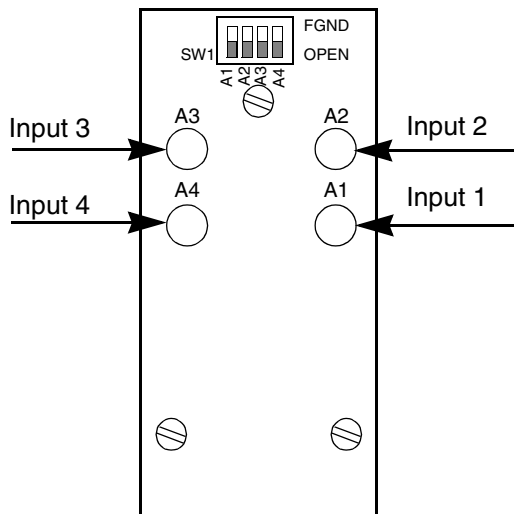
Note: If connecting to a wire-wrap interface module, follow local company practice, and use 25.3 mils, 0.643 mm (22 AWG) or 20.1 mils, 0.511 mm (24 AWG) tinned solid copper, shielded twisted pair cable. Prepare cable ends for wire-wrapping. Ensure that no bare wire ends are exposed, and no wires are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



Use With
PSM-T
PSM-E
PSM-EA

Figure 47. 990-45106-11 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-EA

Figure 48. Coaxial PSM Input Module

E. Wire-wrap Panel Connections

5.26 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 50 to determine which T, R, S terminal sets to use. To connect the output cables to the wire-wrap panel, use Figure 49, and Figure 50, and perform wire-wrap connections as follows:

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 practice 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 50 as reference.

NE Connections Test

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

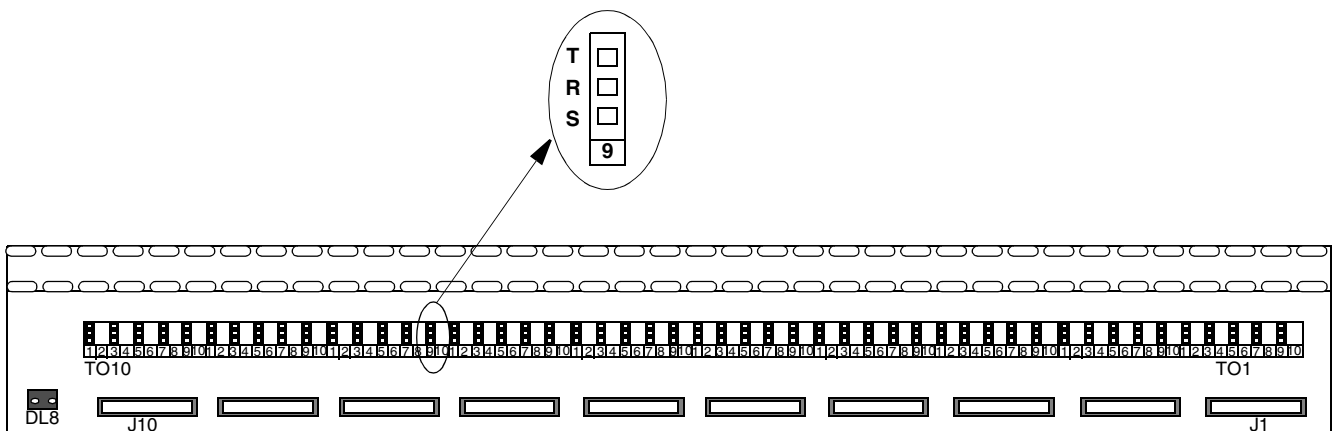
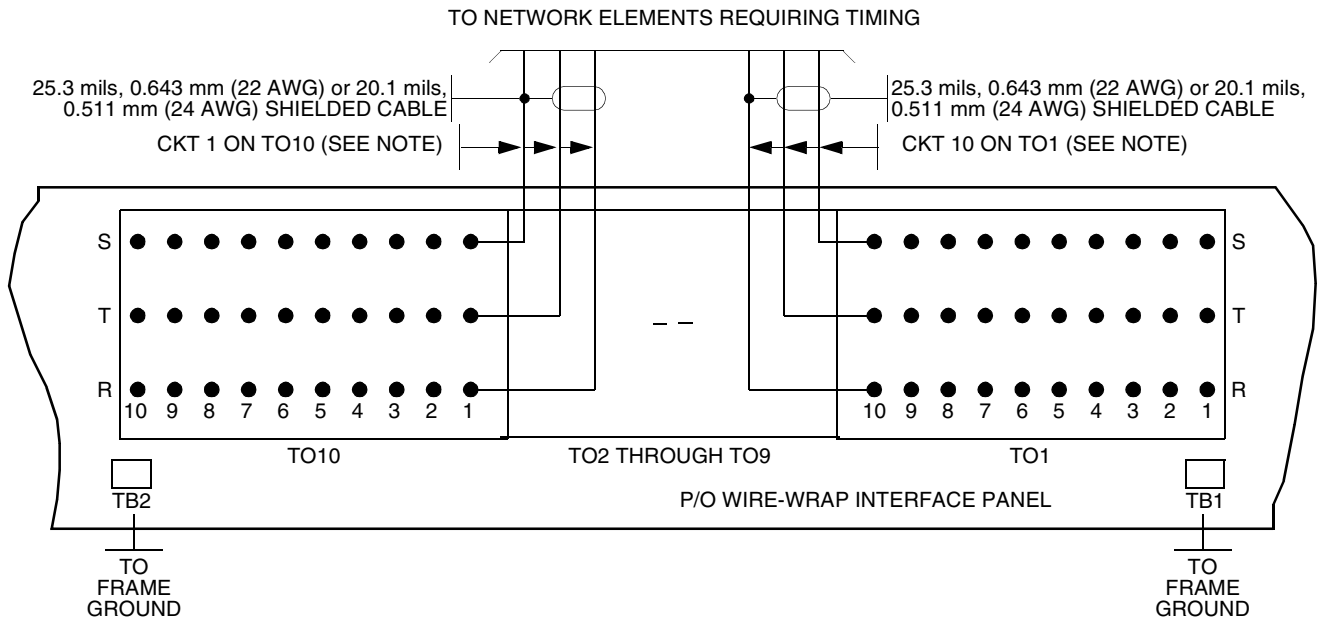
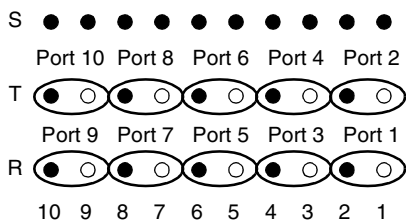


Figure 49. Wire-wrap Interface Panel

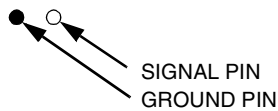


Notes:

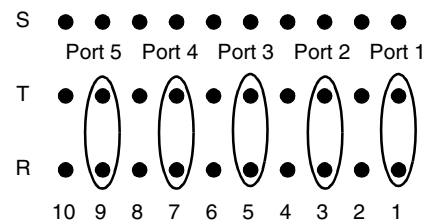
1. This figure illustrates the use of only 1 connection per TO position; a maximum of 10 connections per TO position are possible.
2. When there are 10 output ports in a TO position, the port numbers are the same as the terminal set numbers (port 1 is terminal set 1, port 2 is terminal set 2, etc.).
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 50. Wire-Wrap Interface Panel Connections

F. ESCIU and SCIU Connections

5.28 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.

5.29 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.

5.30 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.

5.31 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

5.32 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 Y and Figure 51, or Figure 52 and Table Z.
2. Repeat Step 1 for each ESCIU or SCIU module installed.

Connecting without a DDF

5.33 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 AA.
2. Repeat Step 1 for each ESCIU or SCIU module installed.

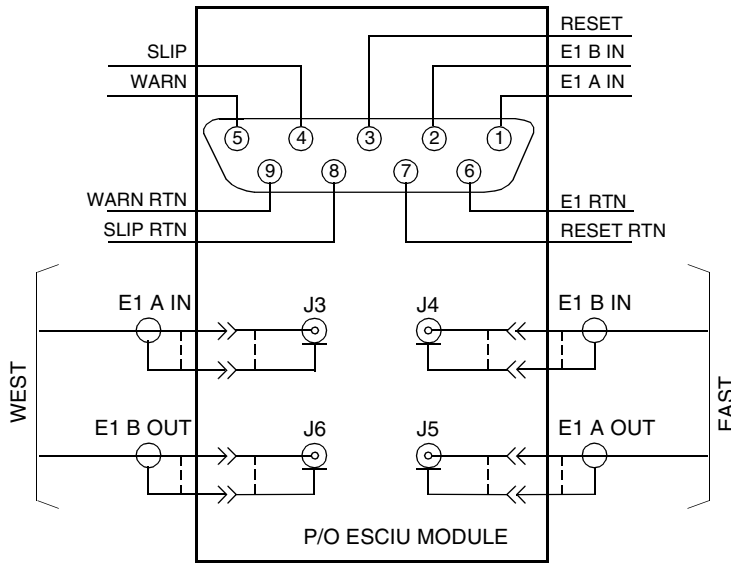
Connecting the Alarms

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

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 51 or Figure 52 and Table AB.
2. Repeat Step 1 for each ESCIU or SCIU module installed.

Table Y. ESCIU and SCIU Module to Access Jack Connections

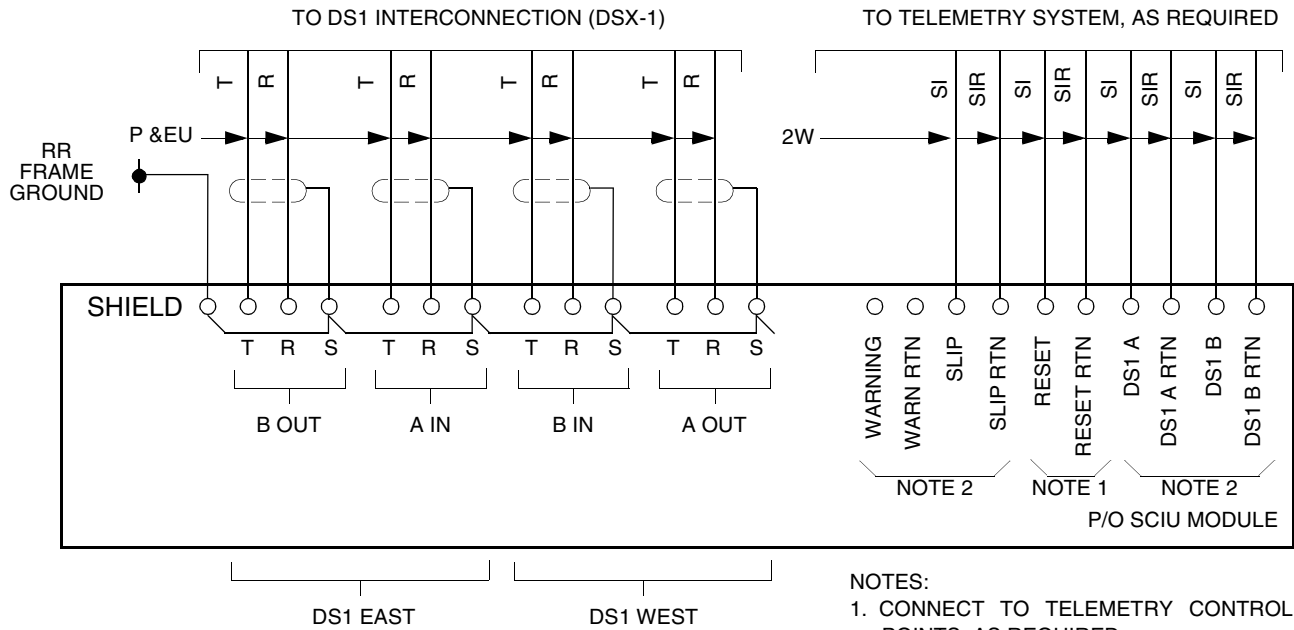
MODULE	ACCESS JACK*
WEST A IN (J3)	IN Jack #1 (Jack normal side)
WEST B OUT (J6)	OUT Jack #1 (Jack normal side)
EAST B IN (J4)	IN Jack #2 (Jack normal side)
EAST A OUT (J5)	OUT Jack #2 (Jack normal side)
* Jack numbers are for reference only.	



ESCIU Module Pin Assignments

PIN	SIGNAL	PIN	SIGNAL
J2-1	E1 A LOS	J2-8	SLIP RTN
J2-2	E1 B LOS	J2-9	WARN RTN
J2-3	RESET	J3	E1 A INPUT
J2-4	SLIP	J4	E1 B INPUT
J2-5	WARN	J5	E1 B OUTPUT
J2-6	E1 A/B RTN	J6	E1 A OUTPUT
J2-7	RESET RTN	—	—

Figure 51. ESCIU Interface Module



- NOTES:
1. CONNECT TO TELEMETRY CONTROL POINTS, AS REQUIRED.
 2. CONNECT TO TELEMETRY SCAN POINT, AS REQUIRED.

Figure 52. SCIU Interface Module

Table Z. 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 AA. 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 AB. 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

5.35 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

5.36 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 Shelf clock will be connected to the ESCIU or SCIU module correctly. Refer to Figure 53 or Figure 54 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 as follows:
 - WEST IN terminals on the module to transmit (OUT) terminals on the NE not being timed from the DCD-519 Shelf
 - WEST B OUT terminals on the module to receive (IN) terminals on the NE not being timed from the DCD-519 Shelf
 - EAST A IN terminals on the module to transmit (OUT) terminals on the NE being timed from the DCD-519 Shelf
 - EAST B OUT terminals on the module to receive (IN) terminals on the NE being timed from the DCD-519 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 Shelf.

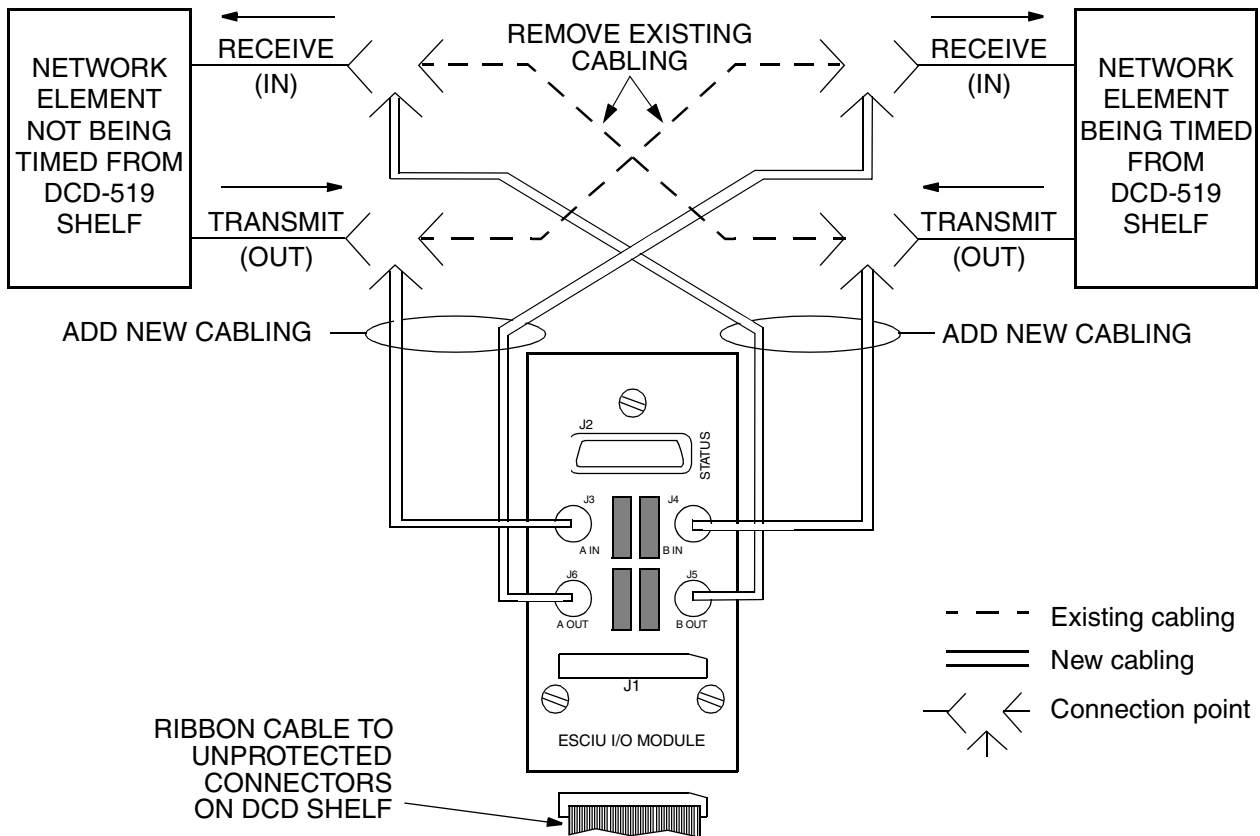


Figure 53. ESCIU Cutover without Jacks (Out-of-Service)

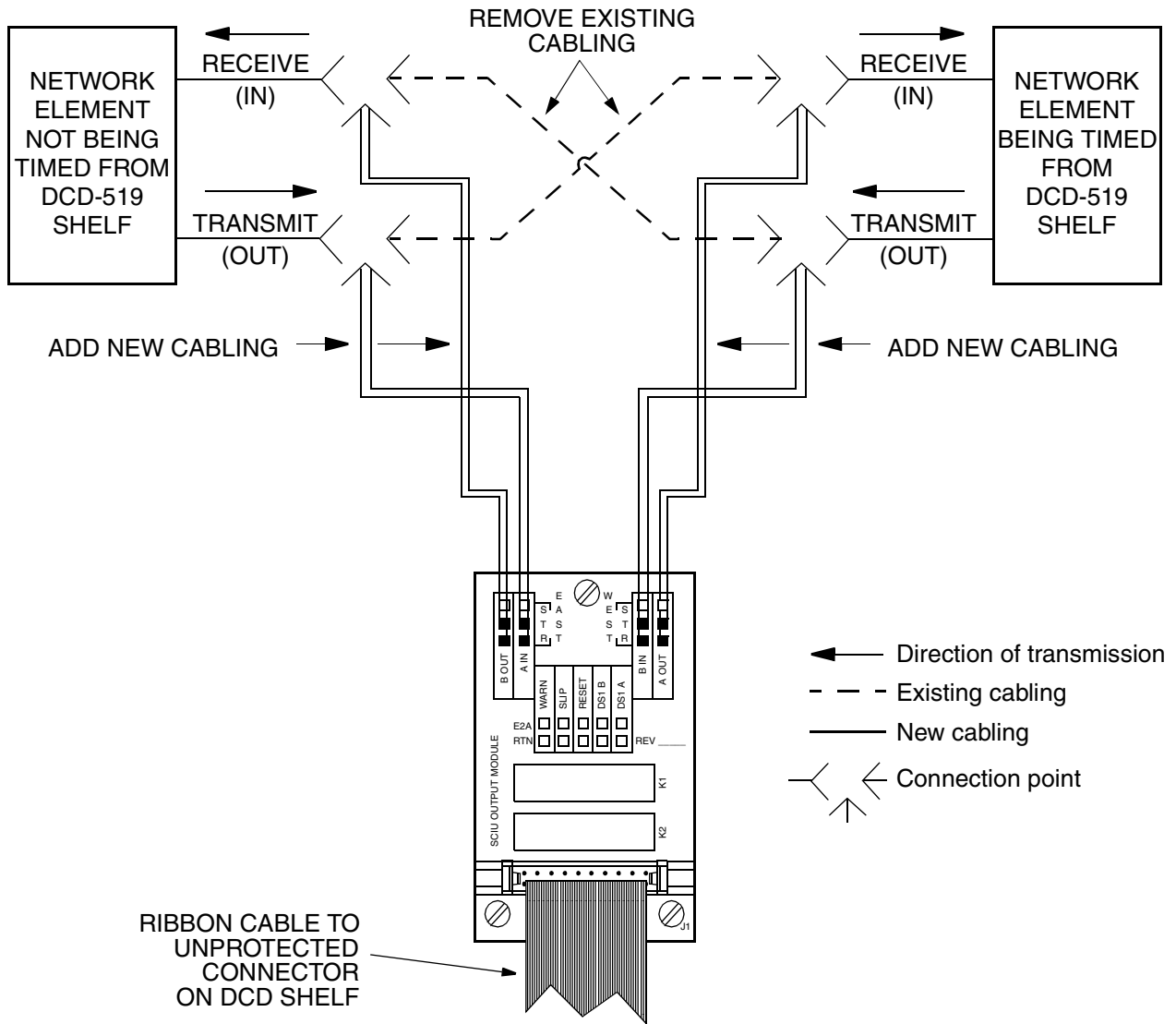


Figure 54. SCIU Cutover without Jacks (Out-of-Service)

In-Service Equipment

5.37 If standard digital signal level access jack sets, such as DSX-1 jacks, were cabled to the ESCIU 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 Shelf clock (BITS) will be connected to the ESCIU or SCIU module WEST A OUT terminals (see Figure 51). Refer to Figure 55 or Figure 56 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 Shelf
 - EAST B OUT jack on the module to IN jack on the NE not being timed from the DCD-519 Shelf
 - WEST B IN jack on the module to OUT jack on the NE being timed from the DCD-519 Shelf
 - WEST A OUT jack on the module to IN jack on the NE being timed from the DCD-519 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 Shelf.

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

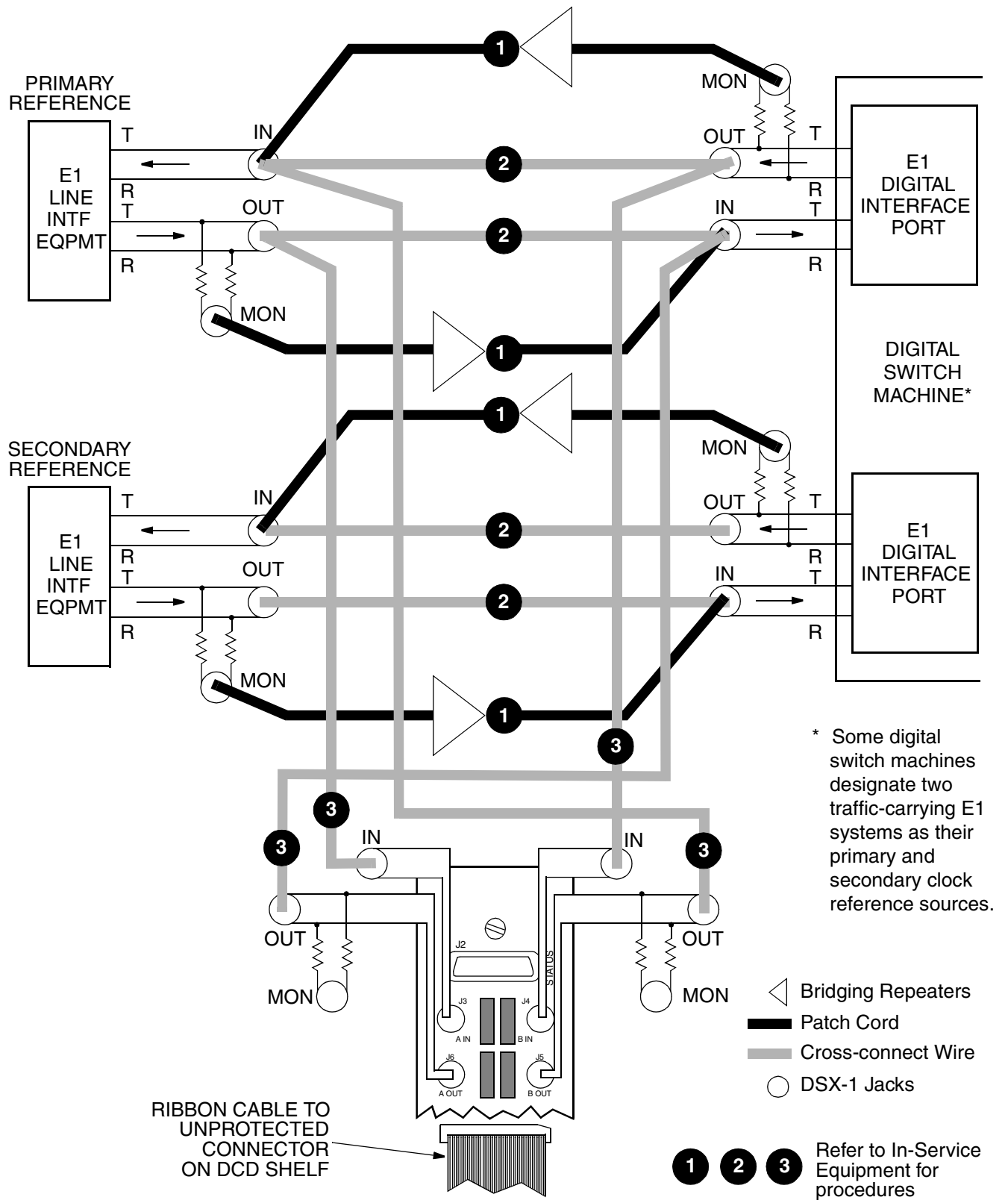


Figure 55. ESCIU Cutover with Jacks (In-Service)

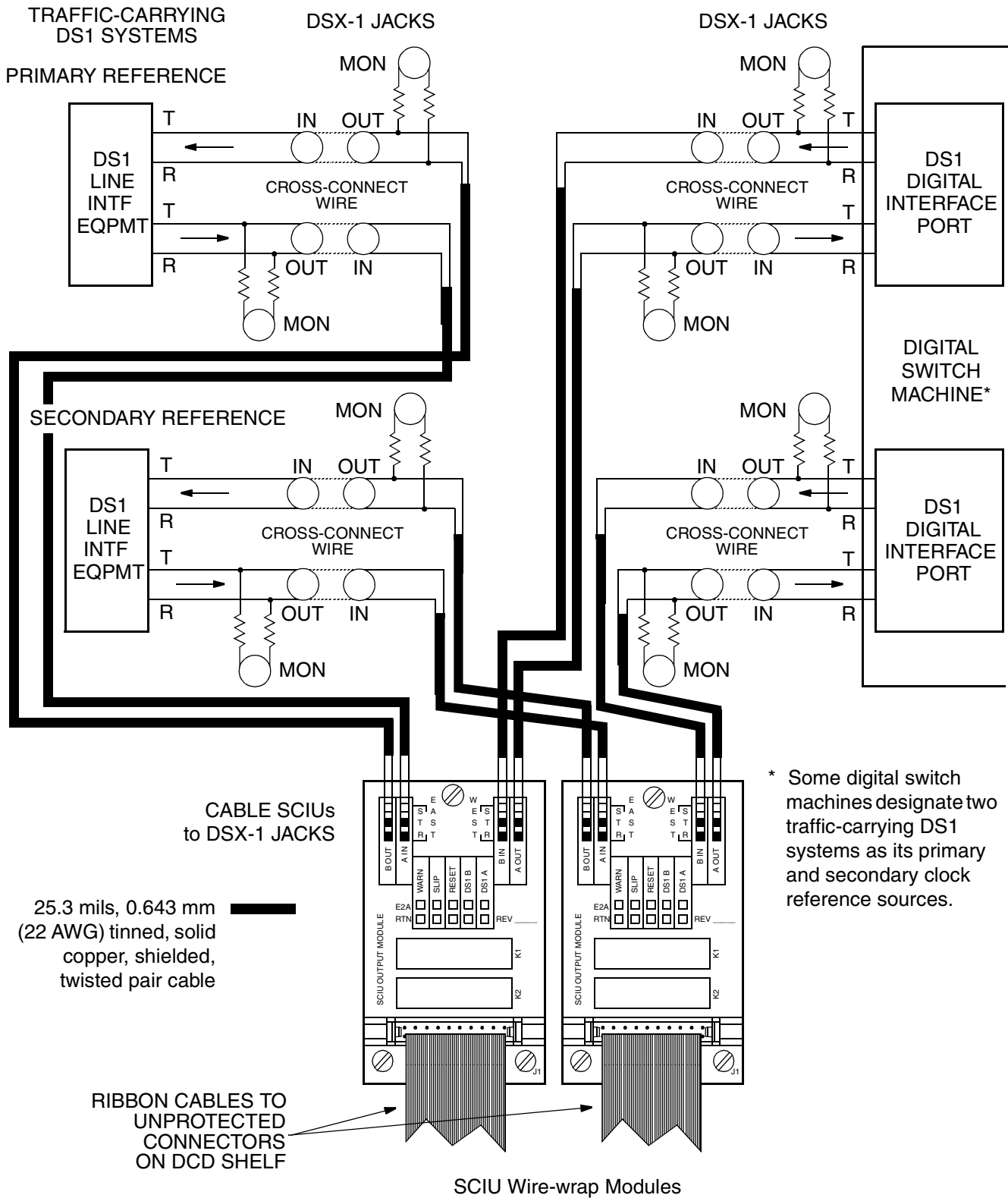


Figure 56. SCIU Cutover with Jacks (In-Service)