DIGITAL CLOCK DISTRIBUTOR
DCD-400, DCD-ST2, AND DCD-CIM
INSTALLATION

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1. GENERAL

1.01 This practice provides instructions for installing the Digital Clock Distributor DCD-ST2, DCD-400 and DCD-CIM shelves.

1.02 This practice has been reissued to correct editorial errors. Change bars are ot used.

1.03 The following acronyms are used in this document:

ACO	Alarm cutoff
ACI	Analog Clock Input card
AI	Alarm Interface card
APS	Automatic Protection Switching
BDFB	Battery distribution fuse board
BPV	Bipolar violations
CC	Composite clock
CI	Clock Input card
D4	Superframe format
DCD	Digital Clock Distributor
ESD	Electrostatic Discharge
ESF	Extended Superframe Format
FA	Fuse and Alarm card
HS TOxA	Hot Spare card
LOS	Loss of signal
MCA	Matrix Controller Automatic
MCA-2	Matrix Controller Automatic-2
MTIE	Maximum Time Interval Error
MVAR	Modified Allen Variance
OOF	Out of frame
SCIU	Synchronous Clock Insertion Unit card
ST2	Stratum-2 Clock card
ST2E	Enhanced Stratum-2 Clock card
ST3	Stratum-3 Clock card
ST3E	Enhanced Stratum-3 Clock card
TIE	Time Interval Error
TOAA	Timing Output Analog Automatic card
TOCA	Timing Output Composite Clock Automatic card
TOLA	Timing Output Logic Level Automatic card
TOTA	Timing Output DS1 Automatic card
TOxA	Timing Output card

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

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

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

2. SHELF INSTALLATION

2.01 Contact Telecom Solutions Customer Service Department at (408) 433-0910 if any difficulties are encountered during the installation process.

A. Required Tools and Materials

2.02 The following items are needed for installing the DCD System:

- Flat-blade screwdriver (small and medium)
- Phillips screwdriver (large and medium)
- Flat-nose pliers
- Cable cutting and stripping tools
- Wire-wrap/unwrap tool
- Dual-trace 100 MHz oscilloscope
- Multimeter with high-impedance inputs and clip-type probes
- Spade/Ring-terminal crimp tool for 16 AWG wire size
- 25 watt and 5 watt soldering irons
- Plastic tie-wrap tightening and cutting tool for miniature, intermediate, and standard size tie-wraps

B. Unpacking

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.

Note: Save packing material. All equipment returned *must be packed in the original packing material*. Contact Telecom Solutions' Customer Service Department at (408)433-0910 if additional packaging is needed.

2.03 The DCD System is shipped in several boxes. One box contains a bare shelf (card chassis), hardware kit, and manual; one box contains the output panel (wire-wrap or Modular Mounting Panel [MMP]) 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 ST2E or ST2 clock cards packed in its own box.

1. Unpack equipment carefully; check for completeness against the purchase order.
2. Notify Telecom Solutions if 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 Telecom Solutions and the carrier if equipment was damaged in transit.

C. Rack Mounting

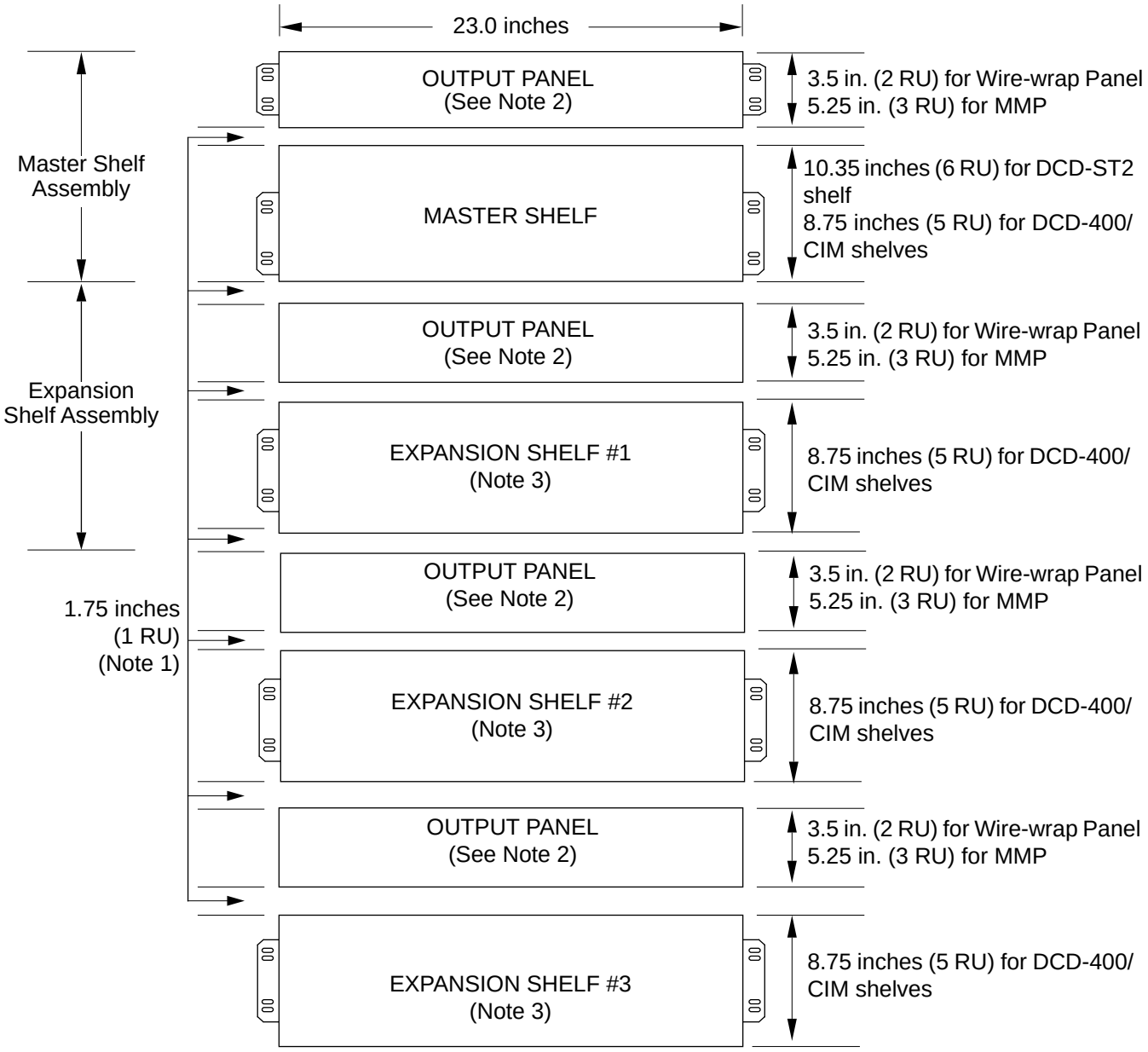
Caution: The DCD System should not be installed near large motors, generators, transformers, or other equipment which radiate strong magnetic fields. Placing the DCD near such equipment may result in improper operation.

2.04 The DCD-ST2, DCD-400, and DCD-CIM shelves are installed in a standard 23-inch rack with either 1.75-inch or 2.0-inch rack unit (RU) mounting screw holes (see Figure 1).

2.05 This practice assumes that a site survey was performed and local company Installation Job Specifications were issued as supplements to this practice. The Installation Job Specifications contain, among other parameters:

- The number and type of shelves to be installed
- In which racks to install the shelves and output panels
- In which rack positions (RU) to install the shelves and output panels
- Where the power and frame ground connections are to be made

• Cable running lists for power, ground, inputs,



Notes:

1. 1 Rack Unit (RU) space (1.75 inches) between shelf and output panel, and between output panels must exist.
2. Output panels can be an MMP containing selected output modules to accommodate the needs of different timing output cards installed in the shelves, or a standard wire-wrap output panel.
3. It is recommended that only DCD-ST2 and DCD-400 shelves be used as a master shelf, and not the DCD-CIM shelf. The DCD-CIM shelf does not have output protection switching capability.

Figure 1. DCD System Configuration

outputs, and alarm connections

- Options for cards and placement of cards
- Which timing outputs will time which network elements (NE)

2.06 Each system may consist of a master shelf and up to three expansion shelves. Each shelf assembly (master and expansion) consists of a shelf and an output panel (wire-wrap or MMP).

2.07 In the event 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 practices for ribbon cable runs between equipment racks, if permitted.

2.08 The DCD shelves (master and expansion) and output panel(s) can be positioned to the rear of the rack rail for flush mounting (Figure 2A) or to the front of the rack rail for offset (Figure 2B) mounting. Perform mounting as specified in the local company Installation Job Specification as follows:

1. Mount the master shelf output panel at the top of the rack using the screws provided. Mount to the rear rail of the rack if flush mounting is desired; to the front rail of the rack for offset mounting. (five inches from the front of the rack). The mounting holes should be aligned so that at least two screws on each side can be installed.

2. Mount the master shelf below the output panel, ensuring that there is 1 RU (1.75 inches) distance between the output panel and the shelf. Attach the shelf to the rear rail of the rack if flush mounting is desired; to the front rail of the rack for offset mounting. The mounting holes should be aligned so that at least four screws on each side can be installed.

   Note: Mounting for the output panel and the shelf must match; either both front mount or both rear mount.

3. Repeat Steps 1 and 2 for the first expansion shelf (if applicable), mounting the output panel for expansion shelf #1 under the master shelf, and then the expansion shelf. (Ensure that there is 1 RU distance between the output panel and the shelf.)

4. Repeat for expansion shelves #2 and #3, if applicable.

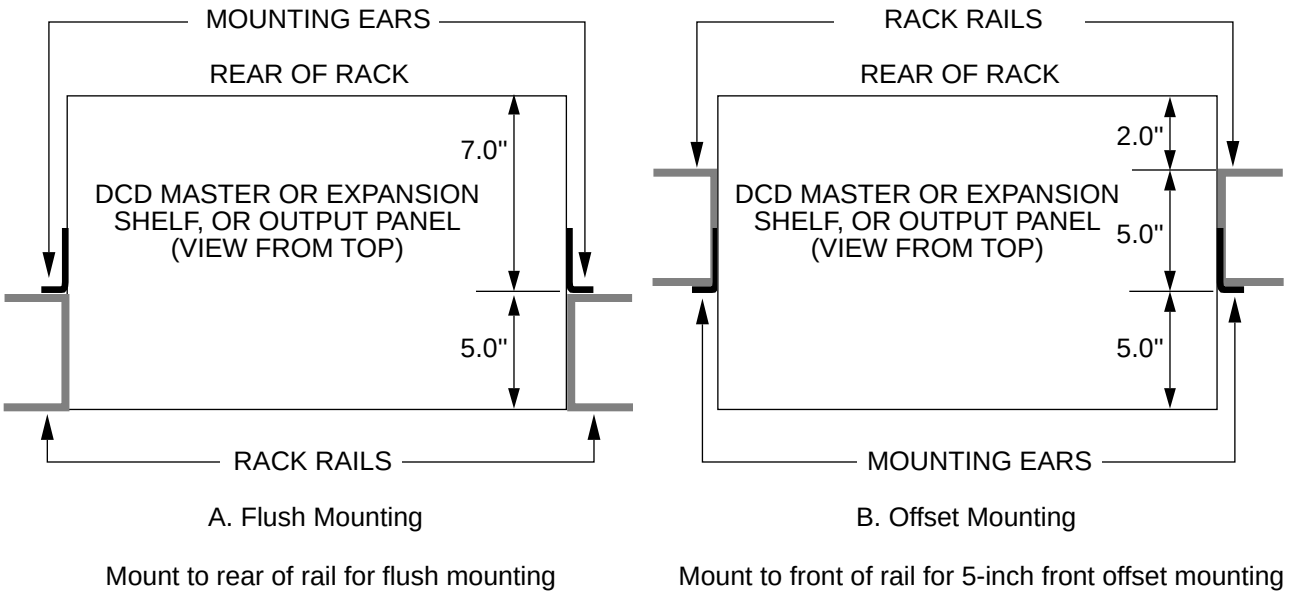


Figure 2. Mounting Positions

5. Install the provided grounding banana jack (p/n 121-00039-01 [black] or 121-00039-02 [red]; the only difference between the two jacks is the color) at the front of each rack as per the following:

   a. Remove the paint where the lug contacts the rack.

   b. Drill a 5/16- inch hole in the front of the rack if one is not provided.

   Note: The hole must be placed close to the center of the system, but not lower than 3.5 ft from the floor. The position of the hole should be such that the static wrist strap can reach all areas of the system.

   c. Install the jack, ensuring jack is on the front of the rack and the lug is between the rear of the rack and the nut (Figure 3).

D. Shelf to Output Panel Connections

2.09 Once the shelf assemblies have been mounted, connections from the DCD-ST2/400 shelf to the output panel (wire-wrap or MMP) must be made. Connections are made to either protected or unprotected outputs as specified in the local company Installation Job Specifications. The local company Installation Job Specifications should specify which timing output slots (TO1, TO2, etc.) are to be configured as protected or unprotected. Typically, protected output connections are used for TOxA cards and unprotected outputs are for SCIU cards; TOxA cards may also be unprotected.

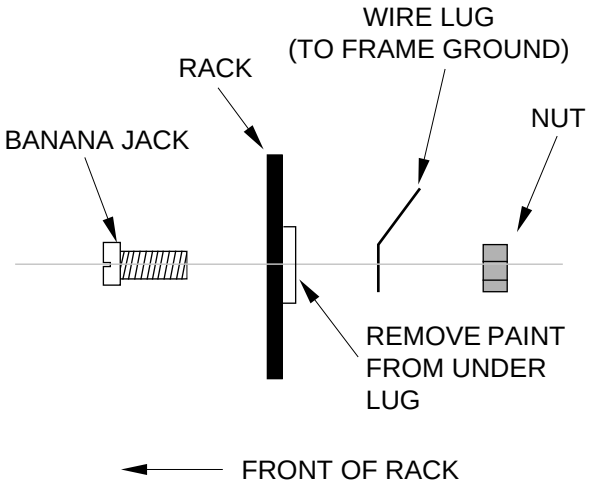


Figure 3. Grounding Banana Jack

Wire-wrap Panel Connections

2.10 As shown in Figure 1, an Output Panel is mounted above each master and expansion shelf. Once the output panel has been mounted, connections from the DCD shelf to the output panel must be made. Connection from the DCD shelf to the output panel is made with the provided connectorized ribbon cables. (Refer to Table A through Table E for wire-wrap connections.)

1. Connect the DCD to the Wire-wrap Panel according to one of the following:

   Note: For protected output slots, 6.5-inch ribbon cables (p/n 060-40001-01) are supplied with the wire-wrap panel. For unprotected output slots, 40-inch ribbon cables (p/n 060-40001-11) must be ordered from Telecom Solutions; order one cable for each unprotected output slot.

   a. **ST2 Shelf:** If using protected cards (TOxA), connect TO1 through TO4 on the rear of the Matrix Relay Assembly to J1 through J4 on the rear of the output panel as appropriate (Figure 4 and Table A).

      If using unprotected cards (SCIU or TOxA), remove and tag existing ribbon cables from J15 to J20 on the shelf backplane and connect new ribbon cables directly to J1 through J4 on the first output panel and J1 and J2 on the second output panel as appropriate (refer to Figure 4 and Table B).

   Note: If a shelf assembly is equipped with two wire-wrap panels, the bottom panel connectors (J1 through J4) are for slots TO1 through TO4, respectively. The top panel connectors (J1 and J2) are used for the HS TOC and HS TOT slots, respectively; J3 and J4 are not used. The two-panel arrangement is only required when *all* output slots are used in the unprotected mode.

Table A. DCD-ST2 Backplane to Wire-Wrap Panel Connections for Protected Operation

FOR CARD IN SLOT:	CONNECT BETWEEN:	
	MATRIX RELAY ASSEMBLY CONNECTOR	ST2 WIRE-WRAP PANEL CONNECTOR
TO1	TO1	J1
TO2	TO2	J2
TO3	TO3	J3
TO4	TO4	J4

Table B. DCD-ST2 Backplane to Wire-Wrap Panel Connections for Unprotected Operation

FOR CARD IN SLOT:	CONNECT BETWEEN:	
	SHELF BACKPLANE CONNECTOR (NOTE 1)	ST2 WIRE-WRAP PANEL CONNECTOR
TO1	J20	J1
TO2	J19	J2
TO3	J18	J3
TO4	J17	J4
HS TOC (NOTE 2)	J16	Second panel J1
HS TOT (NOTE 2)	J15	Second panel J2

NOTES:
1. Remove and tag existing ribbon cable first, then connect new output panel ribbon cables between the backplane and the wire-wrap panel, without connecting to the Matrix Relay Assembly.
2. If HS TOC and HS TOT slots are to be used for SCIU cards, then a second wire-wrap output panel must be ordered and installed.

Caution: Connecting an SCIU to a wire-wrap panel is not recommended, since the traffic-carrying DS1 facility will fail if the SCIU card fails or is removed from the shelf. The a Modular Mounting Panel (MMP) is recommended for protected SCIU operation.

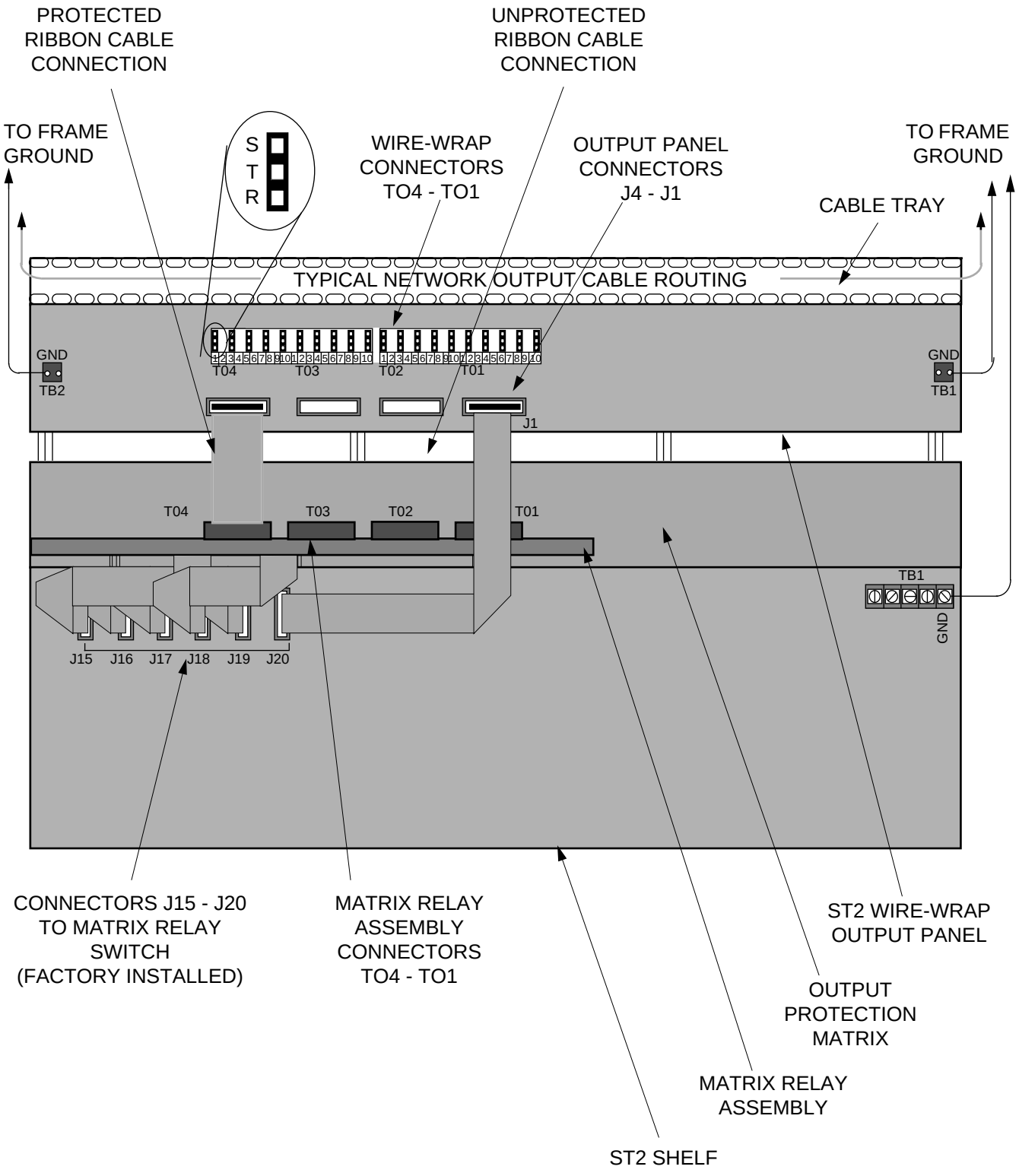


Figure 4. ST2 Wire-wrap Output Panel Cabling (Rear View)

b. **400 Shelf:** If using protected cards (TOxA), connect TO1 through TO10 on the rear of the Matrix Relay Assembly to J1 through J10 on the rear of the output panel (Figure 5 and Table C).

If using unprotected cards (SCIU or TOxA), remove and tag existing ribbon cables from J19 to J30 on the shelf backplane and connect new ribbon cables directly to J1 through J10 on the output panel and J1 and J2 on the second output panel as appropriate (refer to Figure 5 and Table D).

Note: If a shelf assembly is equipped with two wire-wrap panels, the bottom panel connectors (J1 through J10) are for slots TO1 through TO10, respectively. The top panel connectors (J1 through J2) are used for the HS TOC and HS TOT slots, respectively; J3 through J10 are not used. The two-panel arrangement is only required when *all* output slots are used in the unprotected mode.

Table C. DCD-400 Shelf Backplane to Wire-wrap Output Panel Connection for Protected Operation

FOR CARD IN SLOT:	CONNECT TO:	
	MATRIX RELAY ASSEMBLY CONNECTOR	DCD-400 WIRE-WRAP PANEL CONNECTOR
TO1	TO1	J1
TO2	TO2	J2
TO3	TO3	J3
TO4	TO4	J4
TO5	TO5	J5
TO6	TO6	J6
TO7	TO7	J7
TO8	TO8	J8
TO9	TO9	J9
TO10	TO10	J10

Table D. DCD-400 Shelf Backplane to Wire-wrap Output Panel Connection for Unprotected Operation

FOR CARD IN SLOT:	CONNECT TO:	
	SHELF BACKPLANE CONNECTOR (NOTE 1)	DCD-400 WIRE-WRAP PANEL CONNECTOR
TO1	J30	J1
TO2	J29	J2
TO3	J28	J3
TO4	J27	J4
TO5	J26	J5
TO6	J25	J6
TO7	J24	J7
TO8	J23	J8
TO9	J22	J9
TO10	J21	J10
HS TOC (NOTE 2)	J20	Second panel J1
HS TOT (NOTE 2)	J19	Second panel J2

NOTES:
1. Remove and tag existing ribbon cable first, then connect new output panel ribbon cables between the backplane and the wire-wrap panel, without connecting to the Matrix Relay Assembly.
2. If HS TOC and HS TOT slots are to be used for SCIU cards, then a second wire-wrap output panel must be ordered and installed.

Caution: Connecting an SCIU to a wire-wrap panel is not recommended, since the traffic-carrying DS1 facility will fail if the SCIU card fails or is removed from the shelf. The a Modular Mounting Panel (MMP) is recommended for protected SCIU operation.

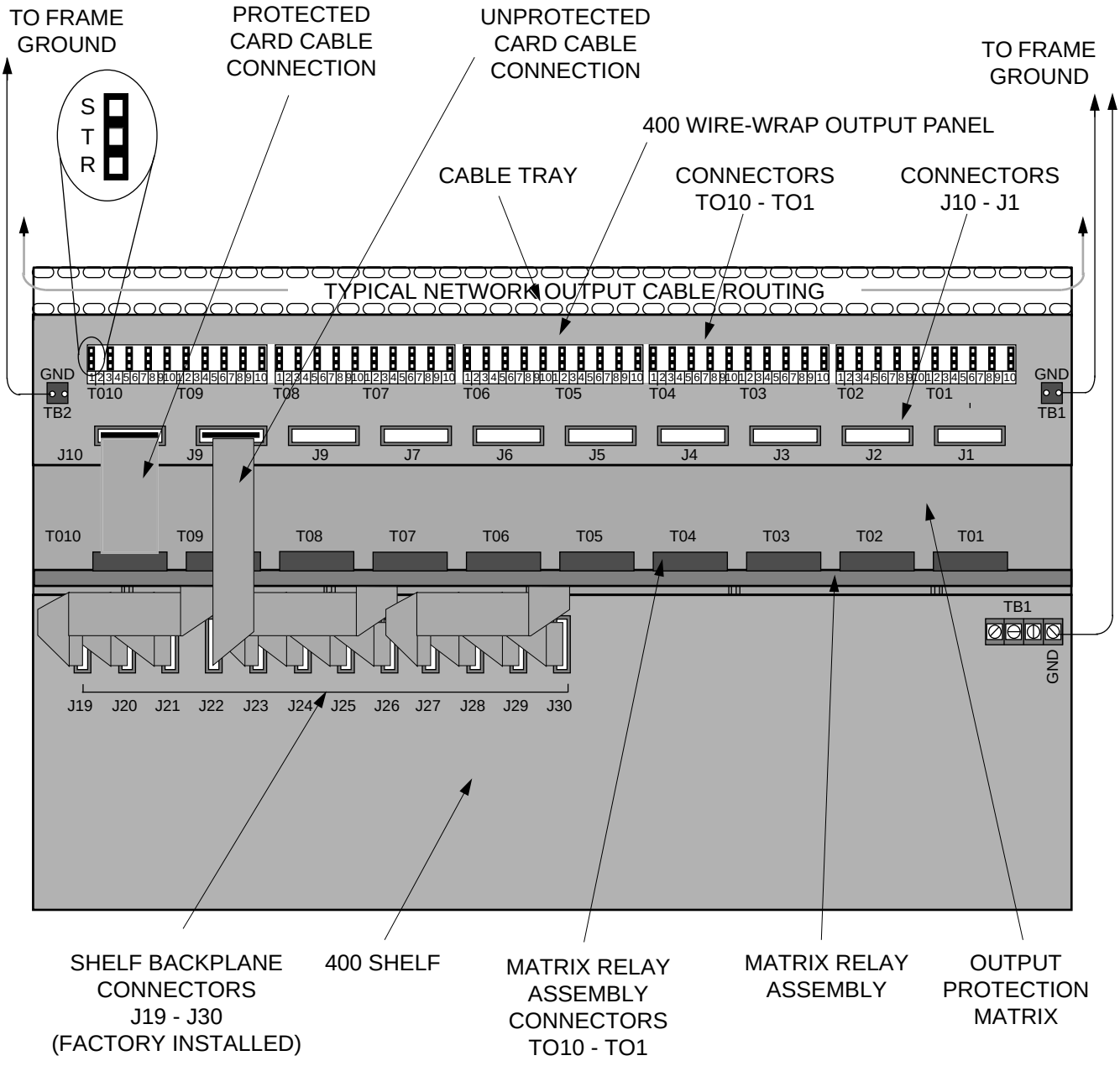


Figure 5. 400 Wire-wrap Output Panel Cabling (Rear View)

c. **CIM Shelf:** Connect the 20-pin locking connectors of SCIU 1 through SCIU 12 on the master shelf backplane to the corresponding connectors on the rear of the output panel (Figure 6 and Table E).

Table E. DCD-CIM Backplane to SCIU Wire-Wrap Output Panel Connection

FOR CARD IN SLOT:	CONNECT TO:	
	SHELF BACK-PLANE CON-NECTOR	SCIU WIRE-WRAP OUTPUT PANEL CONNECTOR
1	J30	J1
2	J29	J2
3	J28	J3
4	J27	J4
5	J26	J5
6	J25	J6
7	J24	J7
8	J23	J8
9	J22	J9
10	J21	J10
HS TOC	J20	J11
HS TOT	J19	J12

2. Use two separate 16 AWG stranded wires to connect TB1 and TB2 (GND) on the rear of the output panel to rack frame ground (see Figure 4, Figure 5, and Figure 6). To do this, perform one of the following:

Note: Use a 25 watt soldering iron to ensure the #6 rod is heated sufficiently to prevent a cold solder connection.

a. The connection should be soldered to the #6 frame ground rod run vertically on each side of the rack, if provided. Two methods are acceptable for connecting the #16 wire to the #6 rod:

   1. Crimp a #16 spade lug to the #16 wire, bend the lug around the #6 rod and solder.

   2. Strip enough insulation from the #16 wire to permit three complete turns around the #6 rod and solder.

b. If the #6 ground rods are not provided, then crimp a #16 spade lug to the #16 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 0.1875 inch of insulation from the other end of the #16 wire, and insert in one of the holes above the two set screws on TB1 and TB2. Tighten the set screw with a small flat-blade screwdriver.

Note: The ground wires used for frame ground are not supplied and must be provided by the installer.

Note: Ensure the ground source is low noise.

3. Repeat the cable connections (Steps 1 and 2) for each shelf in the system.

4. Proceed to Part 2E, Master to Expansion Shelf Interconnection for master to expansion shelf interconnection.

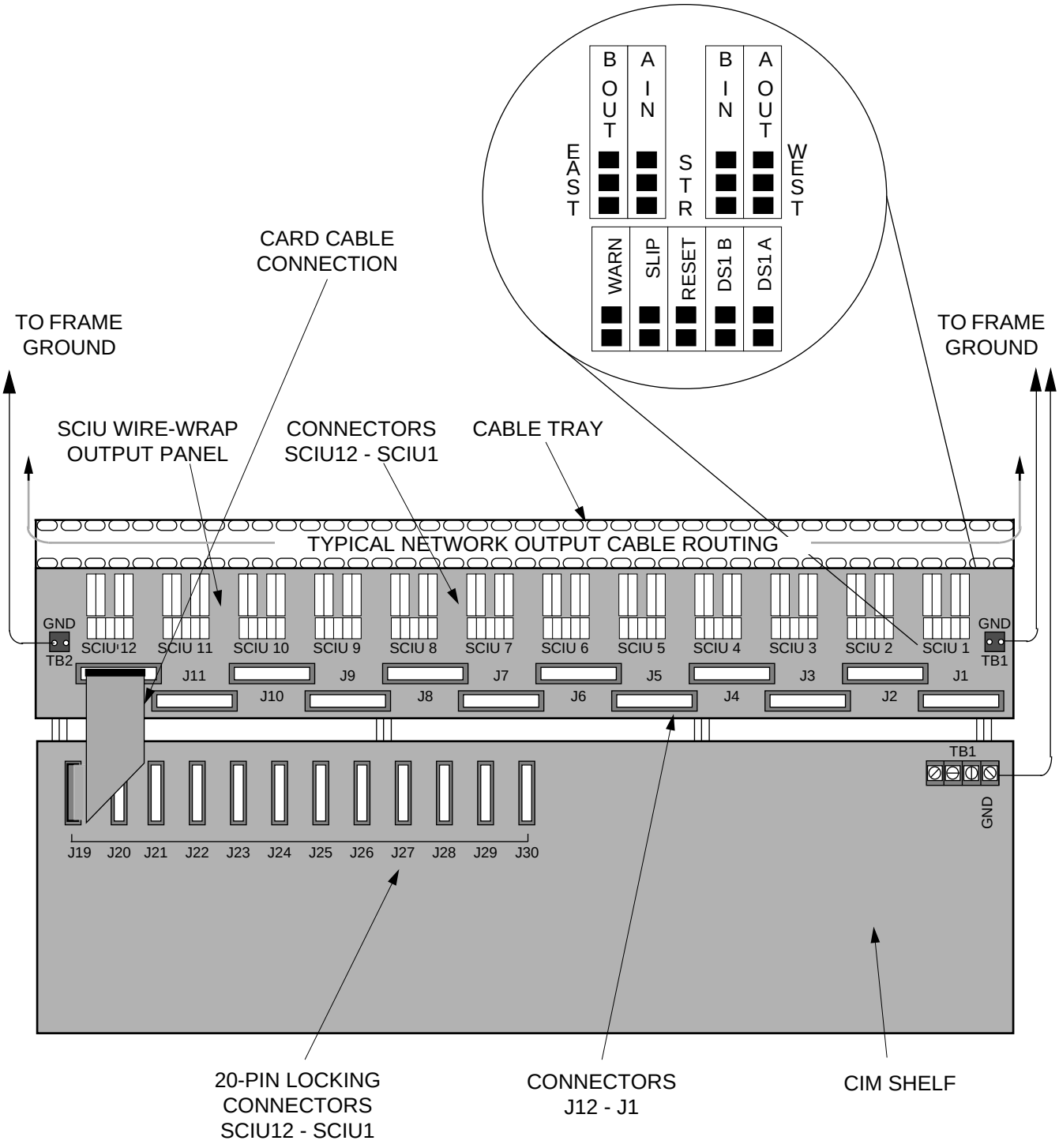


Figure 6. CIM Wire-wrap Output Panel Cabling (Rear View)

Modular Mounting Panel

2.11 Prior to cabling the shelf to the MMP, the output modules must be installed on the MMP. Output modules provide different connectorization to the backplane. Output modules may be used for TOxA and SCIU cards.

2.12 When installing the output module, ensure that the module is installed in the position corresponding to the position the card is to be installed (e.g., if a TOCA card is installed in slot TO1, then a wire-wrap module is installed in the OUTPUT1 position on the MMP). Installation procedures for the master and expansion shelves are identical.

> ***Note:*** When installing an MMP, a 6.5-inch ribbon cable (p/n 060-40001-01) is shipped with each output module, except for the SCIU wire-wrap modules which are shipped with 40-inch cables (p/n 060-40001-11); the 6.5-inch cable may be used for protected connections. If unprotected connections are required for other than SCIU cards, the number of 40-inch cables (p/n 060-40001-11) required must be ordered as a separate item.

2.13 To install the output module, perform the following:

1. Install the appropriate output module for each output card to be installed (refer to Table F and Figure 7) on the master shelf.

   Note: Prior to mounting the 2-port BNC output module to the panel, the appropriate attenuation pad (3 dB, 3.5 dB, 30 dB, or 60 dB) must be installed on the output module. (The pad values should be determined from the local company Installation Job Specifications.) To install the pads, line up pins on the pad with U1 (with labeling on the pad right-side up) and insert until firmly seated (see Figure 7). Repeat for U2.

2. To install an output module, line up the three spring-loaded screws on the modules to the holes on the panel.

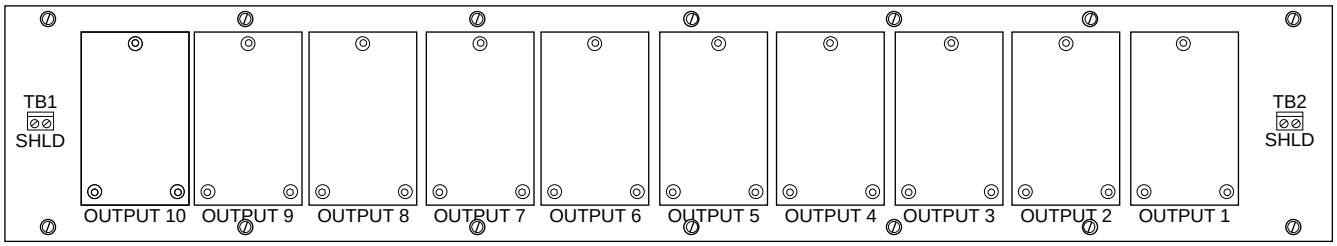
3. Used a medium flat-blade screwdriver to lock each screw in place. Screw in evenly to prevent skewing the module. Also make sure that the top screw is securely in place; this is the FRM GND connection to the MMP.

4. Repeat Steps 1 through 3 for all output modules.

5. Repeat Steps 1 through 4 for each expansion shelf in the system.

Table F. Output Modules

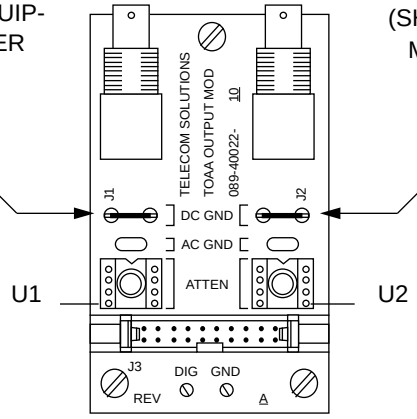
DESCRIPTION	PART #	USED WITH	COMMENTS
Wire-wrap Module	990-40011-10	TOCA, TOTA, TOLA cards	10 Tip, Ring, and Shield wire-wrap output ports
SCIU I/O Wire-wrap Module	990-40021-10	SCIU card	I/O for one SCIU with wire-wrap pins
2-port BNC Module	990-40022-10	TOAA card	2 BNC connectors and attenuator module
DB9 Module	990-40023-10	TOLA card (also can be used with TOCA and TOTA)	5 DB9 female connectors for RS-422 and TTL (RS-423)outputs



Modular Mounting Panel

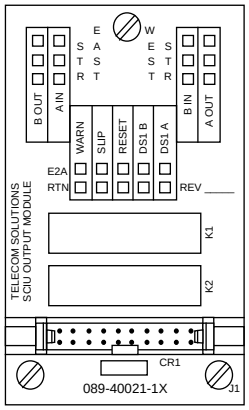
TO ISOLATE DC GROUND (SHIELD) FROM DCD EQUIP-MENT, REMOVE JUMPER (DC2 GND), J2.

TO ISOLATE DC GROUND (SHIELD) FROM DCD EQUIP-MENT, REMOVE JUMPER (DC2 GND), J1.

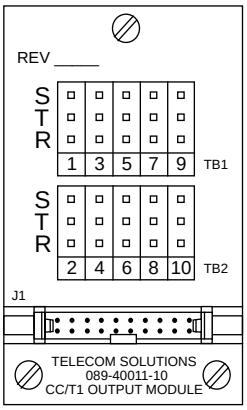


INSTALL ATTENTUATOR (2 PLACES: U1 AND (U2) FOR LEVEL COORDINATION. OUTPUT LEVEL IS 1 VOLT RMS. 75 OHM ATTENTUATORS SUPPLIED ARE 0 dB, 3 dB, 30 dB, 60 dB, and 3.5 dB 75 to 50 OHM.

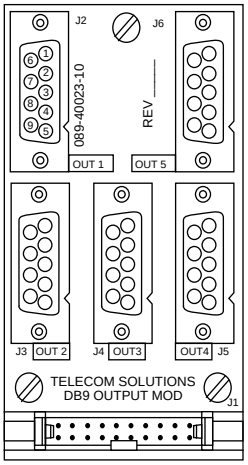
2-Port BNC Module
990-40022-10



SCIU Wire-wrap Module



Wire-wrap Module



DB9 Module

Figure 7. Modular Mounting Panel and Output Modules

Note: When installing cables, ensure that the cables are not twisted and the key on the cable connector aligns with the key slot on the shelf and MMP connectors. Be sure to lock the cables in place.

6. ***If configuring the DCD-ST2 or DCD-400 for protected output slots:*** use the provided 6.5-inch ribbon cables (p/n 060-40001-01) between the relay matrix connectors TO1 through TO4 for the DCD-ST2 shelf, and TO1 through TO10 for the DCD-400 shelf and the corresponding connectors on the output modules (refer to Figure 8 and Table G for the DCD-ST2, and Figure 9 and Table H for the DCD-400).

Table G. DCD-ST2 Backplane to MMP Connections for Protected Operation

FOR CARD IN SLOT	RELAY MATRTIX CONNECTOR	MMP OUTPUT PANEL POSITION
1	TO1	OUTPUT 5
2	TO2	OUTPUT 6
3	TO3	OUTPUT 7
4	TO4	OUTPUT 8

Table H. DCD-400 Backplane to MMP Connections for Protected Operation

FOR CARD IN SLOT:	CONNECT TO:	
	RELAY MATRIX CONNECTORS	MMP OUTPUT PANEL POSITION
1	TO1	OUTPUT1
2	TO2	OUTPUT2
3	TO3	OUTPUT3
4	TO4	OUTPUT4
5	TO5	OUTPUT5
6	TO6	OUTPUT6
7	TO7	OUTPUT7
8	TO8	OUTPUT8
9	TO9	OUTPUT9
10	TO10	OUTPUT 10

7. ***If configuring the DCD-ST2 or DCD-400 for unprotected output slots:*** one 40-inch ribbon cable (Telecom Solutions p/n 060-40001-11) must have been ordered for each unprotected slot (a 40-inch ribbon cable is provided with each SCIU wire-wrap module).

   a. Remove and tag existing ribbon cables first from J15 through J20 for the DCD-ST2 shelf backplane, or J19 through J30 for the DCD-400 shelf backplane.

   b. Connect the cables between the connectors J15 through J20 for the DCD-ST2 shelf backplane, and J19 through J30 for the DCD-400 shelf backplane and the corresponding connectors on the output modules (refer to Figure 8 and Table I for the DCD-ST2, and Figure 9 and Table J for DCD-400).

Note: If configuring for 12 unprotected output slots, a second MMP will be necessary, mounted above the first one. The bottom MMP connectors (OUTPUT1 through OUTPUT10) are for slots TO1 through TO10. The top MMP connectors (OUTPUT1 and OUTPUT2) are for slots HS TOC and HS TOT, respectively; the remaining MMP connectors on the top panel are not used.

Table I. DCD-ST2 Backplane to MMP Connections for Unprotected Operation

FOR CARD IN SLOT	SHELF BACK-PLANE CONNECTOR	MMP OUTPUT PANEL POSI-TION
1	J20	OUTPUT 5
2	J19	OUTPUT 6
3	J18	OUTPUT 7
4	J17	OUTPUT 8
HS TOC	J16	OUTPUT 9
HS TOT	J15	OUTPUT 10
* Remove and tag existing ribbon cable first, then connect new output panel ribbon cable directly from the backplane to the output panel.		

Table J. DCD-400 Backplane to MMP Connections for Unprotected Operation

FOR CARD IN SLOT:	CONNECT TO: SHELF BACK-PLANE CONNECTORS (NOTE)	CONNECT TO: MMP OUTPUT PANEL POSITION
1	J30	OUTPUT1
2	J29	OUTPUT2
3	J28	OUTPUT3
4	J27	OUTPUT4
5	J26	OUTPUT5
6	J25	OUTPUT6
7	J24	OUTPUT7
8	J23	OUTPUT8
9	J22	OUTPUT9
10	J21	OUTPUT 10
HS TOC	J20	SECOND PANEL OUTPUT 1
HS TOT	J19	SECOND PANEL OUTPUT 2

NOTE: Remove and tag existing ribbon cable first, then connect new output panel ribbon cable directly from the backplane to the output panel

8. ***If configuring the DCD-CIM for unprotected output slots:*** Connect the 20-pin locking connectors of SCIU 1 through SCIU 12 (J19 through J30) on the shelf backplane to the appropriate output module connector on the MMP (see Figure 10 and Table K).

9. Dress the cables per local company practice.

10. Repeat Steps 6 through 9 for each expansion shelf in the system.

11. Use two separate 16 AWG green insulated wires to connect TB1 and TB2 (GND) on the rear of the DCD shelf output panel to the rack frame ground. To do this, perform one of the following on each expansion shelf in the system:

    Note: Use a 25 watt soldering iron to ensure the #6 rod is heated sufficiently.

Table K. DCD-CIM Backplane to MMP Connections

FOR CARD IN SLOT:	CONNECT TO: SHELF BACK-PLANE CONNECTORS	CONNECT TO: MMP OUTPUT PANEL POSITION
1	J30	OUTPUT1
2	J29	OUTPUT2
3	J28	OUTPUT3
4	J27	OUTPUT4
5	J26	OUTPUT5
6	J25	OUTPUT6
7	J24	OUTPUT7
8	J23	OUTPUT8
9	J22	OUTPUT9
10	J21	OUTPUT 10
HS TOC	J20	SECOND PANEL OUTPUT 1
HS TOT	J19	SECOND PANEL OUTPUT 2

a. The connection should be soldered to the #6 frame ground rod run vertically on each side of the rack, if provided. Two methods are acceptable for connecting the #16 wire to the #6 rod:

   1. Crimp a #16 spade lug to the #16 wire, bend the lug around the #6 rod and solder.

   2. Strip enough insulation from the #16 wire to permit three complete turns around the #6 rod and solder.

b. If the #6 ground rods are not provided, then crimp a #16 spade lug to the #16 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 0.1875 inch of insulation from the other end of the #16 wire, and insert in one of the holes above the two set screws on TB1 and TB2. Tighten the set screw with a small flat-blade screwdriver.

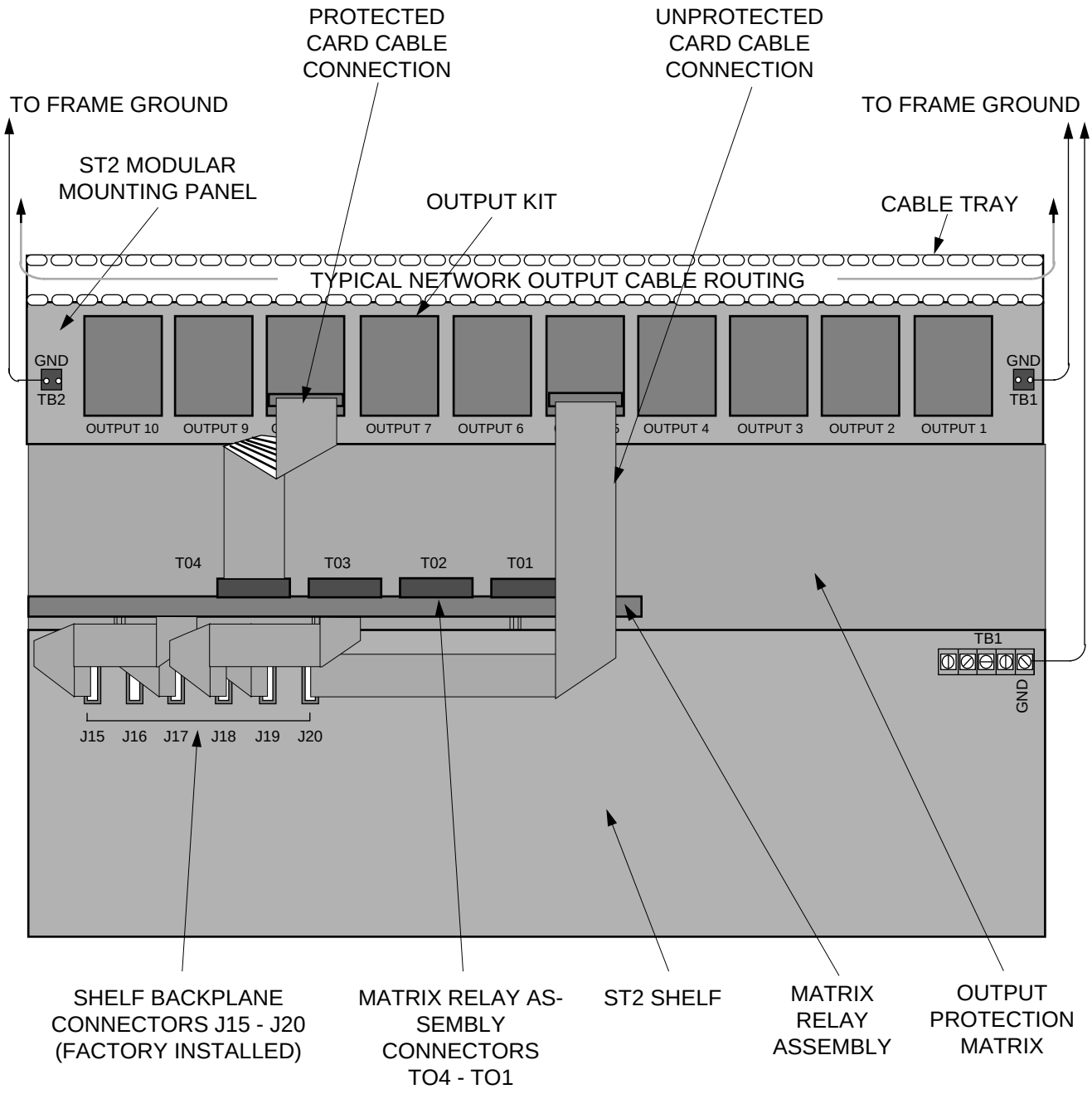


Figure 8. DCD-ST2 Shelf to MMP Connection (Rear View)

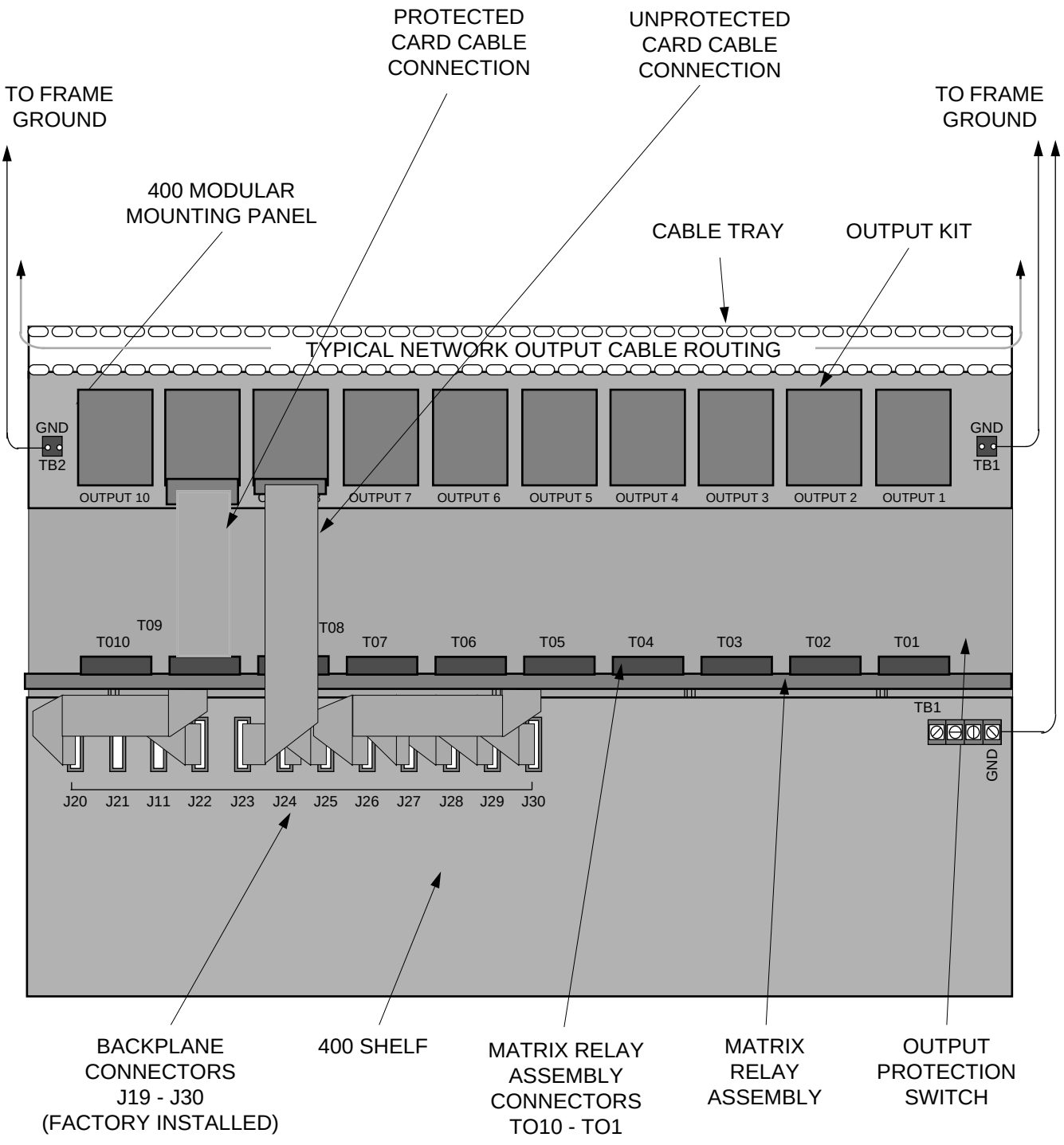


Figure 9. DCD-400 Modular Mounting Panel Cabling (Rear View)

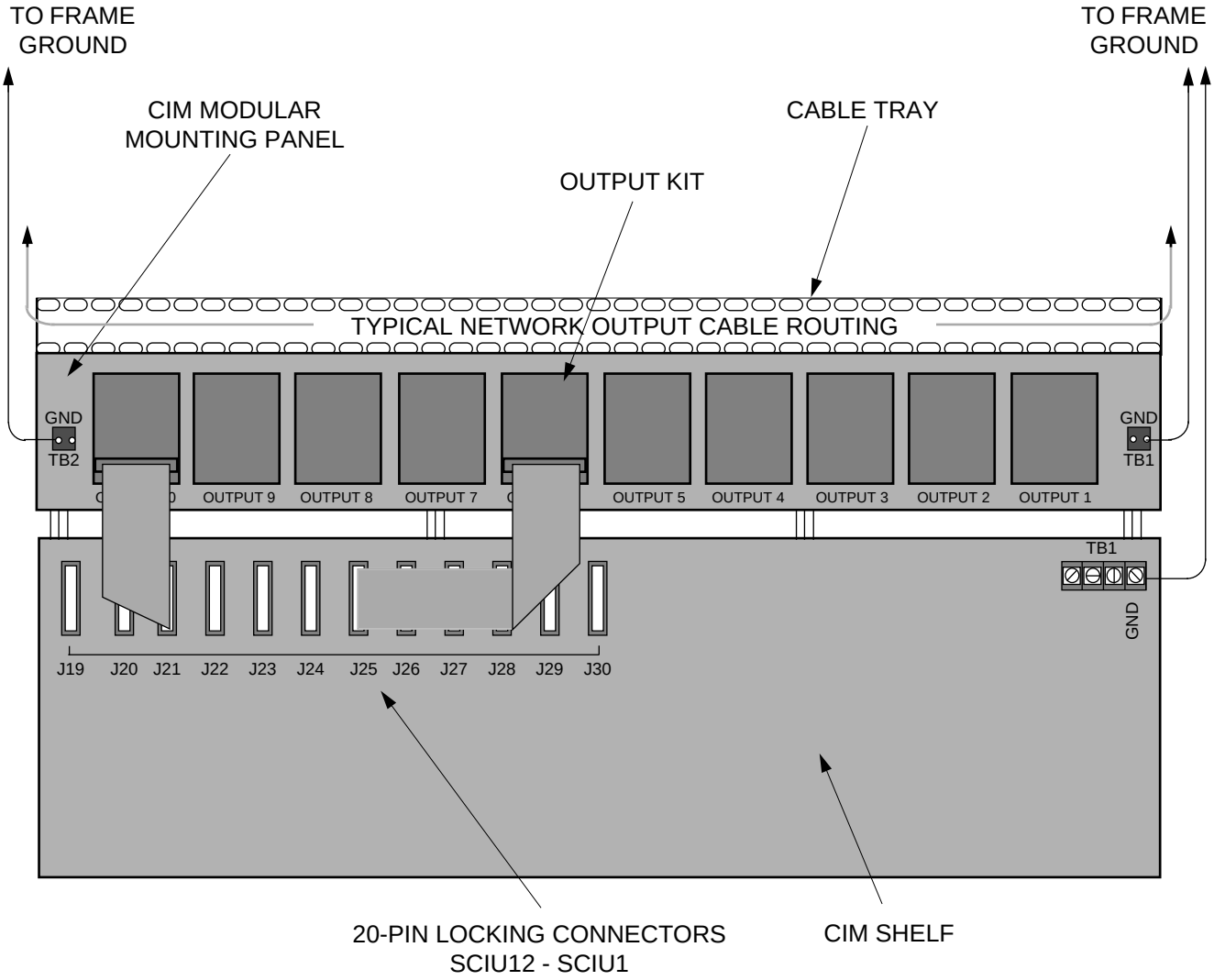


Figure 10. DCD-CIM Modular Mounting Panel Cabling (Rear View)

E. Master to Expansion Shelf Interconnection

2.14 Refer to Table L and Figure 11 and connect the master system shelf to the expansion shelves as follows:

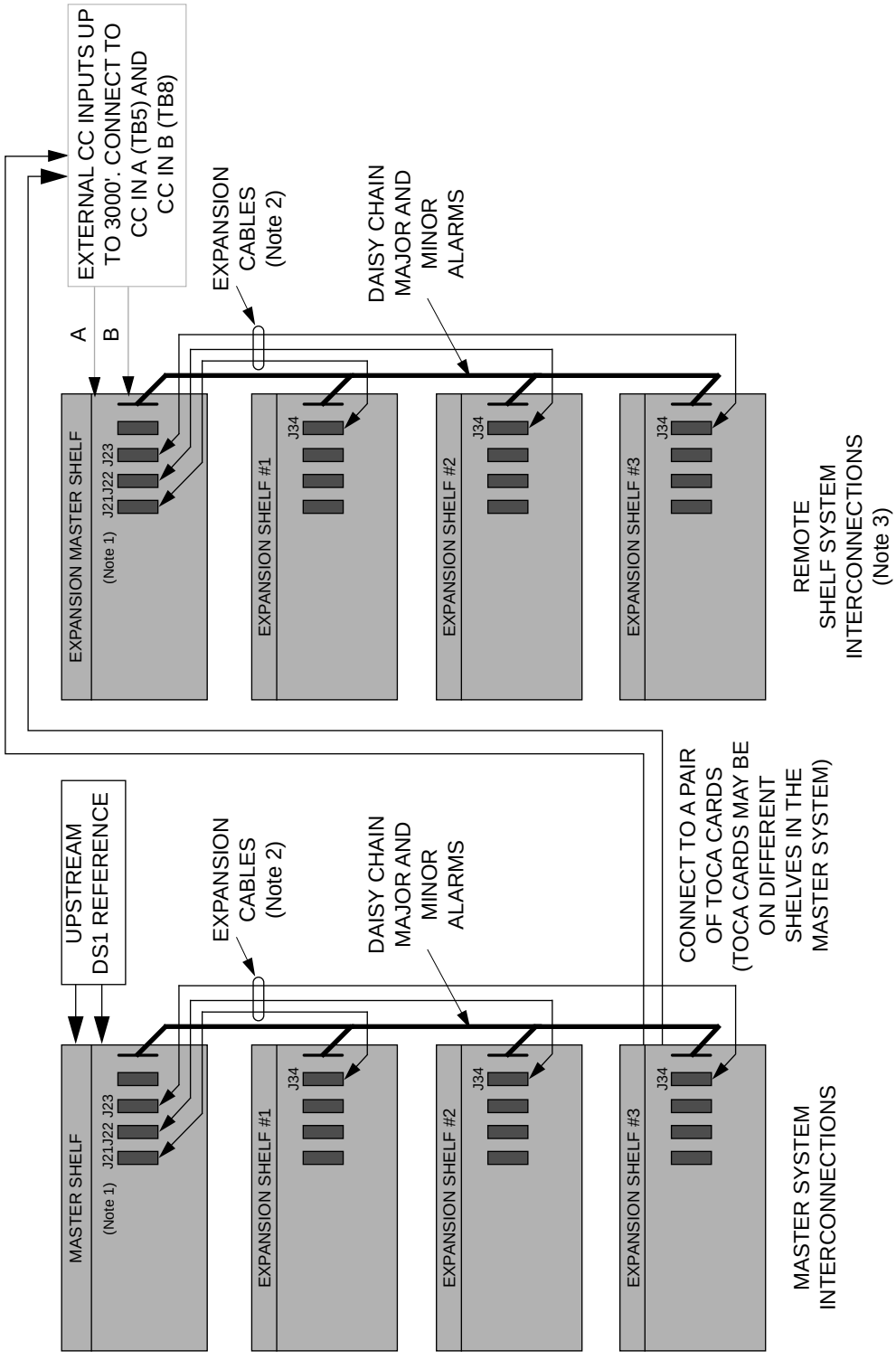
1. Connect the 5-foot connectorized ribbon cable provided with each expansion shelf (part number 060-40004-01), between the connectors of the appropriate shelves (refer to Table L).
2. Route expansion cables to the right, laying them over the top edge of the shelf. Secure cables under the flat cable clamp on the side of the shelf.
3. Take up the slack in the expansion cables by folding them "accordion" fashion. Secure the folds with ribbon-cable clamps or tie-wraps.

Note: As the ribbon cables must lie flat, it is acceptable to fold the cables flat.

Table L. Master to Expansion Shelf Cable Connections

FROM		TO	
ST2 MASTER SHELF		**400/CIM EXPANSION SHELF**	
MASTER OUTPUT	J21	SHELF 1: SLAVE INPUT	J34
MASTER OUTPUT	J22	SHELF 2: SLAVE INPUT	J34
MASTER OUTPUT	J23	SHELF 3: SLAVE INPUT	J34
400/CIM MASTER SHELF*		**400/CIM EXPANSION SHELF**	
MASTER OUTPUT	J31	SHELF 1: SLAVE INPUT	J34
MASTER OUTPUT	J32	SHELF 2: SLAVE INPUT	J34
MASTER OUTPUT	J33	SHELF 3: SLAVE INPUT	J34

* The CIM System is not recommended for use as a master shelf or in a remote expansion system; the CIM does not provide protection switching.



Notes:

1. Master shelf output connectors J21, J22, J23 as shown are for DCD-ST2; corresponding connectors for 400 and CIM master shelves are J31, J32, J33.
2. Connections are made from "MASTER OUTPUT" on the master shelf to J34 "SLAVE INPUT" on the corresponding expansion shelf. TTL, 4 kHz cables are provided with each shelf. Refer to Table R for length limits.
3. The master shelf for the remote system is equipped with two CI cards to accept two CC feeds from the DCD master system located elsewhere.

Figure 11. DCD and CIM System Interconnections (Rear View)

F. Master System to Remote System Interconnection

2.15 The DCD-ST2/400/CIM master and expansion shelf outputs can drive inputs to a remote system master shelf located within the same building. A remote system consists of a remote master shelf and up to three remote expansion shelves.

2.16 The remote master shelf is equipped with two CI cards (optioned for CC) and ST3 card(s) to accept CC feeds from the DCD master system.

Note: CC is only required between the master and remote systems if DS0 phase alignment is required. Otherwise, DS1 between systems is acceptable.

2.17 The remote shelf system can be located up to 1500 feet from the master system, thereby allowing the remote system to be located in another part of the building.

Note: The maximum distance may be increased to 3000 feet by special cable compensation option settings on TOCA cards (see TOCA card option settings in TMSL 097-40000-58, DCD Test and Acceptance).

2.18 Refer to Figures 12 through 13 and Tables M through N to connect the master system to the remote shelf system as follows:

1. Set up and mount a DCD-400/CIM System in the same manner as a master system at its remote site in the building.

2. Use 22 AWG tinned solid copper, shielded twisted-pair cables to connect output ports from any pair of TOCA cards (can be located in different shelves) in the master system to CC IN A (TB5) and CC IN B (TB 8) on the remote master shelf.

   Note: Do not connect the shield leads at both ends.

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

G. Grounding Connections

2.19 Frame ground is connected at the TB1 FRM terminal on the DCD backplane; TB1 also applies -48V A and -48V B. The terminal block is a screw terminal type for spade lug and ring-terminal lug connections. Figures 4 through 6 and Figures 8 through 10 illustrate the DCD ground connections.

Note: 16 AWG stranded wire (green insulation) is used for ground connections; these wires are not provided and must be supplied by the user.

Note: Ensure the ground source is low noise.

1. Use 16 AWG green insulated wire to connect TB1 FRM terminal on the shelf backplane to rack frame ground. To do this, perform one of the following:

   Note: Use a 25 watt soldering iron to ensure the #6 rod is heated sufficiently to prevent a cold solder connection.

   a. If the #6 ground rods are provided, the connection should be soldered to the #6 frame ground rod run vertically on each side of the rack. Two methods are acceptable for connecting the 16 AWG wire to the #6 rod:

      1. Crimp a #16 spade lug to the 16 AWG wire, bend the lug around the #6 rod and solder.

      2. Strip enough insulation from the 16 AWG wire to permit three complete turns around the #6 rod and solder.

   b. If the #6 ground rods are not provided, crimp a #16 spade lug to the 16 AWG wire, remove the paint at a screw hole on the rack, sand the area around the screw hole to ensure proper conductivity, and screw the lug to the screw hole.

   c. Strip 3/16" inch of insulation from the other end of the 16 AWG wire, and crimp a #16 spade or ring-terminal lug that fits around a #6 screw to the 16 AWG wire.

- If a spade lug is used, loosen the TB1 FRM terminal #6 screw, insert the spade lug under the grip lock washer and around the screw, tighten the #6 screw with a medium flat-blade screwdriver.
- If a ring-terminal lug is used, remove the #6 screw from TB1 FRM terminal, put the #6 screw through the ring-terminal lug, screw and tighten the #6 screw on TB1 FRM terminal.

2. Repeat Step 1 for each expansion shelf assembly in the system.
3. If a remote system is installed, perform Steps 1 and 2 for each shelf assembly in the remote system.

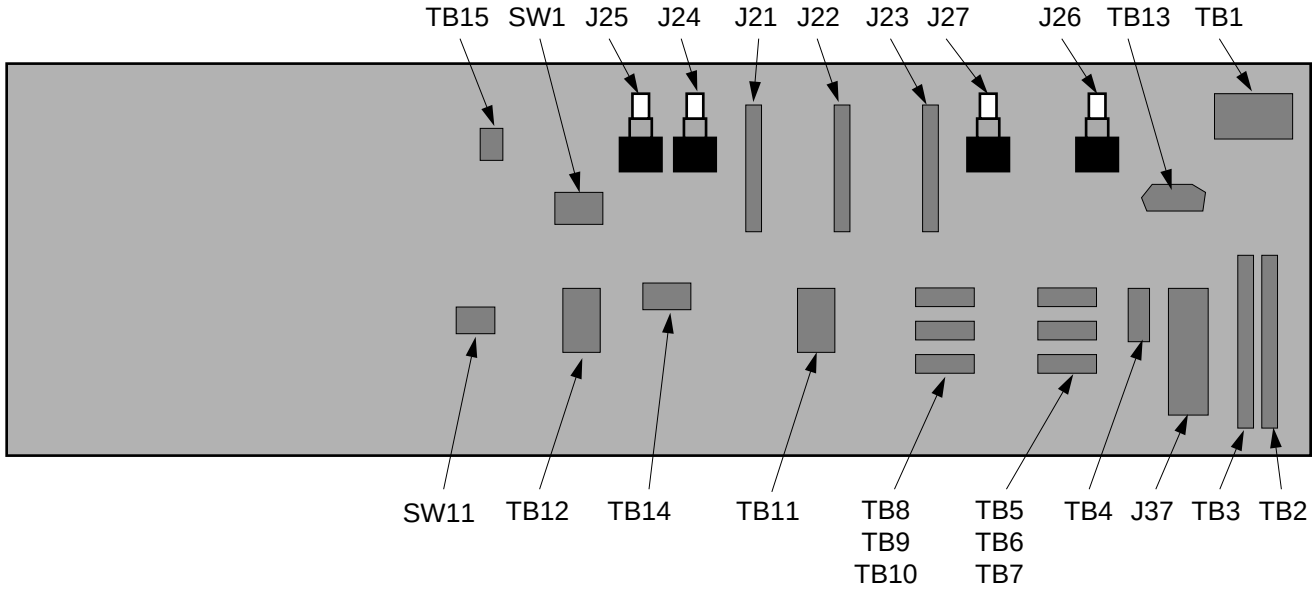


Figure 12. ST2 Rear Panel

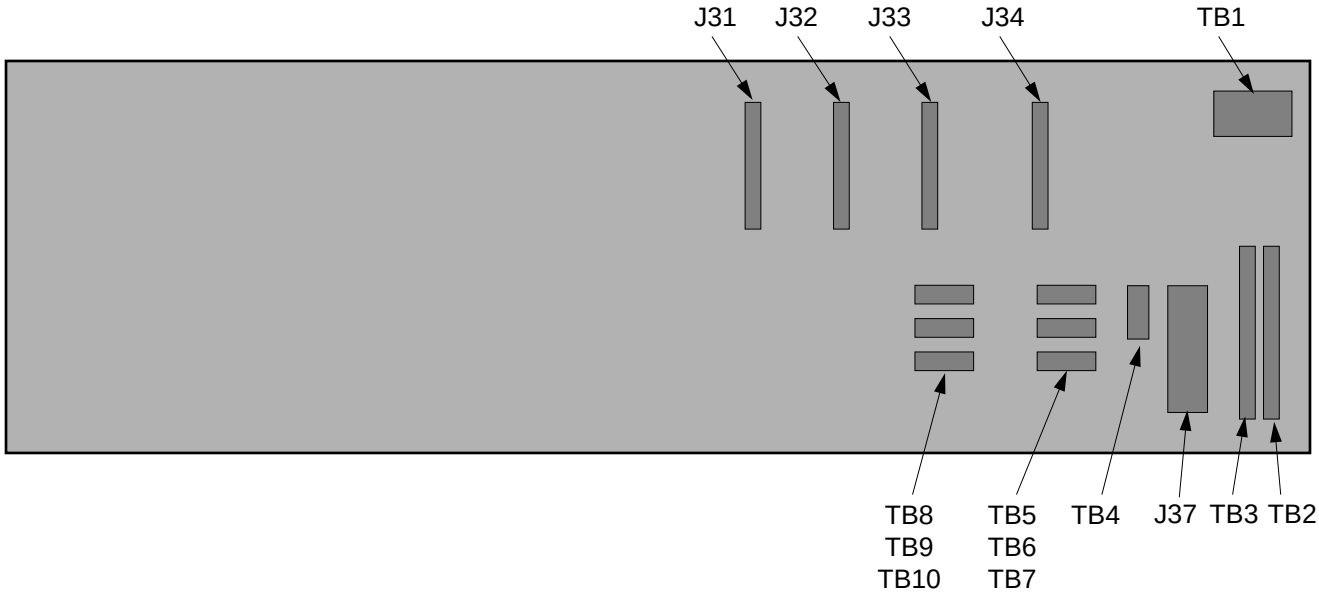


Figure 13. 400/CIM Rear Panel

Table M. ST2 Backplane Connectors And Switches

CONNECTOR/ SWITCH	LABEL	FUNCTION
TB1	——	Office battery, return, and ground connection
TB2	MINOR	External connections for Minor audible and visual alarms, remote alarm cutoff (ACO), and status indicator/return
TB3	MAJOR	External connections for Major audible and visual alarms and status indicators
TB4	REM XFR	Remote switch from active to standby CI (or ACI) card
TB5	CLOCK INPUT A: AUX IN	Auxiliary clock input A (Analog/CC)
TB6	CLOCK INPUT A: DS1 IN - BRDG	DS1 A bridging input
TB7	CLOCK INPUT A: DS1 IN - TERM	DS1 A terminating input
TB8	CLOCK INPUT B: AUX IN	Auxiliary clock input B (Analog/CC)
TB9	CLOCK INPUT B: DS1 IN - BRDG	DS1 B bridging input
TB10	CLOCK INPUT B: DS1 IN - TERM	DS1 B terminating input
TB11	——	ST2 A clock card status outputs
TB12	——	ST2 B clock card status outputs
TB13	——	Cable connector to route power to front panel fuses
TB14	ST2 XFR	Remote switch between ST2 A and ST2 B cards
TB15	——	Loss of battery or a blown fuse status
SW1	ST3--->ST2	Selects Stratum-2 or Stratum-3 operation
SW11	MAJ, MIN	Assigns Major or Minor alarm status to Battery and Holdover alarms
J21	MASTER OUTPUT 1	Expansion bus output to expansion shelf #1
J22	MASTER OUTPUT 2	Expansion bus output to expansion shelf #2
J23	MASTER OUTPUT 3	Expansion bus output to expansion shelf #3
J24	5 MHz OUTPUT A	5 MHz sine wave output (raw rubidium signal)
J25	5 MHz OUTPUT B	5 MHz sine wave output (raw rubidium signal)
J26	AUXILIARY INPUT A	Auxiliary Clock input A (Analog)
J27	AUXILIARY INPUT B	Auxiliary Clock input B (Analog)
J37	REM INTR	Remote communications interface (RS-232C)

Table N. 400/CIM Backplane Connectors And Switches

CONNECTOR/ SWITCH	PIN LABEL	FUNCTION
TB1	——	Office battery, return, and ground connection
TB2	MINOR	External connections for Minor audible and visual alarms, remote alarm cutoff (ACO), and status indicator/return
TB3	MAJOR	External connections for Major audible and visual alarms and status indicators
TB4	REM XFR	Remote switch from active CI (or ACI) card to standby CI (or ACI) card
TB5	CLOCK INPUT A: CC	Composite clock input A
TB6	CLOCK INPUT A: DS1 IN - BRDG	DS1 A bridging input
TB7	CLOCK INPUT A: DS1 IN - TERM	DS1 A terminating input
TB8	CLOCK INPUT B: CC	Composite clock input B
TB9	CLOCK INPUT B: DS1 IN - BRDG	DS1 B bridging input
TB10	CLOCK INPUT B: DS1 IN - TERM	DS1 B terminating input
J31	MASTER OUTPUT 1	Expansion bus output to expansion shelf #1
J32	MASTER OUTPUT 2	Expansion bus output to expansion shelf #2
J33	MASTER OUTPUT 3	Expansion bus output to expansion shelf #3
J34	SLAVE INPUT	Expansion bus input from master shelf
J37	REM INTR	Remote communications interface (RS-232C)

H. Power Connections (Battery and Return Leads)

2.20 Power connections are performed on TB1 (Figure 14). The DCD-ST2 shelf is fused for 5A, the DCD-400 and DCD-CIM shelves are fused for 2A. Fusing at the fuse bay or miscellaneous fuse panel should be 150% of the shelf rating, or the nearest larger size (7.5 A to 10 A for the DCD-ST2, 3A for the DCD-400 and DCD-CIM).

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, then run both A and B feeds from that single source, diversely routed.

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

-48V Connections

2.21 Use 16 AWG stranded wire to connect office battery supply leads from the power source to the terminals on the DCD backplane. The -48 volts dc A and B input voltage supplies can be either filtered or unfiltered.

Note: A and B power inputs must come from two separate sources (loads). 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.

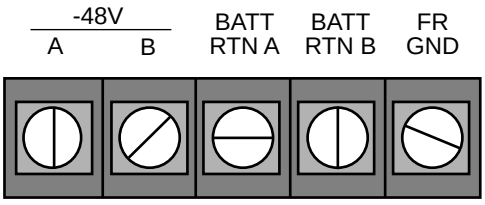
2.22 When connecting power from the fuse panel to the shelf, three types of terminal blocks (Figure 14) are available: 5-position (new DCD-ST2 version), 4-position, and 4-position with splitter, DCD-400, DCD-CIM, and older versions of the DCD-ST2.

- The 5-position terminal block (Figure 14A) provides separate return terminals for BATT A, BATT B, BATT RTN A, BATT RTN B, and FR GND (frame ground).
- With the 4-position terminal block (Figure 14B), there is only one BATT RTN position.
- The 4-position terminal block equipped with a splitter (Figure 14C) provides separate return terminals for BATT RTN A, BATT RTN B, and FR GND (frame ground). Use the battery-return splitter provided (p/n 074-00002-01) to connect both the BATT A and BATT B return wires to the BATT RTN terminal of the 4-position TB1 as follows:

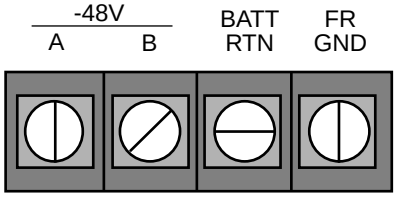
1. Remove and discard the screw and square washer to the BATT RTN terminal of TB1.
2. Refer to Figure 15, and align the splitter over the terminal. Using the supplied 6-32"x 1/2" screw, connect the splitter to the terminal.
3. Repeat Steps 1 and 2 for the remaining three shelves.

2.23 After the check for foreign battery and ground has been completed, connect leads to the DCD per the following:

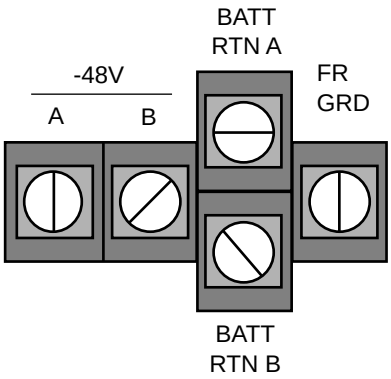
1. Run all power wires from the power sources to TB1 on the DCD shelf.
2. Strip approximately 3/16" of insulation from the ends of BATT and BATT RTN A and B wires.



A. 5-Position Power Terminal Block



B. 4-Position Power Terminal Block



C. 4-Position w/Splitter Power Terminal Block

Figure 14. Wiring for Power Terminal Block 1 (TB1)

Crimp spade or ring-terminal lugs on the ends of the BATT and BATT RTN A and B wires. The lugs must be large enough to fit #6 screws.

3. Connect the battery supply leads "A" and "B" from the fuse panel to the BATT A and BATT B terminals on TB1 on the rear of each shelf (refer to Figure 14).

4. Connect the battery supply return leads to TB1 as follows:

   - If TB1 is a 5-position terminal block, connect the battery supply return leads A and B to BATT RTN A and BATT RTN B.

   - If TB1 is a 4-position terminal block with a splitter, connect the battery supply return lead A to the upper end of the splitter and connect battery supply return lead B to the lower end of the splitter.

5. 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.

6. Repeat Step 1 through Step 5 for each shelf in the system (master and remote, as applicable).

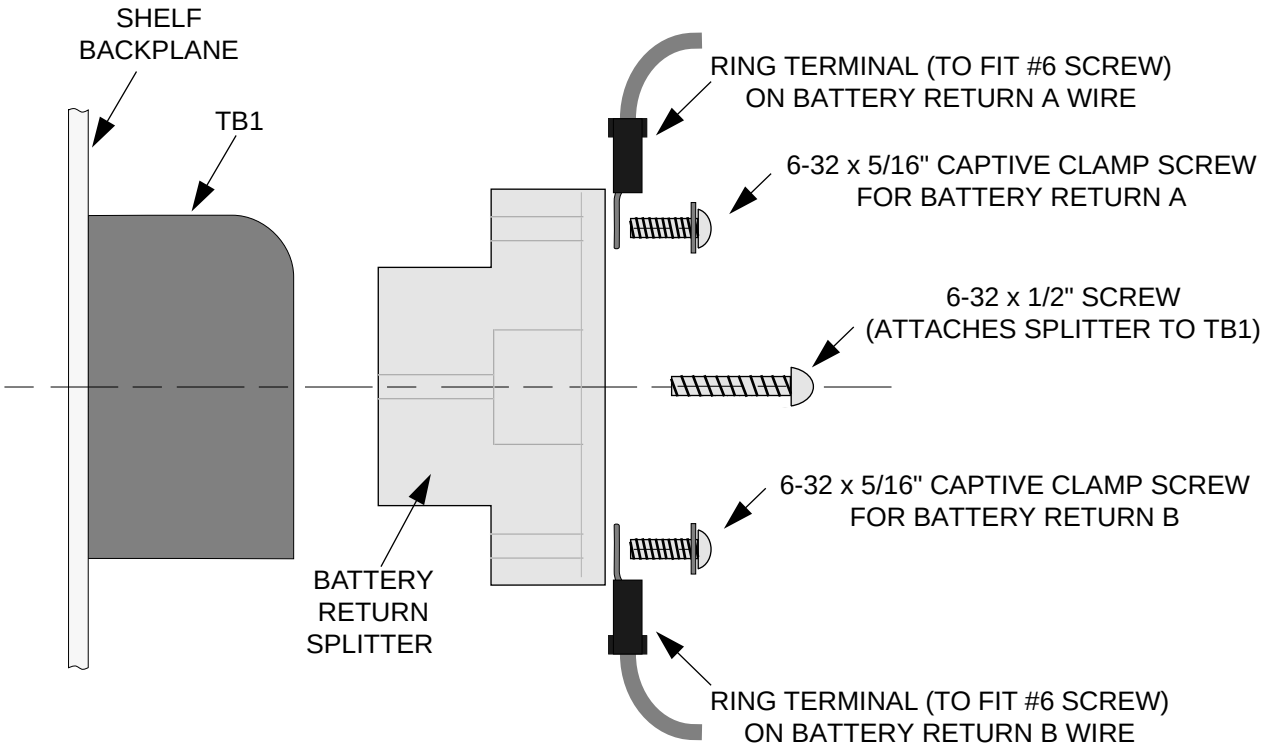


Figure 15. Battery Return Splitter (Side View)

I. System Setup

DCD-ST2 Master Shelf Setup

2.24 Consult the local company Installation Job Specifications to set switches SW1 and SW11 on the DCD-ST2 master shelf backplane for setting up the system (see Figure 12 for switch locations); the switches have no effect on the expansion shelves.

- SW1 selects the clock operation for the shelf. Set SW1 to ST2 for ST2E or ST2 clock card operation; set to ST3 for all other clock cards (the default setting is ST2).

- SW11, section 1, is set to cause the system to generate a major or minor alarm in the event of a power (battery) loss (A or B). Set SW11-1 to MAJ if a major alarm is to be generated; set to MIN for a minor alarm (the default setting is MAJ).

- SW11, section 2, is set to cause the system to generate a major or minor alarm in the event both clock cards enter holdover mode. Set SW11-2 to MAJ if a major alarm is to be generated (default setting); set to MIN for a minor alarm.

Note: If the shelf is to be equipped with ST3E-01 clock cards, then SW1-5 and the ST3E-01 cards must be set the same as SW 11-2. If the shelf is to be equipped with ST3E-03 clock cards, then SW1-5 on ST3E-03 and SW 11-2 on the shelf backplane do not function.

1. Using Figure 12 and Table O as reference, set switches SW1 and SW11 on the backplane of the DCD-ST2 master shelf assembly per local company Installation Job Specifications.

2. Repeat Step 1 for each remote system master DCD-ST2 shelf in the building.

Note: The DCD-400 and DCD-CIM shelves do not have any backplane switch settings.

J. Reference Inputs

Installation Considerations

2.25 When connecting the reference inputs, adhere to the following guidelines:

- Do not run reference input cables near inductive devices (large motors, generators, transformers, etc.) or other equipment which radiates strong magnetic fields.

- Always connect the cable shield to the S (shield) wire-wrap terminals first. Do not use CCK for ST2E/ST2/ST3E 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.

- Run all reference input cables direct. Do not use tie cables or otherwise break the shield between

Table O. DCD-ST2 Master Shelf - System Setup

SWITCH	POSITION	FUNCTION	DEFAULT
SW1	ST2	Clock option set for ST2E/ST2 clock operation	X
	ST3	Clock option set for ST3E/ST3 clock operation	
SW11, Section 1	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)	
SW11, Section 2	MAJ	Sets the system to generate a major alarm in the event of holdover mode of both clock cards	X
	MIN	Sets the system to generate a minor alarm in the event of holdover mode of both clock cards	

the DCD System and the device delivering the clock input. If broken, the shield leads must be bonded.

- Exceeding the upper limit (3.5V b-p [TERM] or 0.35V b-p [BRDG], base-to-peak) will overdrive the internal bridging repeater of the CI, causing the FAIL lamp to light on the CI card. One possible solution to circumvent this reaction would be to add a 100 ohm, 1/4 watt resistor across the tip (T) and ring (R) leads of the DS1 IN wire-wrap terminals on the DCD shelf.

Reference Input Connections

2.26 The DCD-ST2, 400, and CIM systems accept two (A and B) timing inputs. These may be bridged or terminated DS1 inputs or Composite Clock (CC) inputs (see Table P). Connect the selected timing inputs to the wire-wrap terminals of the appropriate terminal block at the proper pins: S for shield, T for tip, and R for ring.

Table P. Input Signal Connections

SIGNAL	TERMINAL BLOCK
CLOCK INPUT A	
CC (DCD-400/CIM), AUX IN (DCD-ST2)	TB5
DS1 BRDG (Bridged)	TB6
DS1 TERM (Terminated)	TB7
CLOCK INPUT B	
CC (DCD-400/CIM), AUX IN (DCD-ST2)	TB8
DS1 BRDG (Bridged)	TB9
DS1 TERM (Terminated)	TB10

Caution: Always connect the cable shield to the S (shield) wire-wrap pin first. Never attach a CC cable to a DS1 input, or vice versa; do not use a CC cable for ST2E/ ST2/ST3E applications.

2.27 For all inputs (DS1 bridged and terminated, and CC/AUX) use 22 AWG twisted, shielded-pair ABAM (or equivalent) cable.

Note: Because the clock input shield pin is capacitively coupled to ground, connect the cable shield to the S (shield) pin on the shelf *and* to the frame ground at the DSX.

2.28 The DS1 input signals used as reference for the ST2 must be certified Stratum-2 or better quality (per ANSI-TI-101).

2.29 The ST2 shelf has additional BNC input connectors (J26 and J27), labeled "AUXILIARY INPUT" A and B, which accept coaxial cable analog signals from PRS equipment. J26 and J27 are internally connected to AUX IN wire-wrap terminals TB5 and TB8, respectively. If J26 and J27 are used, do not use TB5 and TB8, and vice versa.

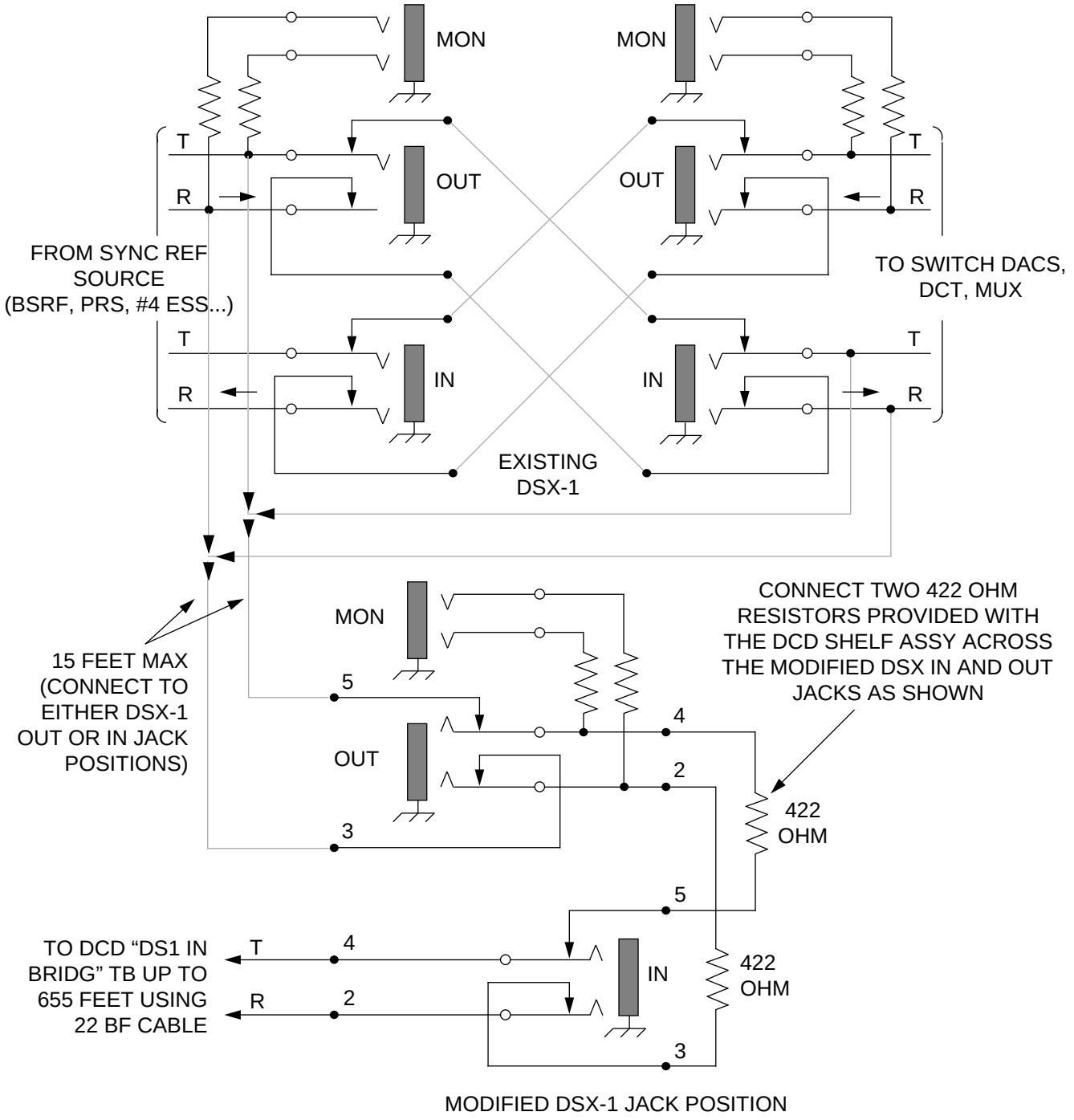
2.30 If BNC analog inputs are required for a DCD-400 or DCD-CIM shelf, then a BNC Adapter Kit (p/n 990-00098-01) must be ordered as a separate line item and soldered to TB5 and TB8 wire-wrap terminals. The BNC Adapter Kit is shipped with installation instructions.

DS1 Bridged Inputs

2.31 Use the bridging input if the DS1 is traffic-carrying and terminated on another piece of equipment. Use the supplied 422Ω resistors (or bridge tap from other manufacturers—see next paragraph) to bridge onto the signal at the DSX-1 and connect to the BRDG inputs (TB6 and TB9). The DCD can be up to 655 feet from the DSX-1. (This is a -20 dB DSX level input reference signal.)

2.32 Bridging resistors (422 ohms) are provided with each shelf assembly. Connect the resistors at the DSX-1, or use a bridging resistor terminal block (ADC part number 4-26248-0014 or Micropak part number 100002-001), bridging circuit network clock sync jack panel (AT&T [part number ED-1C544-30] or a TELECT [part number 020-185] Sync Jack) as shown in Figure 16.

2.33 The bridging resistors must be connected to the DSX-1 within 15 feet (maximum) to avoid mismatching the cable and affecting service on the traffic-carrying DS1 system.



Note: Bridging connections to the DCD can be made via "off the shelf" bridging networks (follow manufacturers' connection instructions), such as:

- ADC P/N 4-26248-0014
- MICROPAK P/N 100002-001
- TELECT P/N ED 20-185
- AT&T P/N ED IC544-30

Figure 16. DS1 Bridging Connections for Input Unit

DS1 Terminated Inputs

2.34 Use the terminated input if the DS1 is not traffic-carrying and is a timing signal only. This signal can be terminated on the DCD shelf using the TERM inputs (TB7 and TB10). The DCD can be up to 655 feet from the DSX-1. (This is a 0 dB DSX level input reference signal.)

Composite Clock Inputs

2.35 CC/AUX IN (TB5 and TB8) inputs are used when the DCD system is slaved from an existing office clock. The signal source can be up to 1,500 cable feet from the DCD.

5 MHz Stratum Connection

2.36 The BNC connectors J24 and J25 (5 MHz OUTPUT A and 5 MHz OUTPUT B) on the DCD-ST2 shelf are for connecting to the DCD-LPR shelf. They provide the necessary 5 MHz stratum signal source for the DCD-LPR shelf. If this connection is made, a 5-MHz Isolator Assembly Kit (p/n 093-45110-04) must be ordered as a separate line item and installed.

K. SCIU Connections

2.37 The SCIU cards are different from the TOxA cards. TOxA timing output ports are cabled directly to the internal clock extraction circuitry of network elements (their internal clocks). In short, these network elements can accept direct external reference clock signals to their internal clocks. The SCIU cards are designed to insert the DCD clock signal (BITS) into DS1 traffic-carrying facilities (spans) for those network elements that indirectly extract their reference clock signals from the traffic spans.

2.38 The SCIU cards are unprotected (no HS protection switching). Their output connection modules are connected via ribbon cable to the unprotected connectors on the DCD shelf backplane, bypassing the shelf's relay protection matrix. The SCIU output wire-wrap modules and panels have bypass relays on them which release and close contacts to maintain continuity on the traffic spans if the SCIU card fails or is removed from the shelf. The SCIU card should always be connected into the traffic span from an SCIU wire-wrap module or panel. The standard output wire-wrap panel or module does not have bypass relays.

2.39 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 SCIU without clock insertion. See Figure 17 for typical applications connections of the SCIU cards.

2.40 The SCIU cards' A and B direction output signals are nominally 3.0 volts base-to-peak (b-p) amplitude (0 dB DSX level) and are designed for connection into the DS1 bitstream at a standard digital signal level cross-connect point, such as a digital signal cross-connect (DSX). See Figure 18 for typical connection of the SCIU at a standard digital signal level cross-connect point.

2.41 If a standard digital signal cross-connect point is not available, then the received signal levels at the SCIU A and B inputs must be in the range of 1.5 volts to 4.5 volts b-p into 100 ohms. The network elements receiving the SCIU output signal must be able to accept signal levels in the range of 3.0 volts b-p nominal before line build-out in the SCIU cards.

2.42 The SCIU wire-wrap module or panel terminals are cabled to the digital signal cross-connect test access jack sets, such as DSX-1 jacks as follows (see Figure 18):

1. Use 22 AWG, tinned solid copper, shielded twisted pair cable (user-supplied) to connect the SCIU wire-wrap module or panel EAST and WEST terminals to two DSX-1 access jack sets; refer to Table Q.

2. Repeat Step 1 for each SCIU wire-wrap module or panel installed.

Table Q. SCIU Module to Access Jack Connections

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

2.43 If a standard level cross-connect point is not available, then the SCIU must be connected directly to the line and office network elements' transmit and receive terminals of the traffic-carrying DS1 facility as follows:

1. Use 22 AWG, tinned solid copper, shielded twisted pair cable (user-supplied) to connect the SCIU wire-wrap module or panel EAST and WEST terminals to the two network elements on the spans; refer to Table R.

2. Repeat Step 1 for each SCIU wire-wrap module or panel installed.

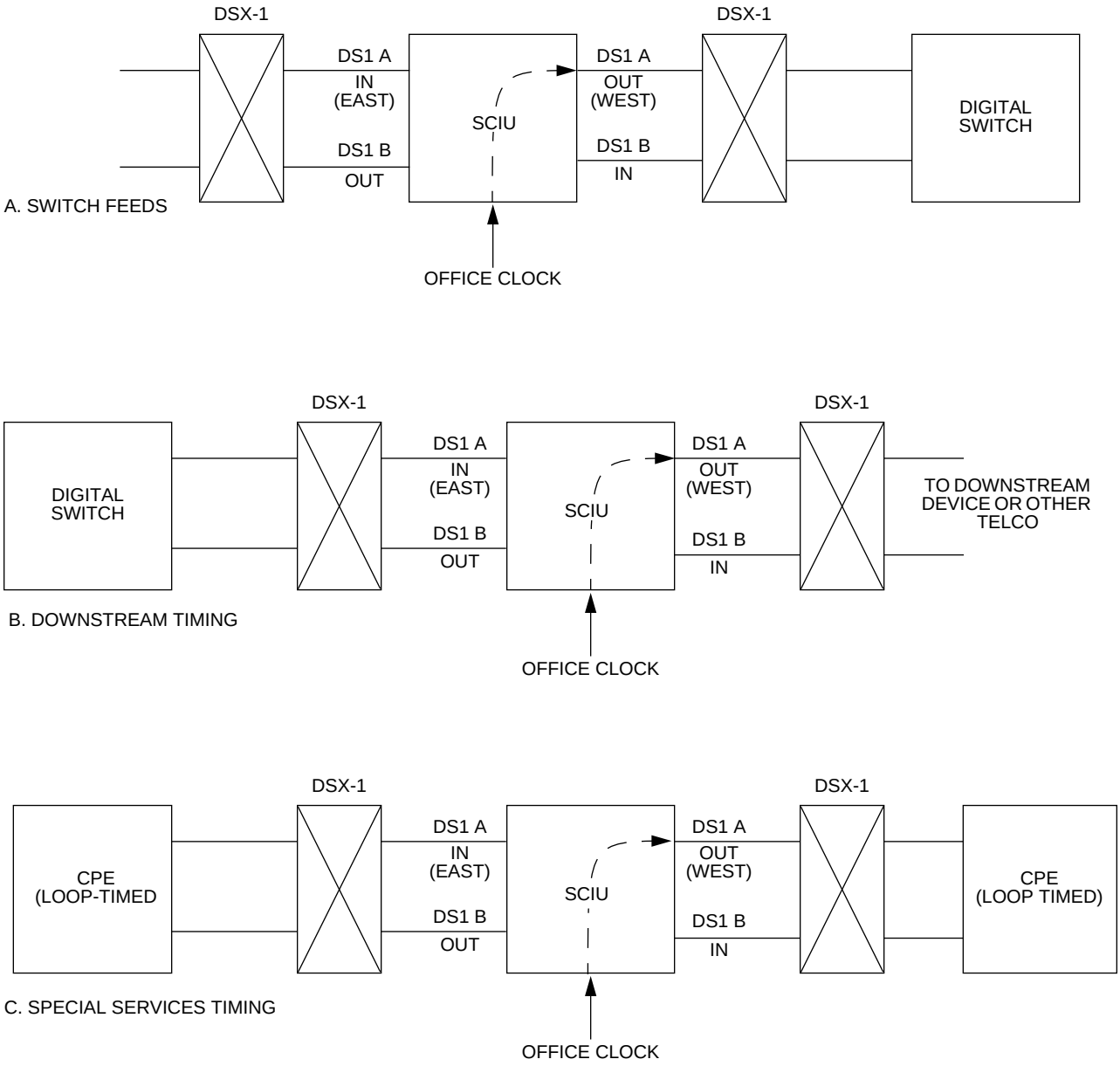


Figure 17. SCIU Timing Applications

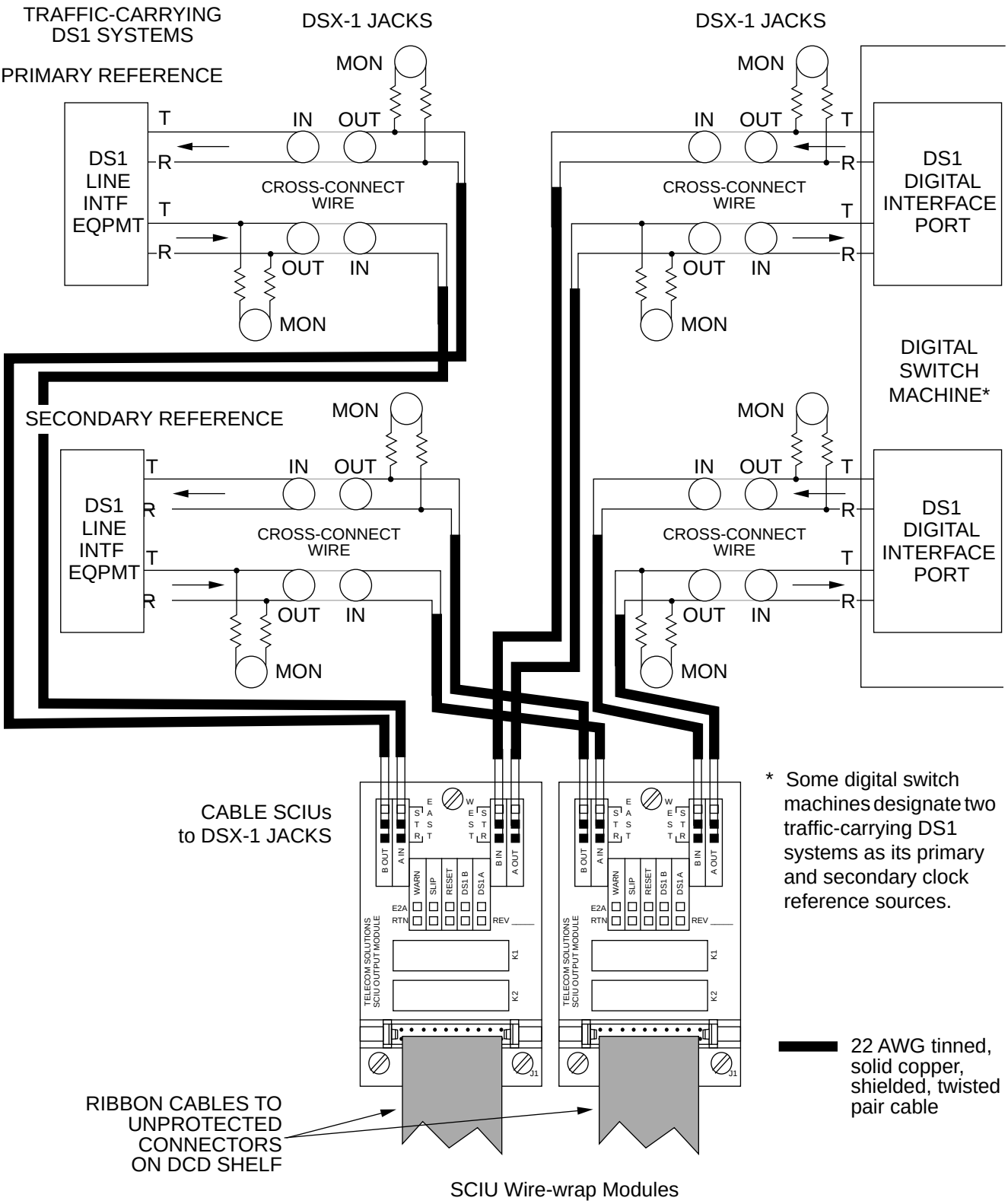


Figure 18. SCIU to DSX Jack Cabling

Table R. SCIU Module to Network Element Connections

MODULE	NETWORK ELEMENT (NE)*
EAST A IN	Transmit or OUT side of the NE not being retimed from the BITS
EAST B OUT	Receive or IN side of the NE not being retimed from the BITS
WEST B IN	Transmit or OUT side of the NE to be retimed from the BITS
WEST A OUT	Receive or IN side of the NE to be retimed from the BITS

* Transmit or OUT is transmission towards the wire-wrap module.
Receive or IN is transmission from the wire-wrap module.

2.44 If the SCIU wire-wrap module or panel alarm and control terminal sets are to be cabled to telemetry equipment (consult local company Installation Job Specifications), perform the following:

1. Use 24 AWG, tinned solid copper paired cable (user-supplied) to connect the terminal sets listed in Table S.

2. Repeat Step 1 for each SCIU wire-wrap module or panel installed.

L. Test and Acceptance

2.45 At this point, refer to TMSL 097-40000-58, DCD Test and Acceptance Procedures, for instructions on installing and testing the DCD cards, as well as instructions for performing a test and acceptance of the system.

2.46 Once the test and acceptance has been completed as instructed, proceed to the next section.

Table S. SCIU Alarm and Control Connections

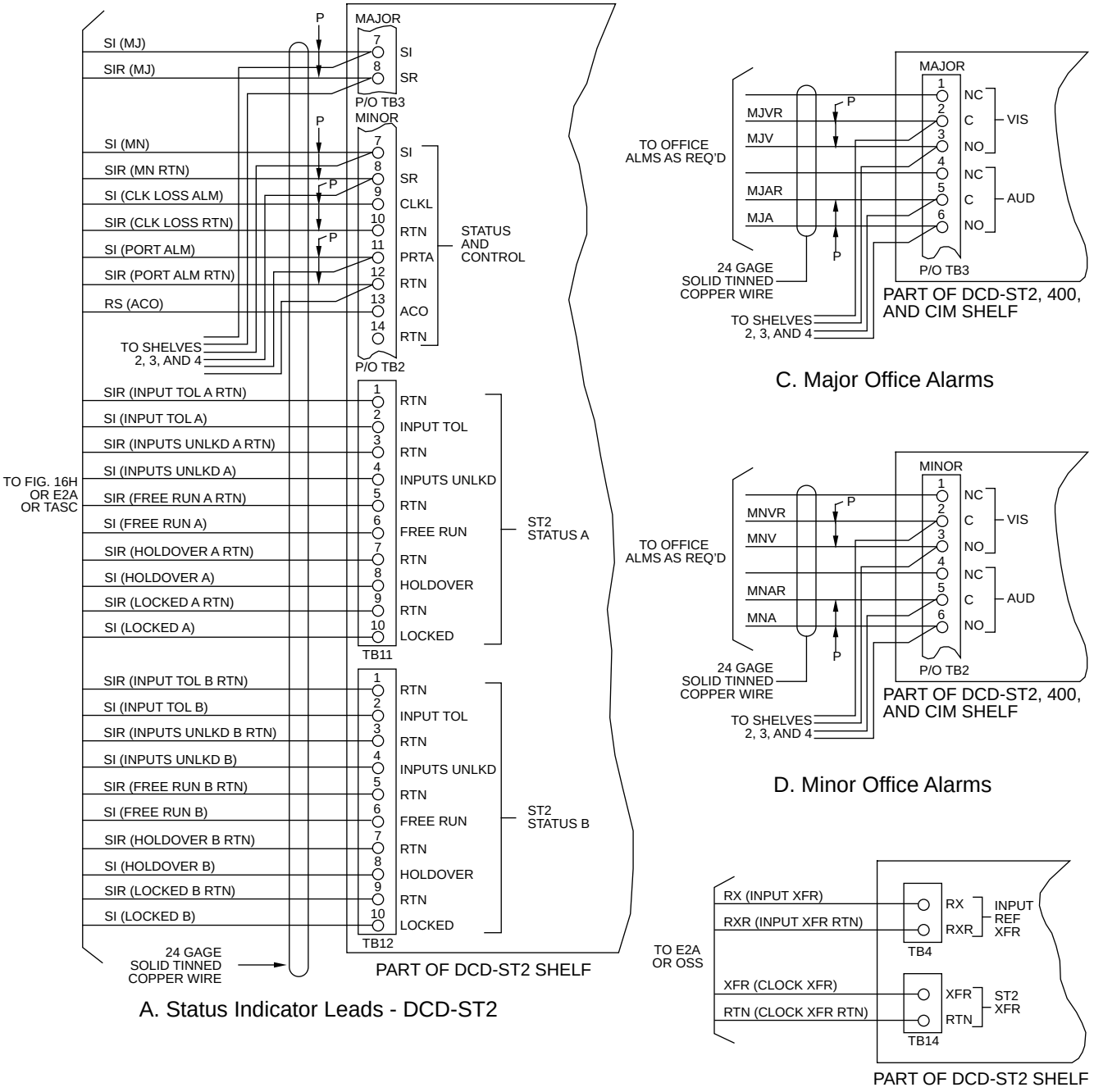
TERMINAL SETS	COMMENTS
WARN (Alarm)	Do not cable
SLIP (Alarm)	Cable to E2A telemetry equipment scan-point
RESET (Control)	Cable to E2A telemetry equipment control-point
DS1 A (Alarm)	Cable to E2A telemetry equipment scan-point
DS1 B (Alarm)	Cable to E2A telemetry equipment scan-point

M. Alarm, Status, and Control Terminations

2.47 The DCD shelf has wire-wrap terminals for Office Alarms (TB2 and TB3), Shelf Status indications (DCD-ST2 only, TB2 and TB15), Clock Status (A and B) indications (DCD-ST2 only, TB11 and TB12), and Control functions (TB2 and TB4; also TB14 for DCD-ST2).

2.48 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 telemetry equipment scan-point inputs to a centralized alarm surveillance and control center. The Control terminals connect to 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.

2.49 Connect the Office Alarm, Shelf Status, Clock Status A and B, and Control terminals to the CO Audible/Visual Alarm System and telemetry equipment using Figure 19 and Tables T, U, and V as reference.

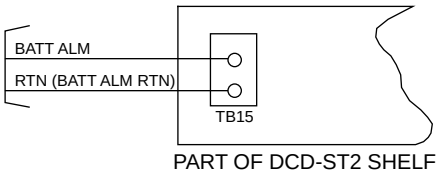


A. Status Indicator Leads - DCD-ST2

C. Major Office Alarms

D. Minor Office Alarms

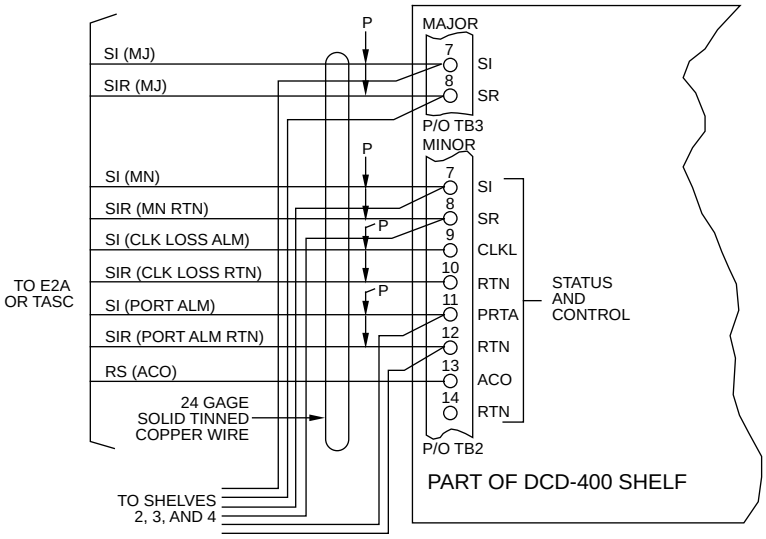
E. Remote Transfer Leads



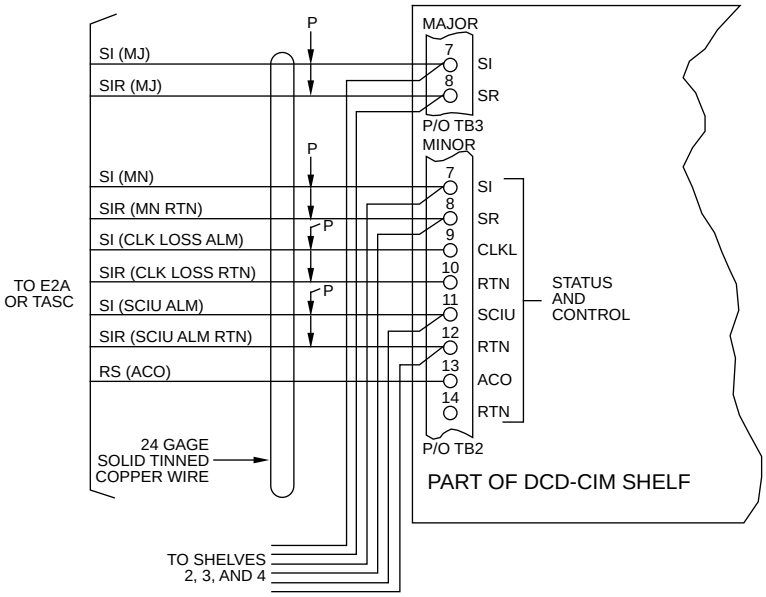
B. Battery Alarm (Major or Minor)

A = Front of Terminal Block
K = Base of Terminal Block
E = Adjacent Rows on Terminal Block
P = Pair

Figure 19. Alarm Connections (Sheet 1 of 3)



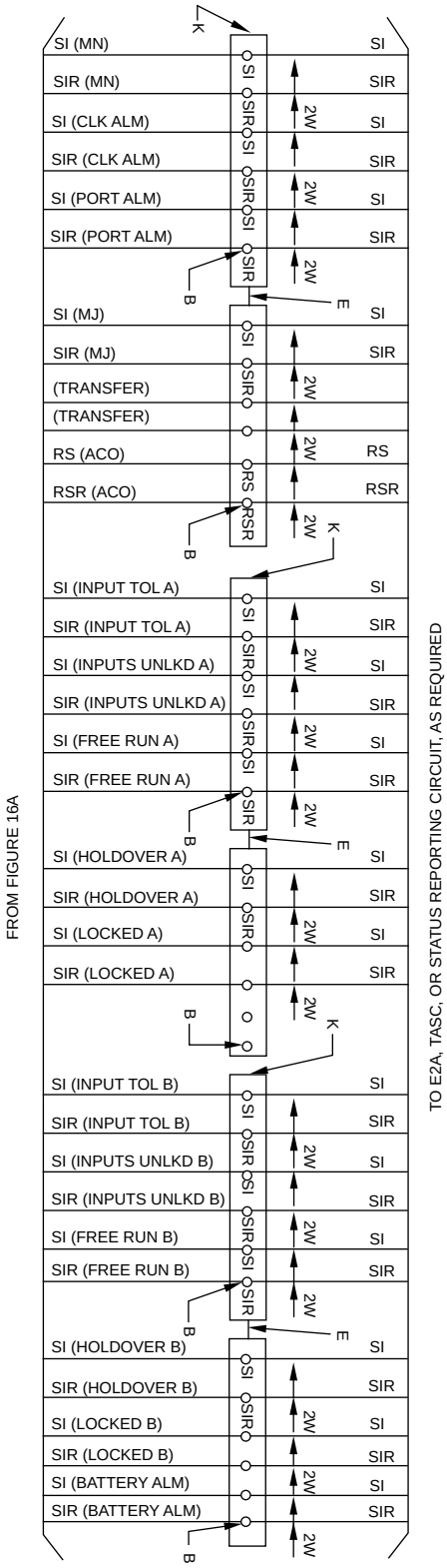
F. Status Indicator Leads - DCD-400



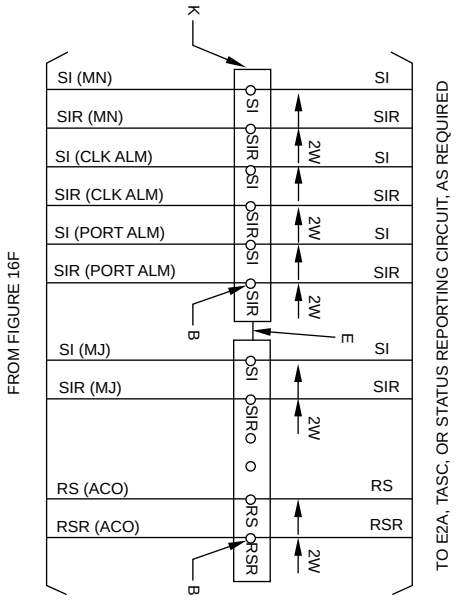
G. Status Indicator Leads - DCD-CIM

A = Front of Terminal Block
K = Base of Terminal Block
E = Adjacent Rows on Terminal Block
P = Pair

Figure 19. Alarm Connections (Sheet 2 of 3)



H. Frame Termination Status Leads - DCD-ST2



I. Frame Termination Status Leads - DCD-400

A = Front of Terminal Block
K = Base of Terminal Block
E = Adjacent Rows on Terminal Block
P = Pair

Figure 19. Alarm Connections (Sheet 3 of 3)

Table T. Local Alarm Connections

TERMINAL BLOCK	PIN NO.	PIN LABEL	FUNCTION (SEE NOTE)
DCD-ST2 SHELF			
TB3	1	VIS NC	Visual Major - Normally Closed (NC)
	2	VIS C	Visual Major - Closed (C)
	3	VIS NO	Visual Major - Normally Open (NO)
	4	AUD NC	Audible Major - Normally Closed (NC)
	5	AUD C	Audible Major - Closed (C)
	6	AUD NO	Audible Major - Normally Open (NO)
TB2	1	VIS NC	Visual Minor - Normally Closed (NC)
	2	VIS C	Visual Minor - Closed (C)
	3	VIS NO	Visual Minor - Normally Open (NO)
	4	AUD NC	Audible Minor - Normally Closed (NC)
	5	AUD C	Audible Minor - Closed (C)
	6	AUD NO	Audible Minor - Normally Open (NO)
DCD-400/CIM SHELF			
TB3	1	VIS NC	Visual Major - Normally Closed (NC)
	2	VIS C	Visual Major - Closed (C)
	3	VIS NO	Visual Major - Normally Open (NO)
	4	AUD NC	Audible Major - Normally Closed (NC)
	5	AUD C	Audible Major - Closed (C)
	6	AUD NO	Audible Major - Normally Open (NO)
TB2	1	VIS NC	Visual Minor - Normally Closed (NC)
	2	VIS C	Visual Minor - Closed (C)
	3	VIS NO	Visual Minor - Normally Open (NO)
	4	AUD NC	Audible Minor - Normally Closed (NC)
	5	AUD C	Audible Minor - Closed (C)
	6	AUD NO	Audible Minor - Normally Open (NO)
Note: Alarms are Form C relay contact closures.			

Table U. Status Indicator Connections

TERMINAL	PIN NO.	PIN LABEL	FUNCTION
DCD-ST2, DCD-400, DCD-CIM SHELVES			
TB3	7	SI	Status Indicator Major (Note 1)
	8	SR	Status Indicator Major Return (Note 1)
TB2	7	SI	Status Indicator Minor (Note 1)
	8	SR	Status Indicator Minor Return (Note 1)
	9	CLKL	Input Clock Loss Alarm Minor (Note 2)
	10	RTN	Input Clock Loss Alarm Minor Return (Note 2)
	11	PRTA	Port Alarm Minor (Note 2)
	12	RTN	Port Alarm Minor Return (Note 2)
DCD-ST2 SHELF			
TB11	1	RTN	Input Tolerance A Return (Note 2)
	2	INPUT TOL	Input Tolerance A (Note 2)
	3	RTN	Inputs Unlocked A Return (Note 2)
	4	INPUTS UNLKD	Inputs Unlocked A (Note 2)
	5	RTN	Free Run A Return (Note 2)
	6	FREERUN	Free Run A (Note 2)
	7	RTN	Holdover A Return (Note 2)
	8	HOLDOVER	Holdover A (Note 2)
	9	RTN	Locked A Return (Note 2)
	10	LOCKED	Locked A (Note 2)
TB12	1	RTN	Input Tolerance B Return (Note 2)
	2	INPUT TOL	Input Tolerance B (Note 2)
	3	RTN	Inputs Unlocked B Return (Note 2)
	4	INPUTS UNLKD	Inputs Unlocked B (Note 2)
	5	RTN	Free Run B Return (Note 2)
	6	FREERUN	Free Run B (Note 2)
	7	RTN	Holdover B Return (Note 2)
	8	HOLDOVER	Holdover B (Note 2)
	9	RTN	Locked B Return (Note 2)
	10	LOCKED	Locked B (Note 2)

Table U. Status Indicator Connections (Contd)

TERMINAL	PIN NO.	PIN LABEL	FUNCTION
TB15	1	BATT ALM	Battery (Fuse) Alarm (Major or Minor) (Note 1)
	2	RTN	Battery Alarm Return (Note 1)

NOTES:
1. Form C relay contact closure
2. Open-collector closure

Table V. Alarm and SI Terminals and SS Types

ALARM/SI	-48 V, LOOP, OR GND ON SI (Notes 1, 2, 3)	SS TYPE (Note 4)	REFER TO FIGURE 20, SECTION:
SHELF STATUS			
MAJOR	LOOP	1	A
MINOR	LOOP	1	A
PRTA	GND	2	B
CLKL	GND	2	B
BATTALM (DCD-ST2 ONLY)	GND	2	C
CLOCK STATUS A AND B (DCD-ST2 ONLY)			
LOCK	GND	3	B
HOLDOVER	-48 V	3	C
FREERUN	GND	2	B
UNLOCK	GND	2	B
INPTOL	GND	2	B

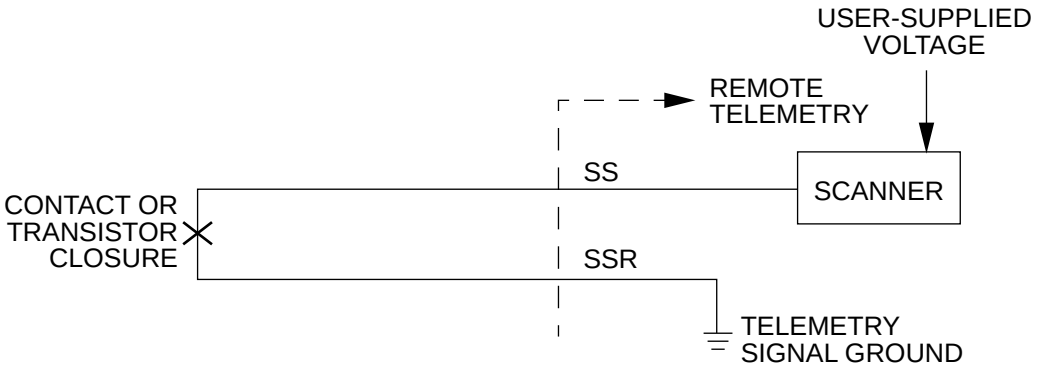
Notes:

1. LOOP indicates that the SI and SR terminals are relay contact closures.

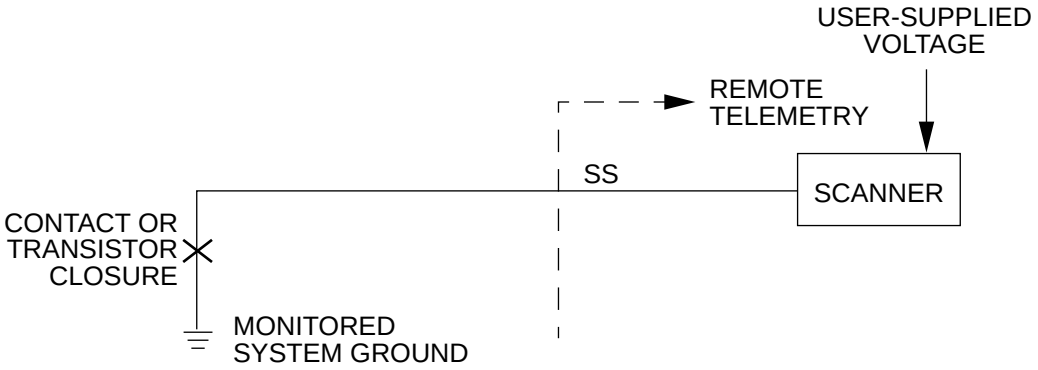
2. GND indicates that the SR terminal is at battery return, or ground, potential. A closure here (SI to SR) connects the SI terminal to ground.

3. -48 V indicates that the SI terminal is pulled to the -48 volt potential through a load, and the SR terminal is at the ground, or battery return, potential. A closure here (SI to SR) brings the SI terminal to near ground potential.

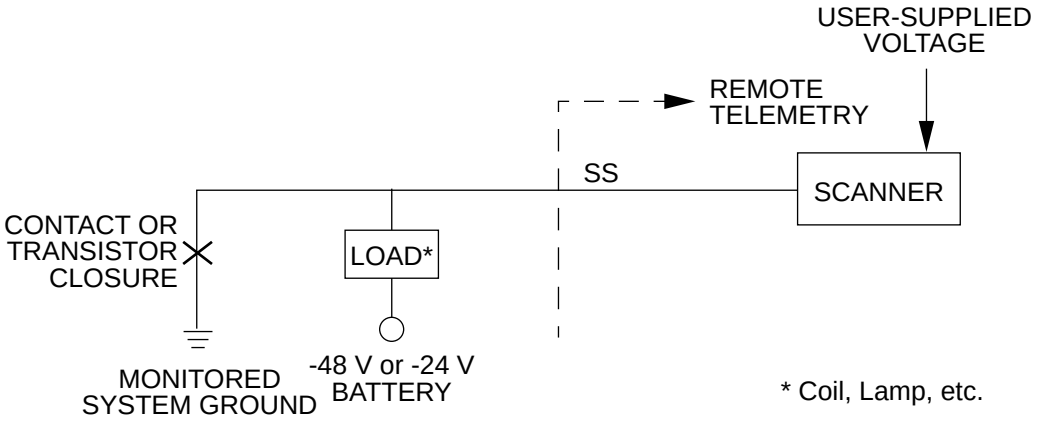
4. Refer to Bellcore Technical Reference PUB 43804 - Network Terminal Equipment Operations Interface Specifications for additional information regarding SS Type 1, 2 and 3 connections.



A. SS Type 1 - Isolated Loop Closure Inside Building



B. SS Type 2 - Isolated Closure to Ground



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 20. SS Type Connection Configurations

Office Alarm Connections

2.50 The OFFICE ALARMS terminals on the shelf backplane provide audible major and minor, and visual major and minor alarm relay contact closures for connection to the CO audible/visual alarm system. 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.

2.51 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 contacts close between the NO and C terminals, and the normally closed contacts open between the NC and C terminals. If the "C" is used as a common between major and minor in a daisy-chain, then tip-ring (T-R) polarity must be observed. The NC terminals cannot be daisy-chained.

2.52 The DCD shelf provides two-level alarm indications (major and minor) to indicate the severity of the disabling or potentially disabling condition.

2.53 Refer to Figure 19 and perform the following to connect the OFFICE ALARM terminals on the backplane of each DCD master and expansion shelf to the CO audible/visual alarm system:

1. Use 24 gauge tinned solid copper wire and prepare the cable ends for wire-wrapping using local company practice.

2. Connect the master shelf OFFICE ALARMS terminals (TB2 minor and TB3 major) to the CO alarm audible/visual alarm system per the local company Installation Job Specifications (see Figure 19 A, C, and D).

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 (see Figure 19 A, C, and D).

4. Once 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 terminals on the DCD shelf backplane and verify that the appropriate bell and gong sounds, and aisle pilot lamp and/or display panel lamp lights

   Note: When completely wired, there will be two wires on each terminal of each shelf, except the last expansion shelf.

Shelf Status and Clock Status (A and B) Connections

2.54 The DCD shelf provides closures for SHELF STATUS for all shelves and CLOCK STATUS A and B for the DCD-ST2 shelf. These closures can be connected to telemetry equipment for transport to a centralized alarm surveillance and control center. The MAJOR and MINOR terminals indicate the severity of the disabling or potentially disabling conditions.

2.55 The CLKL (clock loss), PRTA (port alarm) and BATTALM (battery alarm), as well as the CLOCK STATUS indicators provide indications of the type of conditions associated with the alarms. BATT ALM and CLOCK STATUS terminals are on DCD-ST2 shelves only.

2.56 The MAJOR and MINOR alarm and status terminals on all shelves, and the BATTALM terminals on the DCD-ST2 are relay contact closures. All other terminals are open collector type (PNP Open Collector, -60 volts, 100 mA maximum). Open collector terminals are designated SI for the status indicator terminals and SR for the status return terminals.

2.57 The DCD-ST2 HOLDOVER and RTN terminals TB11 and TB12 pins 7 and 8 must be assigned to telemetry equipment scan-point cards that accept -48 volt leads.

2.58 The other SI terminals on the DCD shelf must be assigned to scan-point cards that accept loop closures on status leads (MAJSI [TB3 pins 7 & 8], MINSI [TB2 pins 7 & 8], CLKL [TB2 pins 9 & 10], PRTA [TB2 pins 11 & 12], and the remainder of the clock status [SI] terminals on DCD-ST2 shelves [TB11 and TB12 pins 1 through 6, 9, and 10]). Figure 20 and Table V provide information as to which SI and SR terminal conditions and SS type connection configurations are needed.

2.59 Refer to Figure 19 A, F, and G for the SHELF STATUS and CLOCK STATUS indicator terminal connections to remote telemetry equipment scan-point input terminals and perform the following:

1. Use 24 gauge 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 telemetry equipment scan-point terminals per the local company Installation Job Specifications.

3. Bridge (daisy-chain) the SHELF STATUS MAJOR, MINOR, and PRTA terminals on the expansion shelves together and then connect to the master shelf SHELF STATUS terminals.

   Note: When completely wired, there will be two wires on each SHELF STATUS terminal, except for CLKL of each shelf, except on the last expansion shelf. CLOCK STATUS A and B terminals on the expansion shelves do not function and should not be daisy-chained.

4. Once 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.

Table W. OS Alarm and Status Messages (Suggested)

ALARM/STATUS TERMINAL	OS MESSAGE
SHELF STATUS	
MAJOR	MAJOR - Sync Potentially Service Affecting
MINOR	MINOR - Sync Non-service Affecting
PRTA	Sync - Timing Output Port Failed
CLKL	Sync - Input Reference Failed
BATTALM (DCD-ST2 ONLY)	Sync - Blown Fuse A or B/Loss Batt A or B
CLOCK STATUS A (DCD-ST2 ONLY)	
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 (DCD-ST2 ONLY)	
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 Function Connections

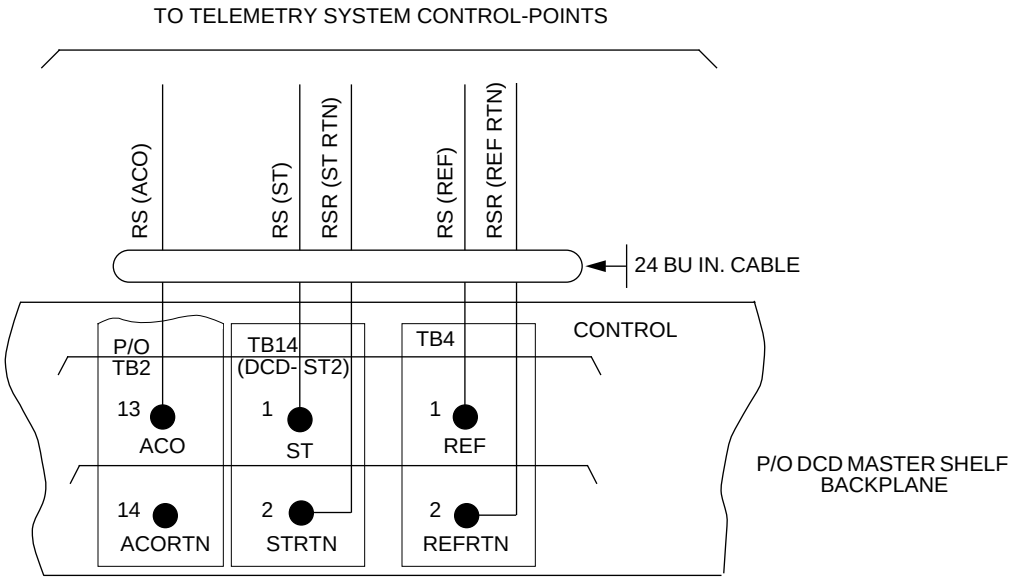
2.60 The CONTROL functions on the shelf backplane are used for:

Caution: The DCD control functions must be cabled to telemetry equipment control points only. If CONTROL function terminals are cabled to telemetry equipment scan-points, they will cause erroneous alarms on the telemetry equipment and the CONTROL functions will not operate.

- ACO and ACO RTN - Used to remotely operate the ACO function on the AI/FA card
- ST and STRTN - (DCD-ST2 shelf, ST2 mode only) Used to remotely transfer active status from one ST2 clock card to the other
- REF and REFRTN - Used to remotely transfer the source (SRC) active status from one clock input card to the other (ST3 mode only for DCD-ST2 shelf).

2.61 To connect the CONTROL function terminals, on the backplane of the DCD master shelf only:

1. Use 24 gauge tinned solid copper wire and prepare cable ends for wire-wrapping using local company practice.
2. Cable the CONTROL function terminals to telemetry equipment control-points per the local company Installation Job Specifications (refer to Figure 21).



Notes:

1. Status/control leads are office assignable at telemetry end by Central Office Engineer.
2. (DCD-400/CIM shelves) DO NOT connect TB2 pin 14 to telemetry equipment. If an external ground is connected to TB2 pin 14, it will cause a total loss of power when the FA card is removed.

Figure 21. Control Leads

3. OUTPUT CONNECTIONS

Caution: Read all of Part 3 BEFORE attempting to connect the DCD System to any timed equipment. Fully understand the principles behind the procedure. This is especially true in Part B – Connecting to In-Service Equipment – if interruptions to service are to be minimized.

3.01 This section describes how the network elements (NE) requiring DCD System output port timing are connected to the DCD output panel. The local company Installation Job Specifications should specify which DCD timing output ports are to be cabled to which network elements, what type of cable and connectors to use, and the routing of the cables between the DCD output panel and the network elements. Consult the network element manufacturer's documentation for proper connection, termination, and cutover procedures at the network element.

A. Initial Considerations

3.02 All timing output connections on the DCD shelf are made at the output panel (either the standard wire-wrap panel, SCIU wire-wrap panel, or MMP). If the local company Installation Job Specifications do not specify the DCD shelf timing output assignments, then a local assignment plan must be developed before proceeding with the connections. The following information is provided to assist in developing the local output assignment plan:

a. Consult the network element (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 1ESS switch DTC) require 1 TOCA port per bay (DTC require 2 TOCA ports per DCT 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 ports per machine.
- SONET OC-n terminals require 2 TOTA ports per terminal or per six terminals (vendor specific). 2 TOTA ports per OC-N terminal is recommended for diversity.
- 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, which require 1 SCIU per traffic DS1 system.
- Some digital switch machines & subscriber premise NEs require RS-422 or RS-423 square wave signals. These generally require 2 TOLA ports per switch per NE
- Other NEs may require analog sine wave signals. These require 1 or 2 TOAA ports per NE.

b. NEs that require two timing references (primary and secondary) should be assigned output ports from two separate TOxA cards of the same type for diversity, i.e., assign the primary reference to port 1 on TOTA card in slot TO1, and the secondary reference to port 1 on TOTA card in slot TO2.

c. Assign each NE to an appropriate TOxA/SCIU port/slot. Use assignment sheet tables found in TMSL 097-40000-60 DCD-ST2/400/CIM Interconnect Drawing.

d. Pertinent information about the TOCA card is:

- Each card has 10 composite clock (CC) output ports, and all output ports on a single card are identical, e.g., 0 to 1500 feet, 1501 to 2000 feet, 2001 to 2500 feet, or 2501 to 3000 feet cable compensation.
- The output ports may be cabled to NEs up to 1500 feet away when 22 AWG tinned solid copper shielded twisted pair cable is used. The distance may be increased to 1501 to 3000 feet by cable compensation option settings on the card (refer to TMSL 097-40000-58, DCD Test and Acceptance practice for option settings). The option settings affect all 10 output ports on the card.

e. Pertinent information about the TOTA card is:

- Each card has 10 DS1 framed all-ones output ports, and all outputs on a single card are identical, e.g., DS1 with D4 framing or DS1

with ESF framing, selected with option settings on the card (refer to TMSL 097-40000-58, DCD Test and Acceptance practice for option settings). The option settings affect all 10 output ports on the card.

- The output ports may be cabled to NEs up to 655 feet away when 22 AWG tinned solid copper shielded twisted pair cable is used.

f. Pertinent information about the TOLA card is:

- TOLA-01, -02, -04 through -07 cards have 5 RS-422 or 10 RS-423 logic square wave output ports, and all outputs on a single card are identical. Most versions of the card (-01 through -07) have group option settings to determine the bit rates at the output ports (refer to TMSL 097-40000-58, DCD Test and Acceptance practice for option settings). The option settings affect all output ports on the card. The TOLA-04 card has 5 RS-232 output ports, otherwise it is the same as the other TOLA cards.

- The determination of whether the output port(s) is RS-422 or RS-423 is in how the port is cabled to the NE, and is not a function of option settings on the card.

- The TOLA -03 card provides RS 232 outputs, refer to Table Y for wire-wrap connection.

- The maximum allowable cable distance to NEs is determined by the selected bit rate of the output ports. Use the specifications in TMSL 097-40000-55, General Description and Specifications, to determine the maximum allowable cable distances for output ports. The cable is 24 AWG tinned solid copper shielded twisted pair.

g. Pertinent information about the TOAA card is:

- Each card has 2 analog sine wave output ports, and all outputs on a single card are identical. Option settings determine the frequency at the output ports (refer to TMSL 097-40000-58, DCD Test and Acceptance practice for option settings). The option settings affect all output ports on the card.

Modular Mounting Panel

3.03 To connect the output cables to the MMP:

1. Ensure that the MCA/MCA-2 card has been removed (to prevent unwanted protection switching during connection), then guide the cable ends into the cable duct from either (or both) side(s) of the equipment rack.

2. Route the cables to the output modules of the appropriate TOxA group on the MMP. Tag the cables for identification.

3. If connecting to a wire-wrap output module, follow local company practices, and using 22 or 24 AWG tinned solid copper, shielded twisted pair cable, prepare cable ends for wire-wrapping. Connect to the wire-wrap output modules using Figure 22 and Figure 23 for reference. Ensure that no bare wire ends are exposed, and no wires are nicked. Table X lists the output pins when using the wire-wrap connector module. Table Z lists the output pins when using the DB9 connector module. Refer also to Figures 24 through 26.

4. Repeat Steps 1 through 3 for each shelf with an MMP.

   Note: In a shelf assembly equipped with two MMPs, the bottom panel connectors (J1 through J10) are for slots TO1 through TO10. The top panel connectors (J1 and J2) are used for slots HS TOC and HS TOT, respectively; the remaining connectors on the top panel are not used.

5. Reinstall the MCA/MCA-2 card in each shelf.

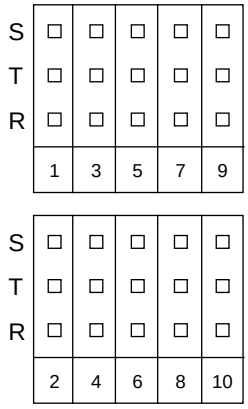


Figure 22. Wire-wrap Pins (on Output Module)

TIMING OUTPUT INTERCONNECTIONS (MMP)

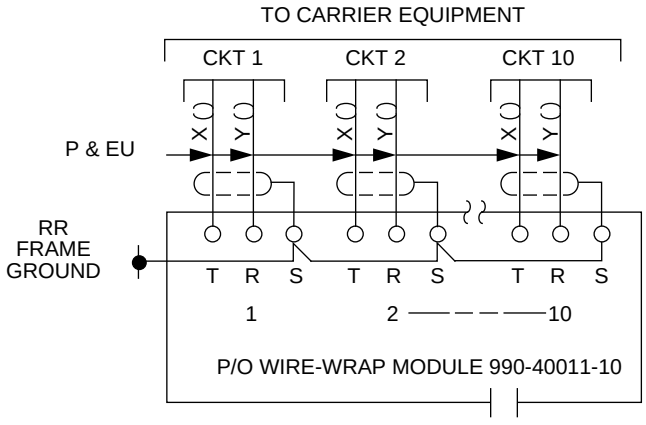


Figure 23. Wire-wrap Module (For TOCA/TOTA/TOLA Cards)

Table X. Wire-Wrap Output Connections

WIRE-WRAP LEADS *		TOTA, TOCA (DS1 or CC)		TOLA (RS-422)**		TOLA (RS 423)***		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			1 2	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			3 4	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			5 6	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			7 8	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			— 9 & 10	TP1 C9 and C10		

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

* In the wire-wrap leads column, the paired outputs of 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, use the Tip (T) of the odd-numbered output and the Tip of even-numbered output as one TTL output. 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 RS-423 operation, two outputs are derived from each RS-422 driver. One output across T (Dn) and T (Cn) leads, and the other outputs is across R (D-) and R (Cn) leads (e.g., D2 and C2 are output 2, D1 and C1 are output 1).

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

Table Y. Wire-Wrap Output Connections for TOLA-03 Only

WIRE-WRAP LEADS		TIMING PORT	LEAD	WIRE-WRAP LEADS		TIMING PORT	LEAD
OUTPUT	PIN			OUTPUT	PIN		
1	T R S	1	CLOCK GND —	6	T R S	4	CLOCK GND —
2	T R S	—	—	7	T R S	—	—
3	T R S	2	CLOCK GND —	8	T R S	5	CLOCK GND —
4	T R S	—	—	9	T R S	—	—
5	T R S	3	CLOCK GND —	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 output 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 Z. DB9 Output Connections

DB9 CONNECTOR		TOTA, TOCA		TOLA (RS-422) (Note 1)		TOLA (RS 423) (Note 2)		TOAA (ANALOG)	
LABEL	PIN	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD	TIMING PORT	LEAD
J2	9 5 1	1	T R S	5	— — —	9 & 10	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	— — —	7 8 —	C7 C8	2	T S —
	4 3 1	4	T R S		D+ D- S	7 8 —	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	5 6	D5 D6		
J5	9 5 1	7	T R S	2	— — —	3 4	C3 C4 —		
	4 3 1	8	T R S		D+ D- S	3 4	D3 D4 —	1	T S —
J6	9 5 1	9	T R S	1	— — —	1 2	C1 C2 —		
	4 3 1	10	T R S		D+ D- S	1 2	D1 D2		

Legend:
T=Tip
R=Ring
S=Shield (Frame Ground)*
D+=RS 422 + driver
D-=RS 422 - driver
Cn=RS 423 common to + and - driver (digital ground) (n=1 thru 10)
Dn=RS 423 + and - drivers (n=1 thru 10)

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

Notes:
1. For RS 422 (balanced output) connections, connect across D+ (Tip) and D- (Ring) of the RS 422 driver.
2. For RS 423 (unbalanced output) connections, connect across Dn and Cn of the same connector (from Tip to Tip and from Ring to Ring). For example, on J6, connect across D1 and C1 (RS 422 + driver and common), and across D2 and C2 (RS 422 - driver and common).

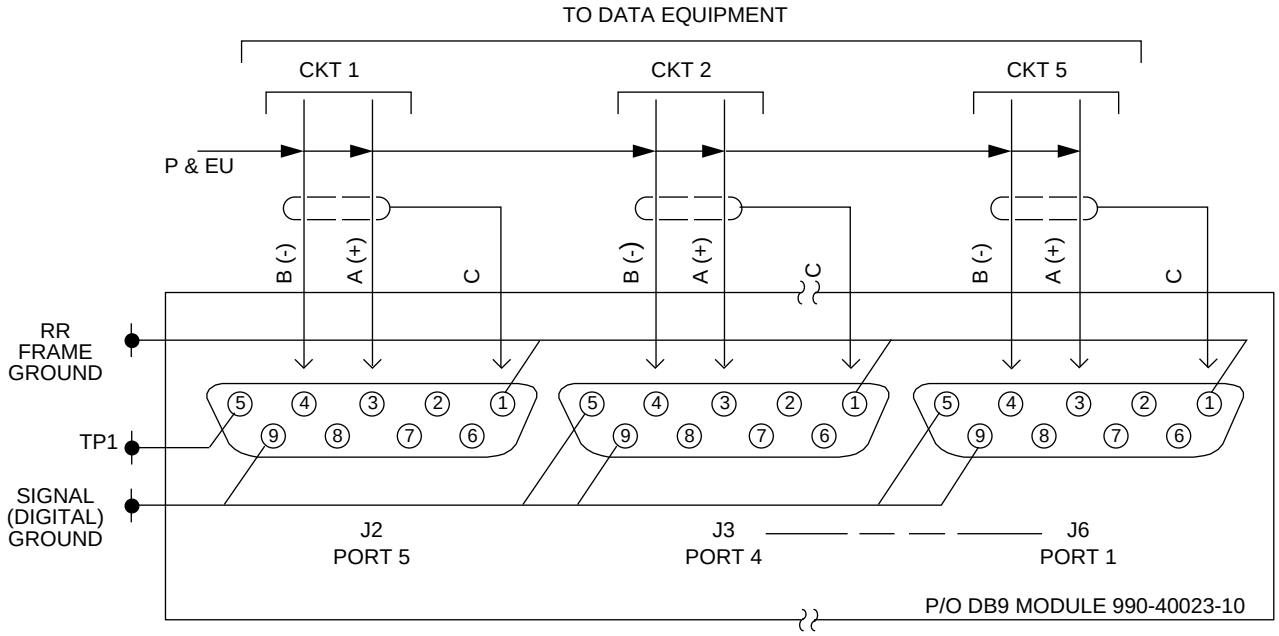


Figure 24. DB9 Module (RS-422) (For TOLA Card)

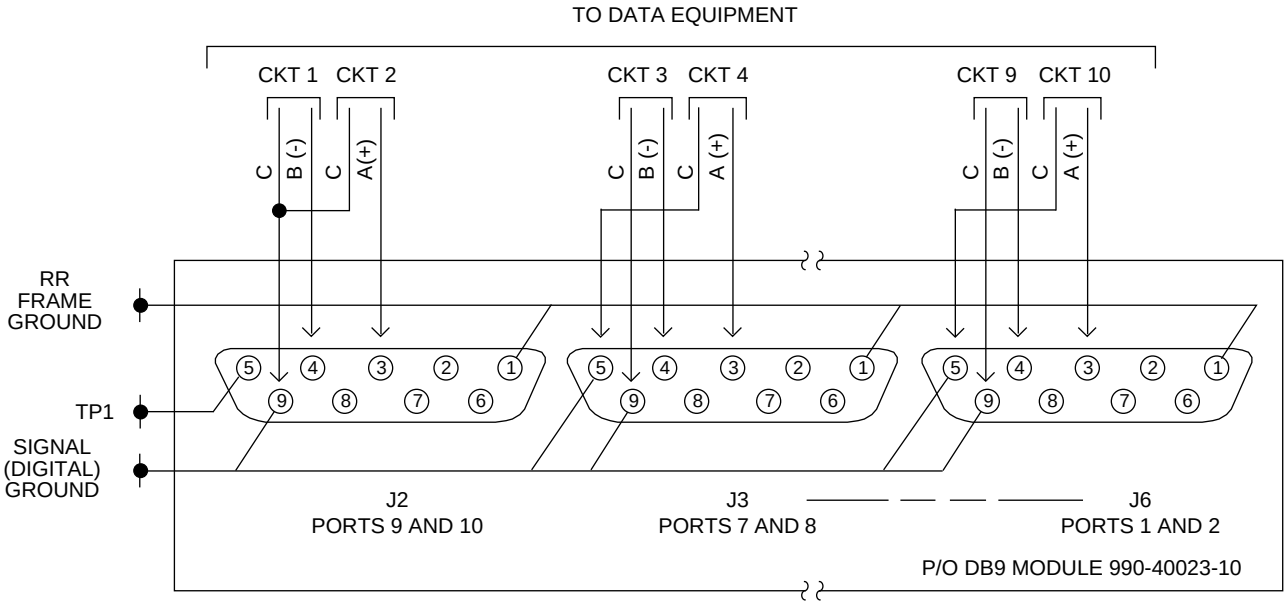


Figure 25. DB9 Module (RS-423) (For TOLA Card)

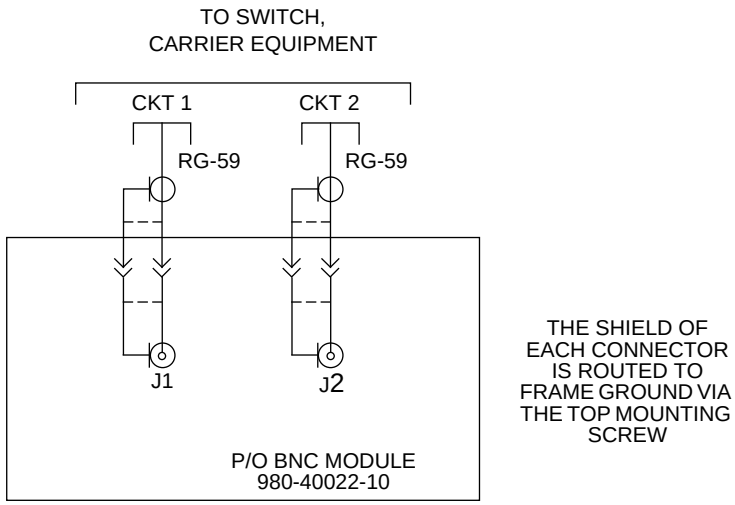


Figure 26. 2-Port BNC Module (For TOAA Card)

Wire-wrap Panel

3.04 The panel has 10 groups of 10 wire-wrap T, R, S terminal sets. Each T, R, S terminal set is an output port for connecting timing to the network element. The panel may be used to connect any TOxA output card to network elements. Refer to Table X to determine which T, R, S terminal sets to use for different types of output cards. To connect the output cables to the wire-wrap panel, use Figure 27 and Figure 28 and perform wire-wrap connections as per the following:

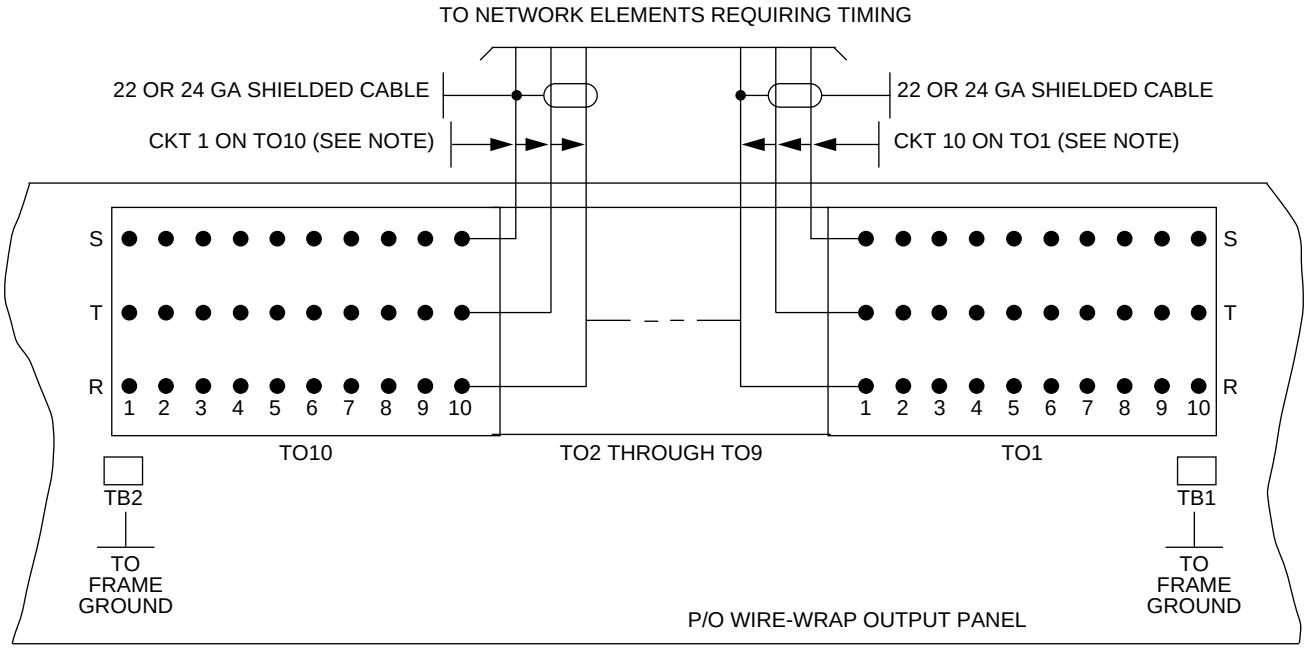
1. Ensure that the MCA/MCA-2 card has been removed (to prevent unwanted protection switching during connection), then using 22 or 24 AWG tinned solid copper, shielded twisted pair cable, make wire-wrap connections per Figure 27 as required.

   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.

   Note: In a shelf assembly equipped with two wire-wrap panels, the bottom panel connectors (J1 through J10) are for slots TO1 through TO10. The top panel connectors (J1 and J2) are used for slots HS TOC and HS TOT, respectively; the remaining connectors on the top panel are not used.

3. Replace the MCA/MCA-2 card.



NOTE: THIS FIGURE ILLUSTRATES THE USE OF ONLY 1 CONNECTION PER TOx SLOT; A MAXIMUM OF 10 CONNECTIONS PER TOx SLOT ARE POSSIBLE.

Figure 28. Wire-wrap Output Panel Connections

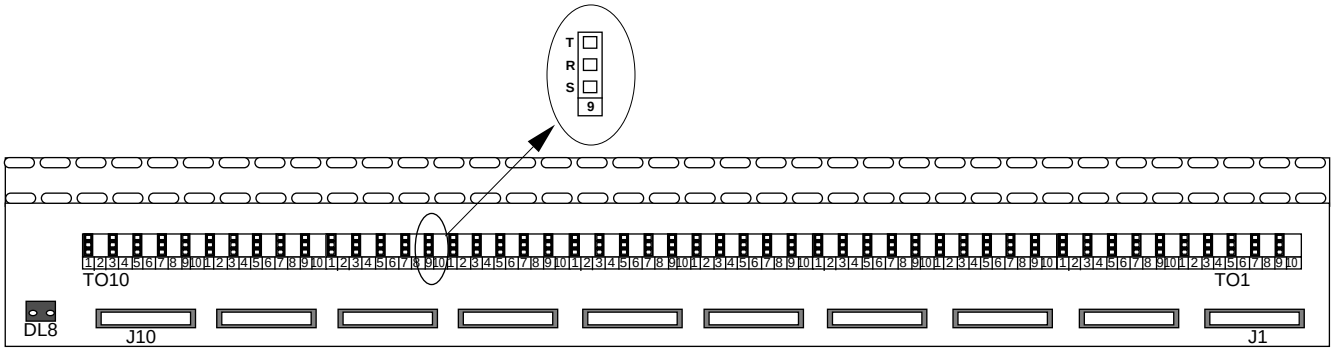


Figure 27. Wire-wrap Output Panel

B. Inactive Equipment

3.05 Verify the integrity of the timing signal from the DCD System at the channel bank using a dual-channel oscilloscope. For other types of equipment, refer to the appropriate manufacturers' practice for system verification.

C. SCIU Cutover Procedures

Out-of-Service Equipment

3.06 The SCIU card must be cabled into the bitstream of a traffic-carrying DS1 system. This procedure assumes that the installation cabling was completed according to instructions in this practice, and the test and acceptance was completed per TMSL 097-40000-58, DCD Test and Acceptance Practice.

3.07 If standard digital signal level access jack sets, such as DSX-1 jacks, ***are not*** cabled to the SCIU wire-wrap module or panel, 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 shelf clock (BITS) will be connected to the SCIU wire-wrap module or panel WEST A OUT terminals (see Figure 17). Refer to Figure 29 for the following procedure:

1. Remove from service (turn down) the traffic trunks on the DS1 system to be cutover to the SCIU wire-wrap module or panel.

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 SCIU wire-wrap module or panel cables as per the following:

   - EAST A IN terminals on the module to transmit (OUT) terminals on the NE not being timed from the DCD shelf

   - EAST B OUT terminals on the module to receive (IN) terminals on the NE not being timed from the DCD shelf

   - WEST A IN terminals on the module to transmit (OUT) terminals on the NE being timed from the DCD shelf

   - WEST B OUT terminals on the module to receive (IN) terminals on the NE being timed from the DCD shelf

4. Verify that there are no alarms on the NEs on the DS1 system. If there are alarms, recheck the new cabling between the NEs and the SCIU wire-wrap module or panel.

5. Restore (turn up) the traffic trunks to service.

6. Repeat Steps 1 through 5 for each SCIU installed in the DCD shelf.

In-Service Equipment

3.08 If standard digital signal level access jack sets, such as DSX-1 jacks, were cabled to the SCIU wire-wrap module or panel, 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 shelf clock (BITS) will be connected to the SCIU wire-wrap module or panel WEST A OUT terminals (see Figure 17). Refer to Figure 27 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 DS1 system to be cutover. Place a 100 ohm 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 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 shelf

   - EAST B OUT jack on the module to IN jack on the NE not being timed from the DCD shelf

   - WEST B IN jack on the module to OUT jack on the NE being timed from the DCD shelf

- WEST A OUT jack on the module to IN jack on the NE being timed from the DCD shelf

4. Remove the 100 ohm (DS1) or 120 ohm (E1) termination plug from the OUT jack and patch cords from the NE IN jack. The DS1 system bitstream is now going through the SCIU card.

5. Verify that there are no alarms on the NEs on the 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 SCIU card installed in the DCD shelf.

Note: Consult Telecom Solutions for additional information regarding system cutovers.

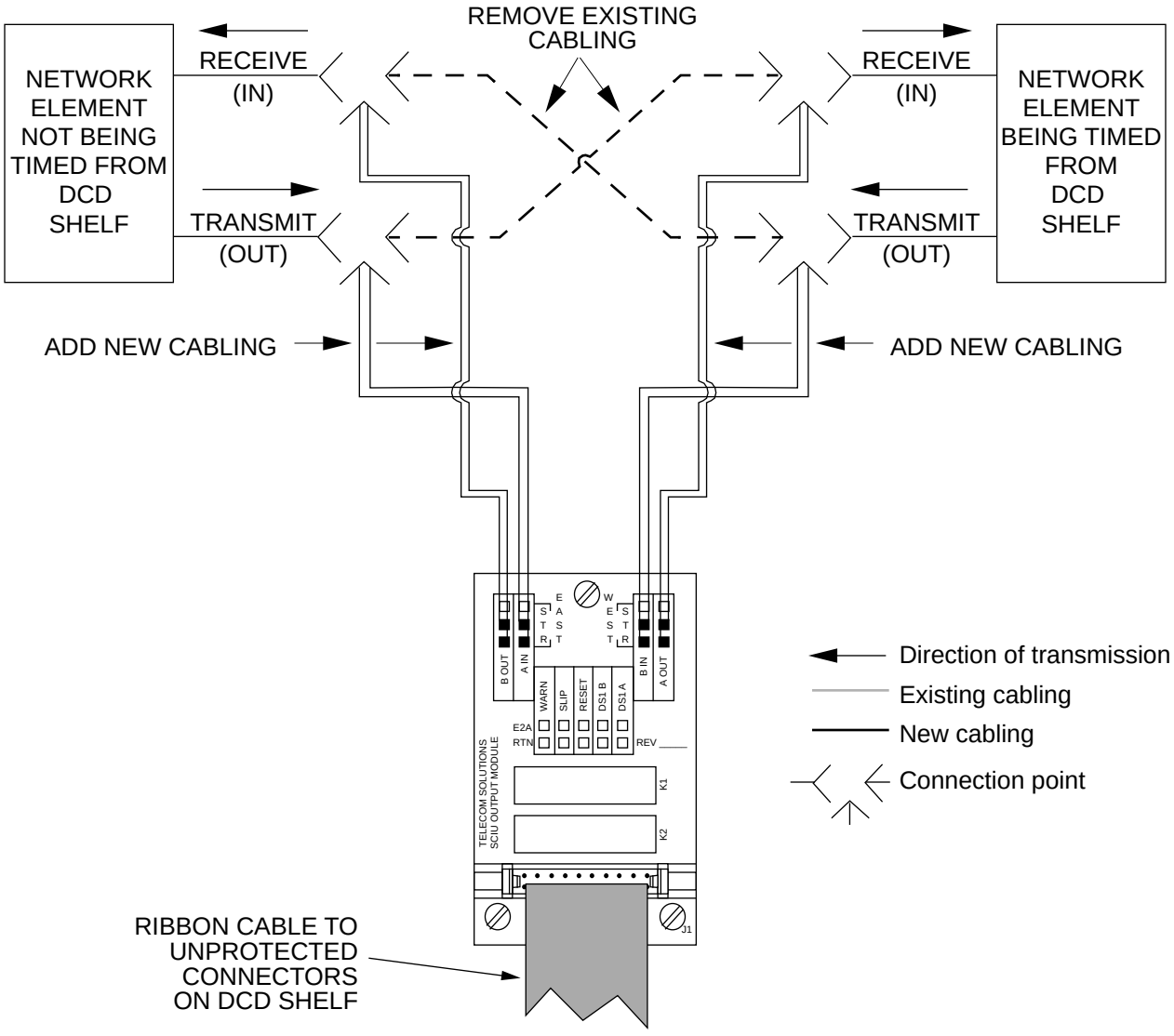


Figure 29. SCIU Cutover Without Jacks (Out-of-Service)

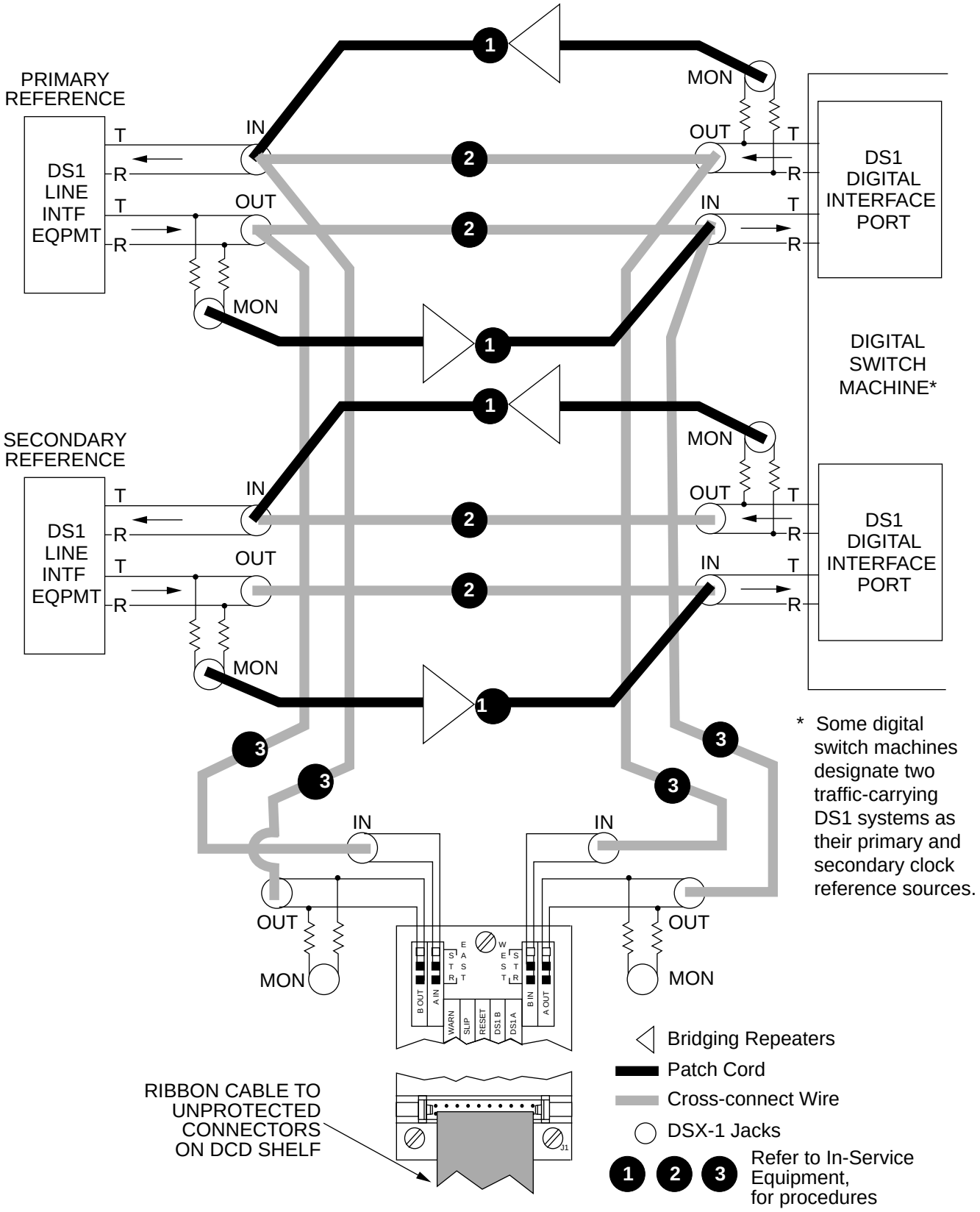


Figure 30. SCIU Cutover with Jacks (In-Service)