DIGITAL CLOCK DISTRIBUTOR

LOCAL PRIMARY REFERENCE

INTERCONNECT DRAWINGS

1. GENERAL

1.01 This section provides interconnect wiring diagrams of Symmetricom's Digital Clock Distributor Local Primary Reference (DCD-LPR) System. For additional installation information, refer to the Installation section of this manual.

1.02 This section was reissued to replace references to unshielded three-conductor power cables to shielded three-conductor power cables. Changes and additions are marked by change bars.

1.03 All product names, service marks, trademarks, and registered trademarks used in this document are the property of their respective owners.

ENGINEERING NOTES:

PRIOR TO INSTALLATION, THE INSTALLER MUST DETERMINE THE FOLLOWING TO DETERMINE WHAT WIRING FIGURES WILL BE APPLIED DURING INSTALLATION. ALSO, SEE NOTE 6.

A. WHICH CARDS (GTI, LTI, OR LOU) ARE TO BE INSTALLED IN THE DCD-LPR FRONT PANEL SLOTS A AND B.

B. WHICH TYPE OF DIGITAL CLOCK DISTRIBUTOR (DCD) MASTER SHELF EQUIPPED WITH AN APPROPRIATE CLOCK INSTALLED THAT PROVIDES 5 MHz OR 10 MHz OUTPUT TO THE DCD-LPR SHELF.

1. DCD-419 REV. C OR EARLIER SHELVES CANNOT BE USED WITH A DCD-LPR SHELF.

2. IN A SINGLE GTR LIGHTNING PROTECTOR INSTALLATION, THE LIGHTNING PROTECTOR SHOULD BE CONNECTED TO THE CO. GROUND BAR WHICH IS BONDED TO THE OPGP. *KEEP THE GROUND WIRE AS SHORT AND STRAIGHT AS POSSIBLE IN ACCORDANCE WITH LOCAL OFFICE PRACTICE (MINIMUM 4.115 mm [MINIMUM 6 AWG] SOLID COPPER IS RECOMMENDED). DO NOT UNDERSIZE THIS GROUNDING WIRE.* SYMMETRICOM RECOMMENDS THAT THE LIGHTNING PROTECTOR MOUNTED INSIDE THE BUILDING BE LOCATED WITHIN 3 METERS (10 FEET) OF THE CABLE ENTRY POINT INTO THE BUILDING.

3. THESE ARE SPADE LUG CONNECTORS AT THE DCD-LPR. THE TWINAX CABLE CONNECTS TO TB6 FOR THE LORAN ANTENNA WHICH HAS A CORRESPONDING LTI CARD INSTALLED IN SLOT A, AND/OR TB7 FOR A LORAN ANTENNA WHICH HAS A CORRESPONDING LTI CARD INSTALLED IN SLOT B.

4. FOR SINGLE LORAN LIGHTNING PROTECTOR CONFIGURATIONS, THE LORAN TWINAX POWER CABLE WIRES ARE TO BE CONNECTED TO THE + AND – CONNECTORS OF THE LIGHTNING PROTECTOR; EITHER WIRE CAN BE CONNECTED TO EITHER CONNECTOR, BUT THIS WIRING MUST BE CONTINUED FOR ALL LIGHTNING PROTECTOR CONNECTIONS. THE BRAID IS TO BE ATTACHED TO THE SHIELD CONNECTOR ON THE LIGHTNING PROTECTOR. THE SHIELD CONNECTION AT THE DCD-LPR SHOULD NOT BE MADE, BUT CUT OFF AND TAPED BACK (PER LOCAL COMPANY PRACTICE).

5. FOR DUAL LORAN LIGHTNING PROTECTOR CONFIGURATIONS, THE TWO LORAN TWINAX POWER CABLE WIRES ARE TO BE CONNECTED TO THE + AND – TERMINALS OF THE LIGHTNING PROTECTOR; EITHER WIRE CAN BE CONNECTED TO EITHER TERMINAL, BUT THIS WIRING MUST BE CONTINUED FOR ALL LIGHTNING PROTECTOR CONNECTIONS. THE BRAID IS TO BE ATTACHED TO THE SHIELD TERMINAL AT THE FOLLOWING:

   - BETWEEN THE OUTSIDE LIGHTNING PROTECTOR AND THE LORAN ANTENNA (REQUIRED)
   - AT THE ANTENNA SIDE OF THE OUTSIDE LIGHTNING PROTECTOR (REQUIRED)
   - AT THE LPR SIDE OF THE OUTSIDE LIGHTNING PROTECTOR (REQUIRED)
   - AT THE ANTENNA SIDE OF THE INSIDE LIGHTNING PROTECTOR (RECOMMENDED)
   - AT THE LPR SIDE OF THE INSIDE LIGHTNING PROTECTOR (REQUIRED)

   THE SHIELD CONNECTION AT THE DCD-LPR SHOULD NOT BE MADE, BUT CUT OFF AND TAPED BACK (PER LOCAL COMPANY PRACTICE).

6. SEE THE INSTALLATION SECTION OF THIS MANUAL FOR PREPARATION OF THE LORAN ANTENNA POWER CABLE. THE LIGHTNING PROTECTOR HAS A TWINAX BNC CONNECTOR TO THE ANTENNA, AND SPADE LUG FOR THE REST. WIRE POLARITY MUST BE MAINTAINED ON ALL CONNECTIONS FROM THE DCD-LPR SHELF, THROUGH THE LIGHTNING PROTECTOR(S), AND TO THE LORAN ANTENNA, TO ENSURE OPTIMAL ANTENNA OPERATION.

7. USE SPADE OR RING TERMINAL LUGS TO FIT A #6 SCREW FOR ALL CONNECTIONS ON TB1 AND TB5. CONNECT DIG GND AND FRM GND AS PER LOCAL COMPANY PRACTICE.

ENGINEERING NOTES (CONT'D):

8. IN A SINGLE GTR LIGHTNING PROTECTOR INSTALLATION, SHIELDED POWER CABLE IS USED BETWEEN THE GTR AND THE LIGHTNING PROTECTOR; THE SHIELD, AT BOTH ENDS, IS CUT OFF AND TAPED BACK (AS PER LOCAL COMPANY PRACTICE). THE BUILT-IN DRAIN WIRE IS CONNECTED TO THE GROUNDING PLATE OF THE LIGHTNING PROTECTOR. THE COMMON (CMN) LEADS FROM BOTH THE DCD-LPR SHELF AND THE GTR ARE GROUNDED ON THE GROUNDING PLATE OF THE LIGHTNING PROTECTOR. SHIELDED POWER CABLE IS USED BETWEEN THE DCD-LPR AND THE LIGHTNING PROTECTOR.

9. USE SPADE CONNECTORS TO FIT 1.47 mm (16 AWG) WIRE FOR CONNECTIONS.

10. WIRE CONTINUITY MUST BE MAINTAINED ON ALL CONNECTIONS FROM THE DCD-LPR SHELF THROUGH THE LIGHTNING PROTECTOR(S), TO THE GPS ANTENNA/RECEIVER (GTR). IF NOT, LOW VOLTAGE WILL OCCUR AND THE GTR WILL NOT FUNCTION PROPERLY.

11. THE CONFIGURATION OF GTI FIBER I/O MODULES AND/OR LTI I/O MODULES IS DEPENDENT UPON CARDS INSTALLED IN THE DCD-LPR SHELF. SLOT A (UPPER) EQUIPPED WITH A GTI OR LTI CARD MUST BE MATCHED WITH A LIKE I/O MODULE AT J9 I/O A ON THE BACKPLANE. SLOT B (LOWER) MUST BE MATCHED WITH A LIKE I/O MODULE AT J10 I/O B (FIGURE 8 FOR GTI FIBER I/O MODULE, AND/OR FIGURE 9 FOR LTI I/O MODULE). ANY COMBINATION OF GTI OR LTI I/O MODULES IS PERMISSIBLE.

12. ALL CONNECTORS ON THE LORAN LIGHTNING PROTECTOR ARE SCREW-TYPE.

13. IF INSTALLING TWO LIGHTNING PROTECTORS, DO NOT GROUND BOTH PROTECTORS TOGETHER WITH ONE COMMON WIRE. THE INSIDE AND OUTSIDE LIGHTNING PROTECTORS MUST HAVE SEPARATE GROUND POINTS.

14. FOR EITHER ONE OR TWO LORAN LIGHTNING PROTECTOR CONFIGURATIONS, THE LIGHTNING PROTECTOR INSTALLED INSIDE THE BUILDING SHOULD BE GROUNDED TO THE C.O. GROUND BAR WHICH IS BONDED TO THE OPGP. *KEEP THE GROUND WIRE AS SHORT AND STRAIGHT AS POSSIBLE IN ACCORDANCE WITH LOCAL OFFICE PRACTICE (MINIMUM 4.115 mm [MINIMUM 6 AWG] SOLID COPPER IS RECOMMENDED). DO NOT UNDERSIZE THIS GROUNDING WIRE.* SYMMETRICOM RECOMMENDS THAT THE LIGHTNING PROTECTOR MOUNTED INSIDE THE BUILDING BE LOCATED WITHIN 3 METERS (10 FEET) OF THE CABLE ENTRY POINT INTO THE BUILDING.

15. FOR TWO LORAN LIGHTNING PROTECTOR CONFIGURATIONS, THE OUTSIDE LIGHTNING PROTECTOR MUST BE CONTAINED IN A WEATHER-RESISTANT JUNCTION BOX, AND THE LIGHTNING PROTECTOR CONNECTED TO OUTSIDE BUILDING (RING) GROUND IF POSSIBLE, OR A GROUNDING ROD IF NOTHING ELSE IS AVAILABLE. IF PVC MAST AND CONDUIT ARE USED, GROUND AT POINT OF ENTRY INTO THE BUILDING. IF METAL CONDUIT FOR CABLE RUNS IS USED, GROUNDING TO THE CONDUIT IF PREFERRED. *KEEP THE GROUND WIRE AS SHORT AND STRAIGHT AS POSSIBLE IN ACCORDANCE WITH LOCAL OFFICE PRACTICE (MINIMUM 4.115 mm [MINIMUM 6 AWG] SOLID COPPER IS RECOMMENDED). DO NOT UNDERSIZE THIS GROUNDING WIRE.*

16. THE SINGLE LIGHTNING PROTECTOR SCHEME IS RECOMMENDED FOR LOCATIONS WHICH DO NOT HAVE THE INSIDE AND OUTSIDE GROUND POINTS CONNECTED TO THE OFFICE PRINCIPAL GROUND POINT (OPGP).

17. THE DUAL LIGHTNING PROTECTOR SCHEME CAN BE USED IN LOCATIONS THAT HAVE THE INSIDE AND OUTSIDE GROUND POINTS CONNECTED TO THE OFFICE PRINCIPAL GROUND POINT (OPGP).

18. IF INSTALLING TWO ANTENNA SYSTEMS (e.g. TWO GTRs, ONE GTR AND ONE LORAN, OR TWO LORANs), DO NOT GROUND BOTH SYSTEMS TOGETHER WITH ONE COMMON WIRE. EACH SYSTEM MUST HAVE ITS OWN GROUND POINT.

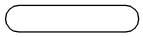
19. FIBER OPTIC CABLE IS AVAILABLE IN TWO CONFIGURATIONS: RISER-RATED FIBER CABLE WITH CONNECTORS AND PULLING MECHANISM, AND RISER-RATED FIBER CABLE ONLY.

ENGINEERING NOTES (CONT'D):

20. ADD THE GTR POWER CABLE CONNECTOR ASSEMBLY AND ATTACH CABLE TO POWER CONNECTOR ON GPS ANTENNA. SEE THE INSTALLATION SECTION OF THIS MANUAL FOR ASSEMBLY INSTRUCTIONS.

NOTES:

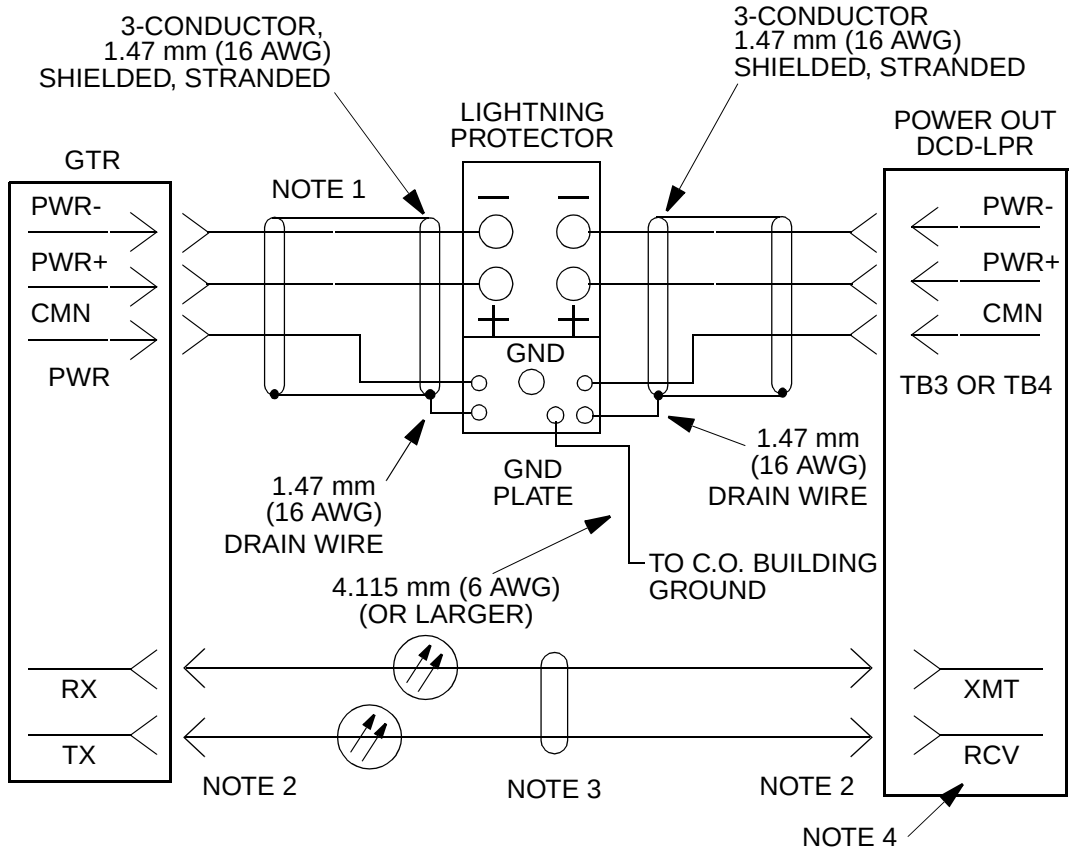
1. DRAWING CONVENTIONS


CABLE


OPTIONS


SCREW CONNECTION

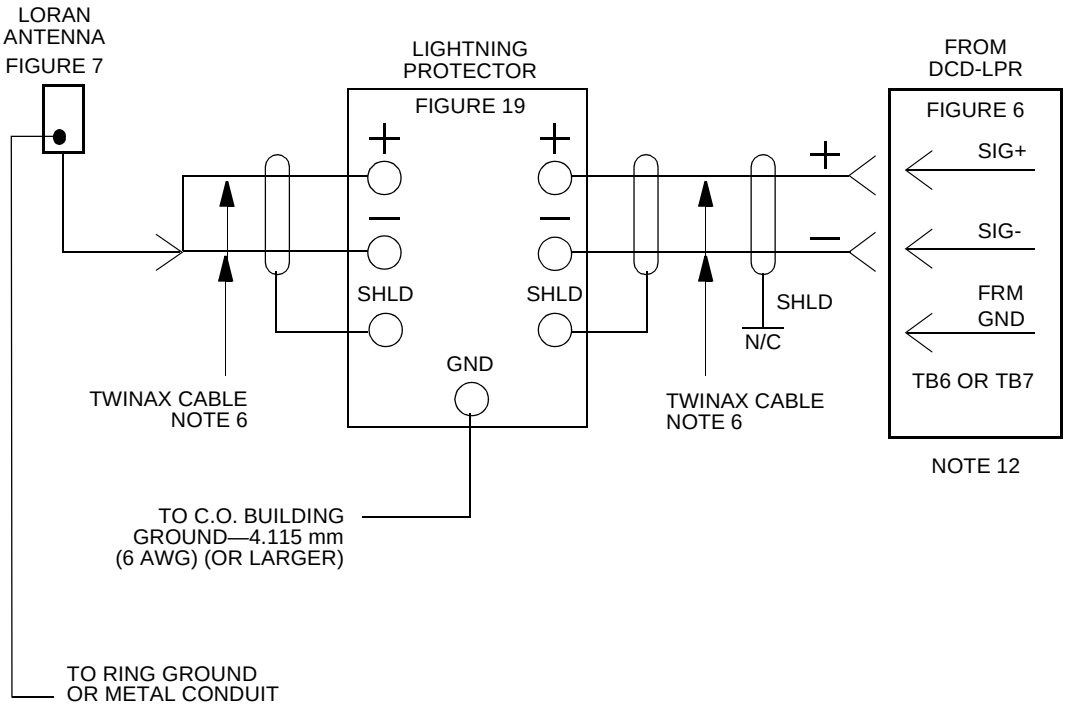
Caution: DC polarity must be maintained. If not, the DCD-LPR will not function.



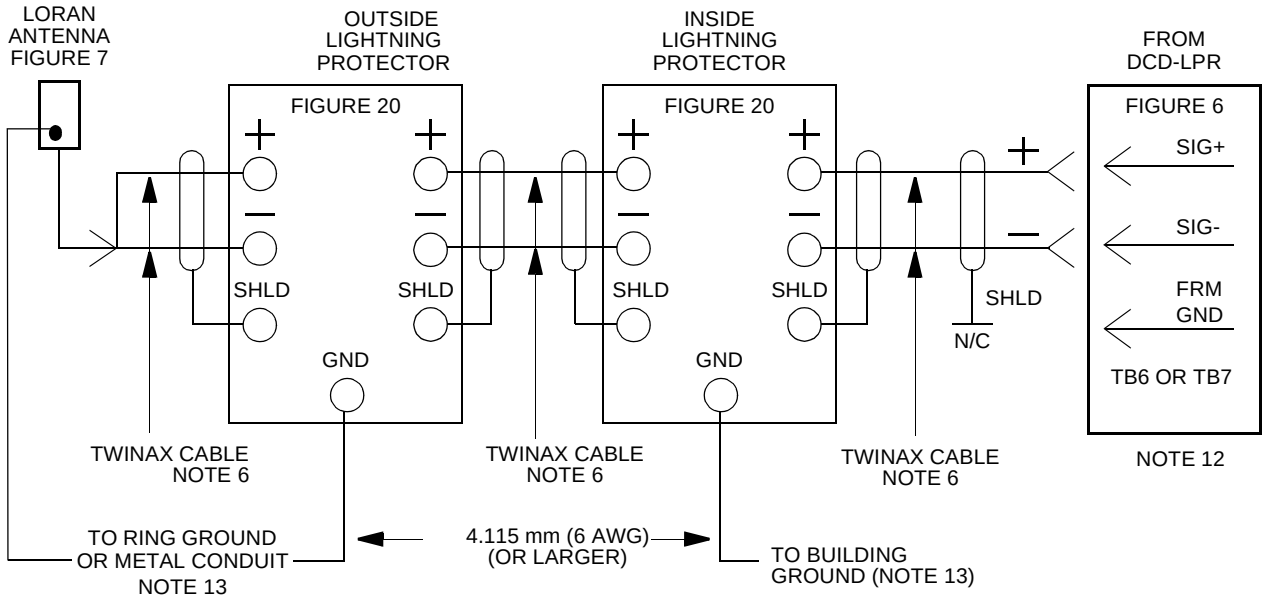
Notes:

1. The cable shield is open at the GTR. The drain wire is connected to the grounding plate of the lightning protector.
2. Fiber optic compound cleave ST style connector.
3. Riser-rated fiber optic 200 µ multimode cables.
4. Two-port fiber I/O module. Mounted and connected to J9 (I/O A) on the DCD-LPR for the GTR which has a corresponding GTI card installed in slot A, and to J10 (I/O B) for a GTR which has a corresponding GTI card installed in slot B.

APPLICATION SCHEMATIC #1
GTR ANTENNA TO DCD-LPR CONNECTIONS
VIA A SINGLE LIGHTNING PROTECTOR
(NOTES 1 AND 2)

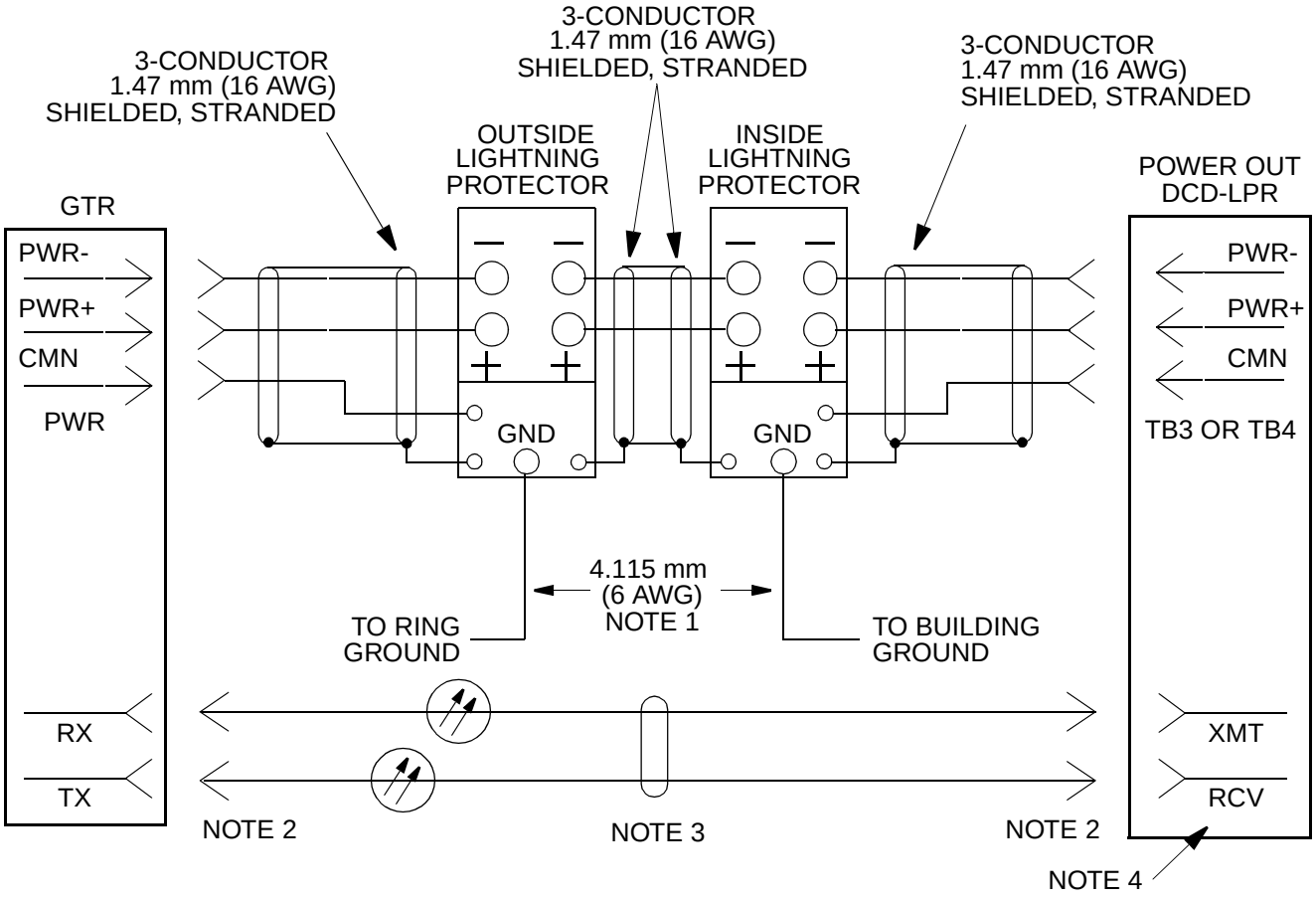


APPLICATION SCHEMATIC #2
LORAN ANTENNA TO DCD-LPR CONNECTIONS
VIA A TYPE 2 SINGLE LIGHTNING PROTECTOR
(NOTES 1, 3, AND 4)



APPLICATION SCHEMATIC #3
LORAN ANTENNA TO DCD-LPR CONNECTIONS
VIA TYPE 2 DUAL LIGHTNING PROTECTORS
(NOTES 1, 3, AND 5)

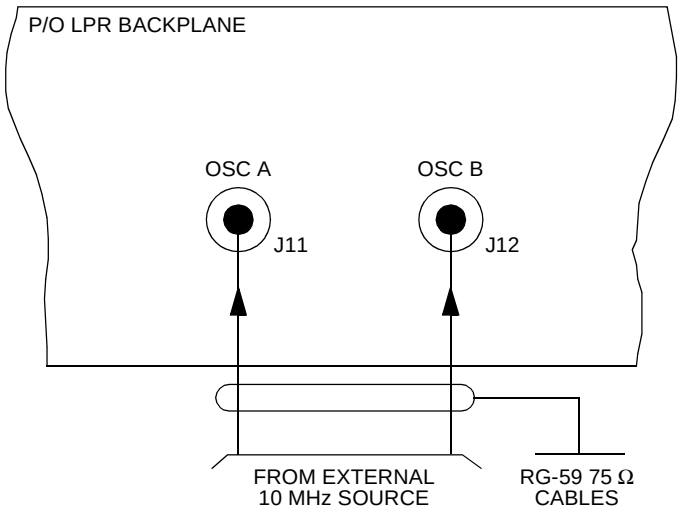
Caution: DC polarity must be maintained. If not, the DCD-LPR will not function.



Notes:

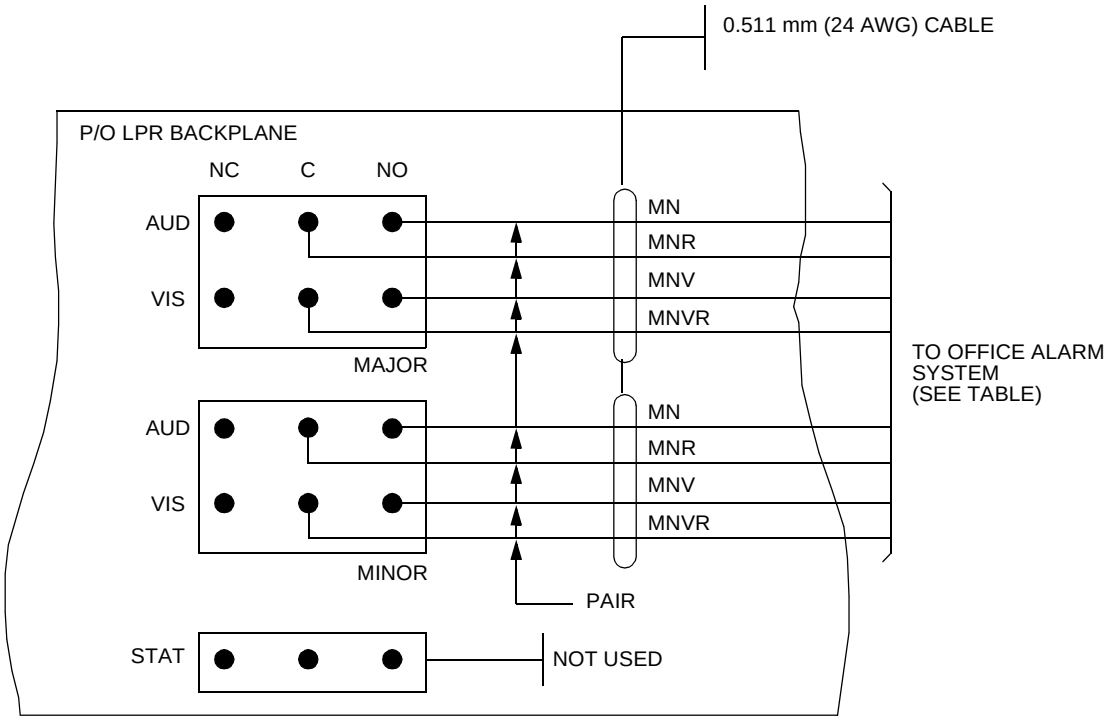
1. Do not ground both protectors together with one common wire; the outside and inside protectors must have separate ground points. 4.115 mm (6 AWG) or larger copper grounding wire is recommended.
2. Fiber optic compound cleave ST style connector.
3. Riser-rated fiber optic 200 µ multimode cables.
4. Two-port fiber I/O module. Mounted and connected to J9 (I/O A) on the DCD-LPR for the GTR which has a corresponding GTI card installed in slot A, and to J10 (I/O B) for a GTR which has a corresponding GTI card installed in slot B.

APPLICATION SCHEMATIC #4
GTR ANTENNA TO DCD-LPR CONNECTIONS
VIA DUAL LIGHTNING PROTECTOR(S)
(NOTE 1)



Notes:
1. Jumpers on the GTI card must be restrapped to accept 10 MHz inputs from an external source. Refer to TMSL 097-45100-04 for details.
2. The LTI accepts only 5 MHz inputs.
3. If connecting to an external source, an isolation module is not required between the DCD-LPR and the external source.

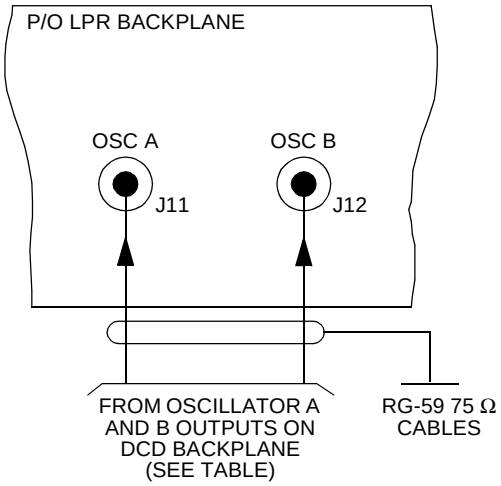
FIGURE 1.
EXTERNAL CESIUM SOURCE TO DCD-LPR SHELF
10 MHz CONNECTIONS (GTI ONLY)



DCD-LPR OFFICE ALARM LEADS

LEAD DESIGNATION	FUNCTION
MN	MINOR AUDIBLE
MNR	MINOR AUDIBLE RETURN
MNV	MINOR VISUAL
MNVR	MINOR VISUAL RETURN
MJ	MAJOR AUDIBLE
MJR	MAJOR AUDIBLE RETURN
MJV	MAJOR VISUAL
MJVR	MAJOR VISUAL RETURN

FIGURE 2.
DCD-LPR ALARMS



DCD OSCILLATOR CONNECTIONS

SHELF (AS APPROPRIATE)	FROM DCD SHELF	
	CONNECTOR	LABEL
DCD-ST2	J24	5 MHZ OUTPUT A
	J25	5 MHZ OUTPUT B
DCD-419	J35	NOT LABELED
	J36	NOT LABELED
DCD-523	J61	OSC A OUT
	J62	OSC B OUT
DCD-519	J44	OSC A OUT
	J45	OSC B OUT
CAUTION: If installing an LOU card, do not make any of the connections in this table.		

Note: If the DCD-LPR is used in conjunction with a particular revision of DCD Shelf, an isolation module may need to be installed between the DCD-LPR and the DCD shelf. The module is connected to the OSC A and B connectors on the DCD-LPR Shelf and to the connectors listed in FIGURE 11. Install A Module if installing one of the following shelves:

- DCD-523 Rev. D or earlier
- All DCD-519
- All DCD-ST2
- DCD-419 Rev. D or later

Do not install an isolation module on DCD-523 Rev. E or later shelves.

If connecting to an external source or if installing an LOU card, an isolation module is not required.

FIGURE 3.
DCD SHELF TO DCD-LPR SHELF
5 MHz CONNECTIONS

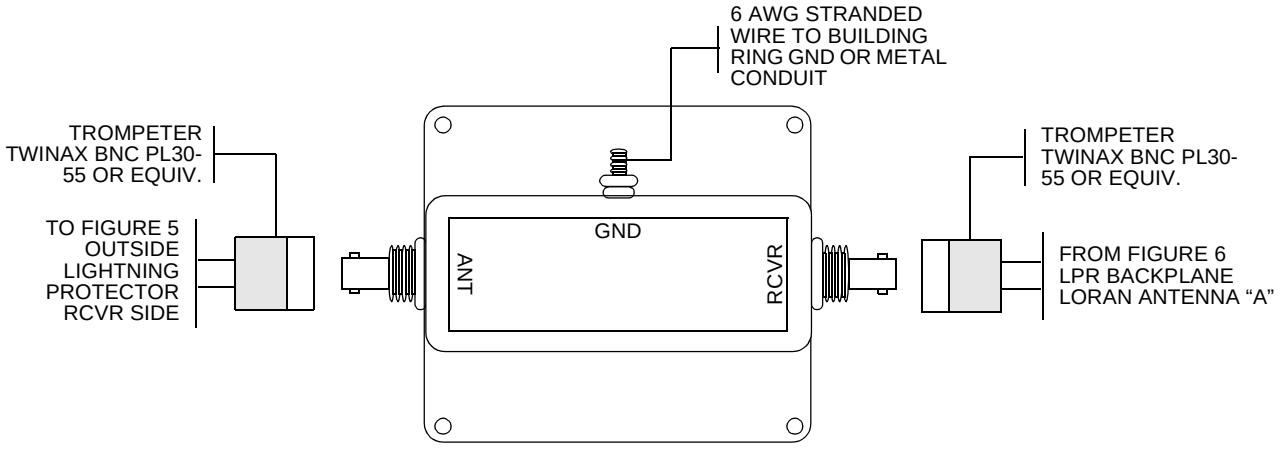


FIGURE 4.
LORAN LIGHTNING PROTECTOR
TYPE 1, MODEL 1 — INSIDE INSTALLATION

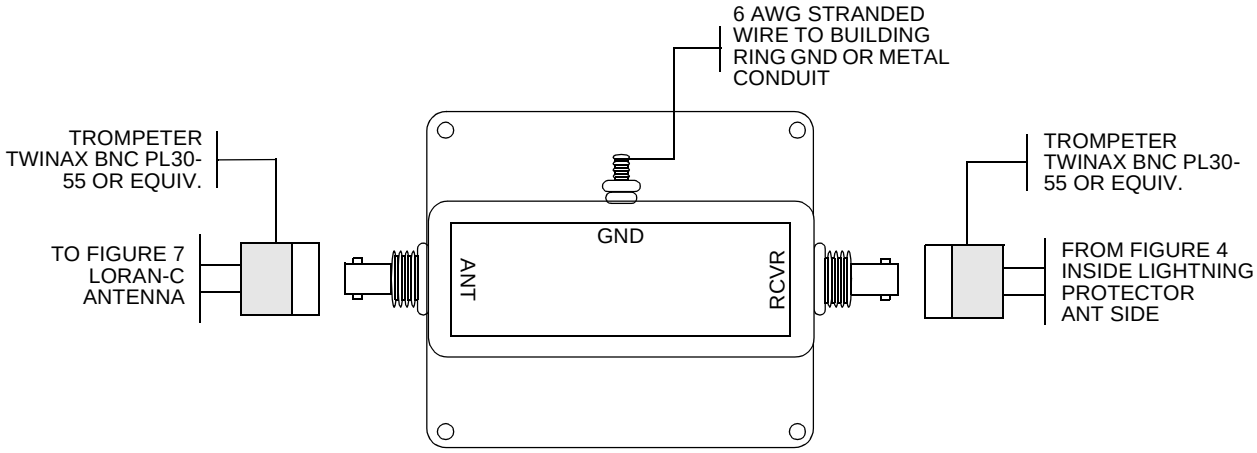


FIGURE 5.
LORAN LIGHTNING PROTECTOR
TYPE 1, MODEL 1 — OUTSIDE INSTALLATION

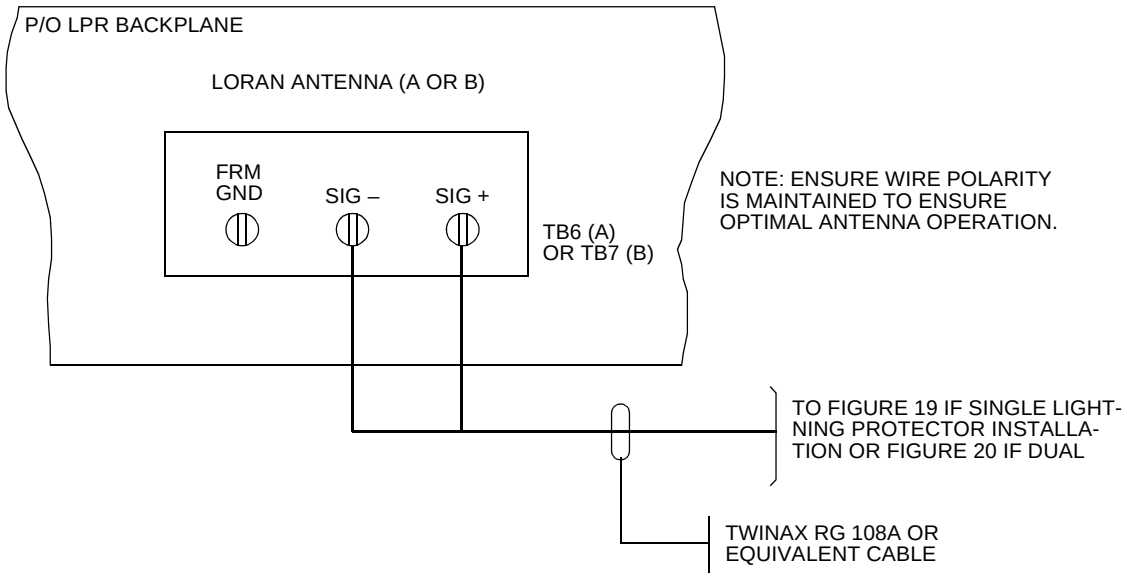
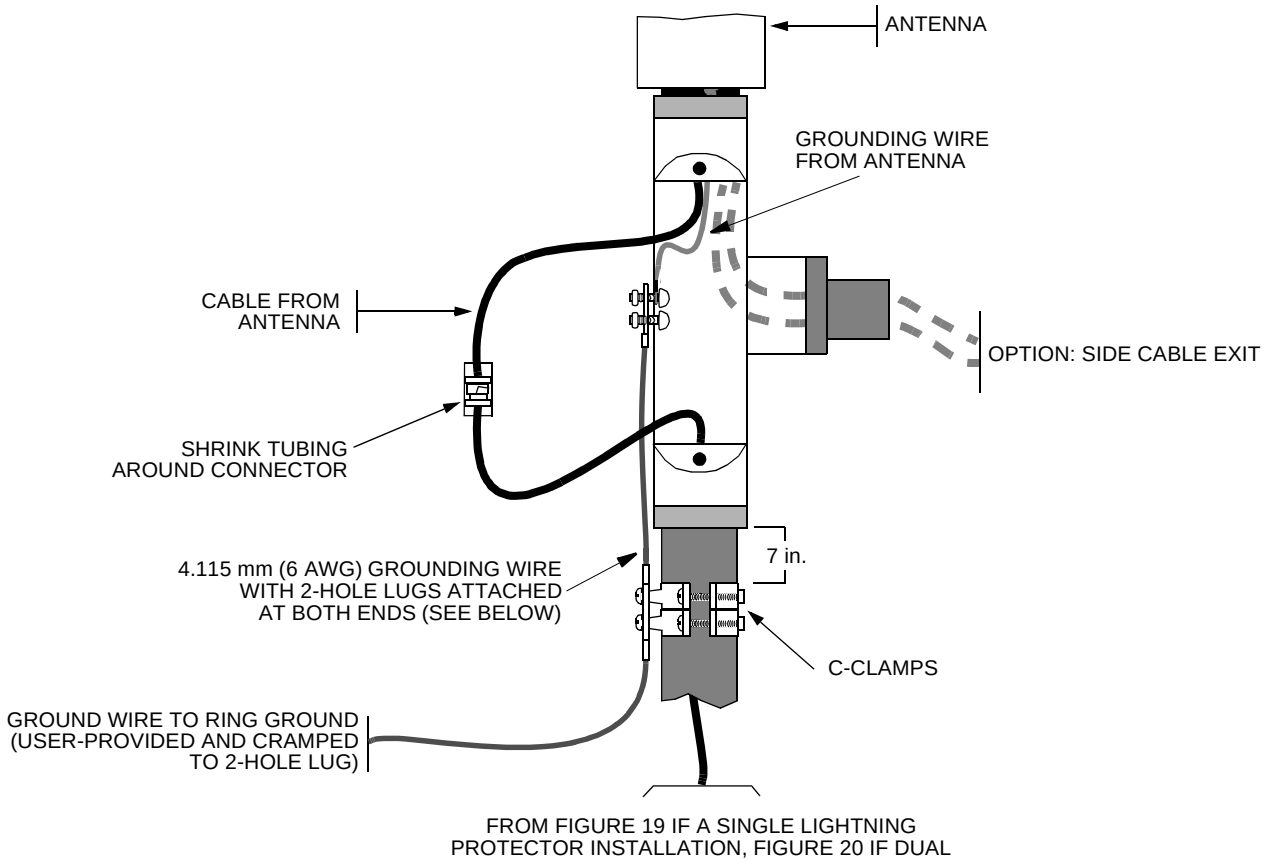
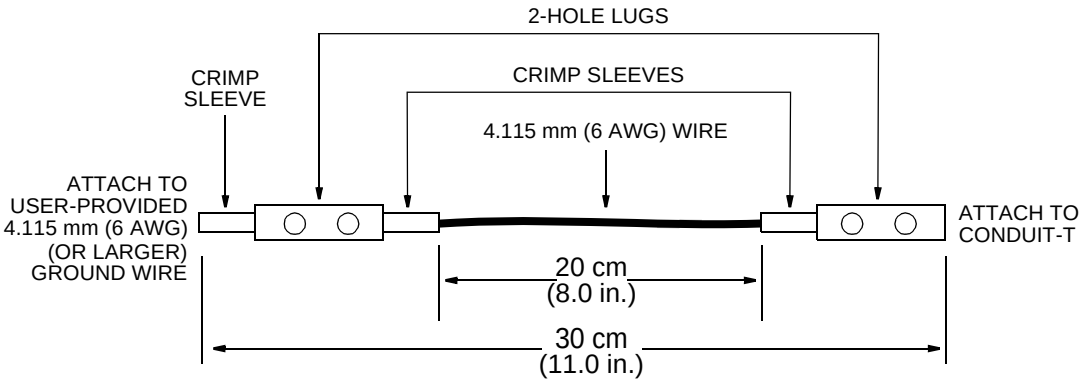


FIGURE 6.
LORAN ANTENNA CONNECTIONS
(NOTE 6)



A. ANTENNA



B. GROUNDING WIRE

FIGURE 7.
LORAN ANTENNA AND GROUND WIRE

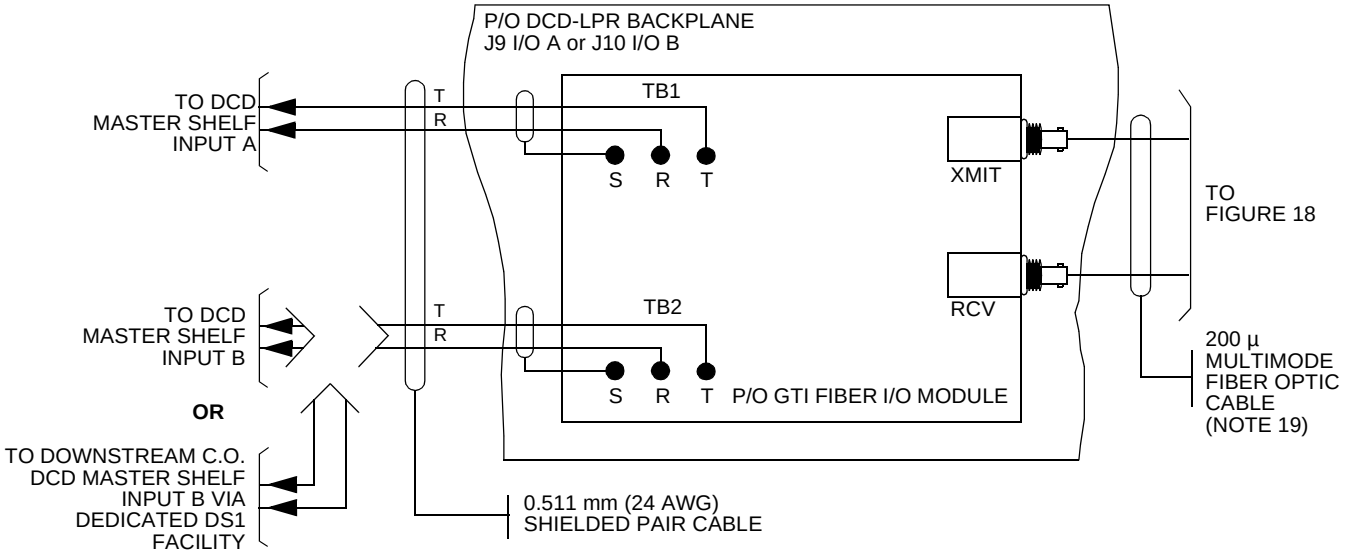


FIGURE 8.
GTI FIBER I/O MODULE

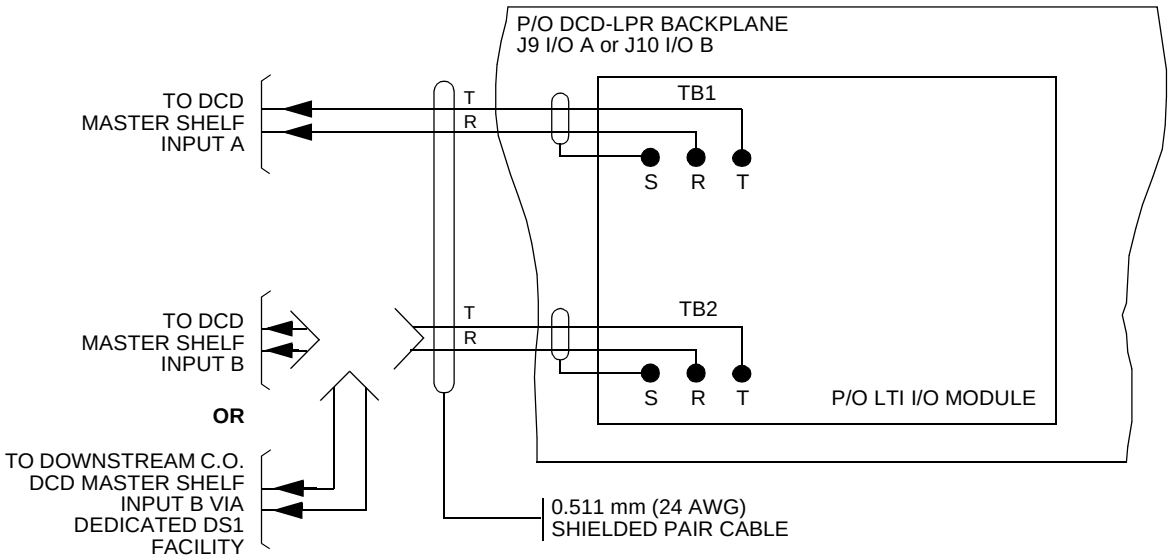
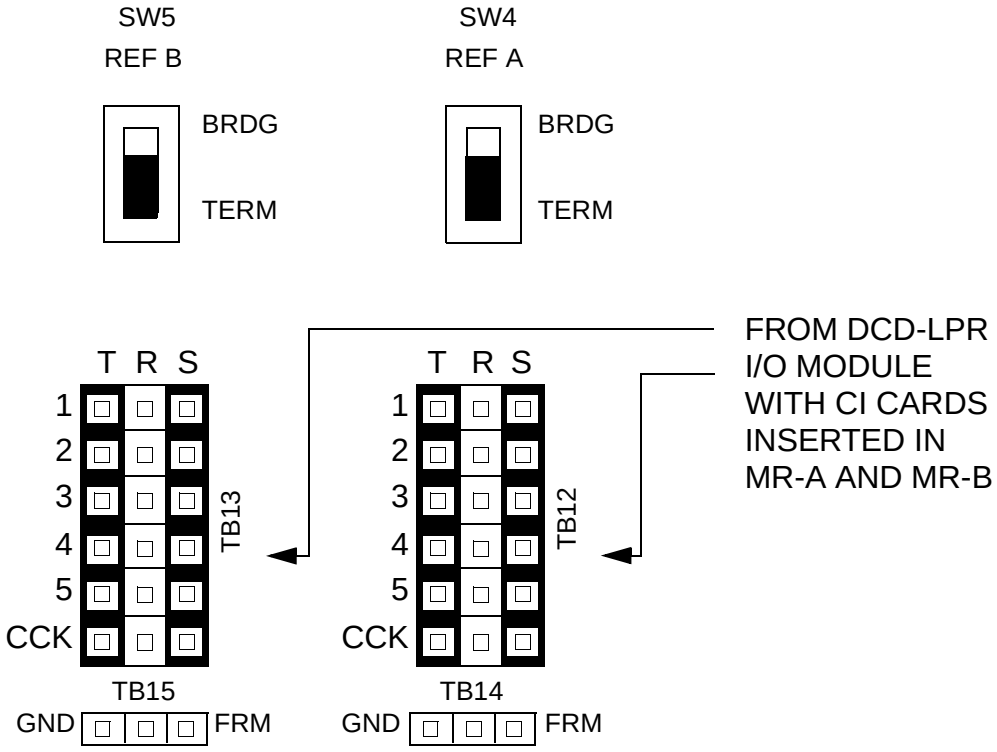
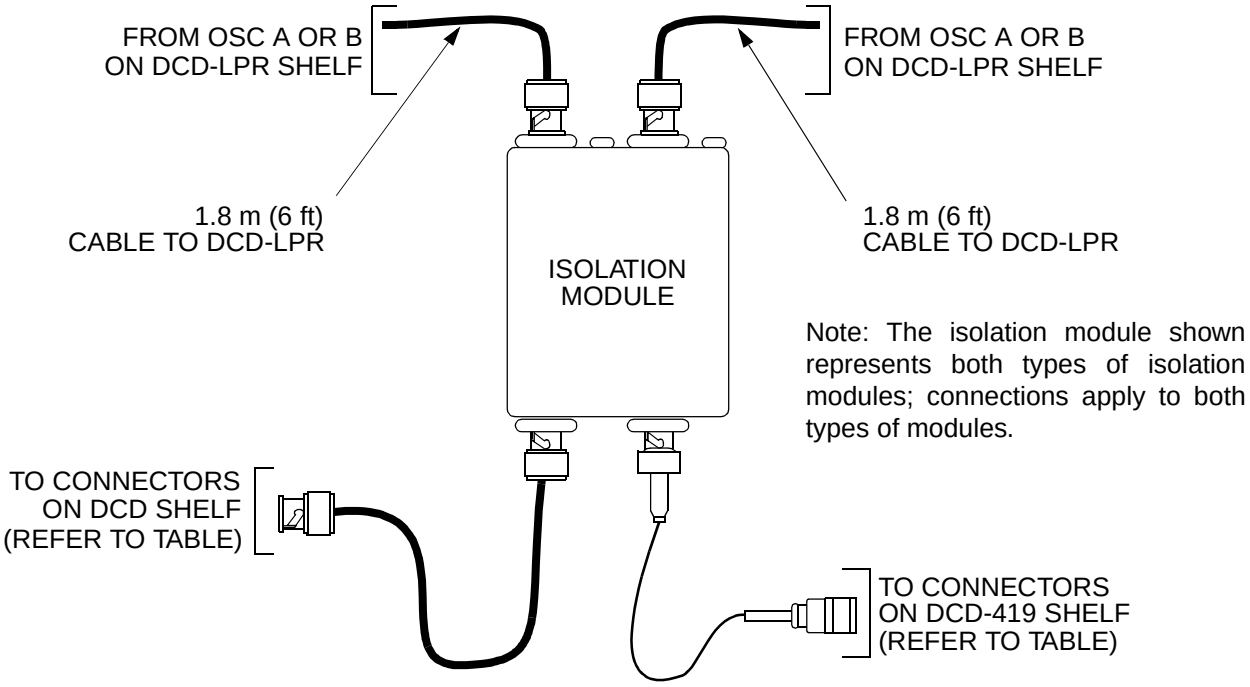


FIGURE 9.
LTI I/O MODULE



CI-A	TB12	TRS	Row 4
CI-B	TB13	TRS	Row 4
DCIM-T-A-1	TB12	TRS	Row 3
DCIM-T-A-2	TB12	TRS	Row 4
DCIM-T-B-1	TB13	TRS	Row 3
DCIM-T-B-2	TB13	TRS	Row 4
MRC-1-1	TB12	TRS	Row 2
MRC-1-2	TB12	TRS	Row 3
MRC-1-3	TB12	TRS	Row 4
MRC-1-4	TB12	TRS	Row 5
MRC-2-1	TB13	TRS	Row 2
MRC-2-2	TB13	TRS	Row 3
MRC-2-3	TB13	TRS	Row 4
MRC-2-4	TB13	TRS	Row 5

FIGURE 10.
DCD-523 WIRE-WRAP INPUT TERMINALS



ISOLATION MODULE CONNECTIONS

DCD SHELF (AS APPROPRIATE)	SHELF CONNECTOR	LABEL	DCD-LPR CONNECTOR	LABEL
DCD-ST2	J24	5 MHZ OUTPUT A	J11	OSC A
	J25	5 MHZ OUTPUT B	J12	OSC B
DCD-419	J35	NOT LABELED	J11	OSC A
	J36	NOT LABELED	J12	OSC B
DCD-523	J61	OSC A OUT	J11	OSC A
	J62	OSC B OUT	J12	OSC B
DCD-519	J44	OSC A OUT	J11	OSC A
	J45	OSC B OUT	J12	OSC B
CAUTION: If installing an LOU card, do not make any of the connections in this table.				

FIGURE 11.
ISOLATION MODULE CONNECTIONS

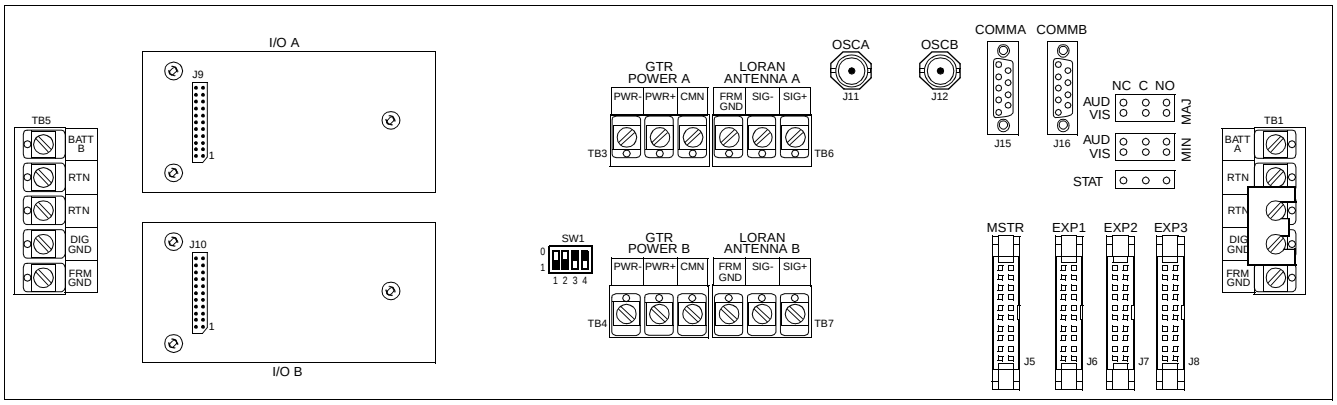
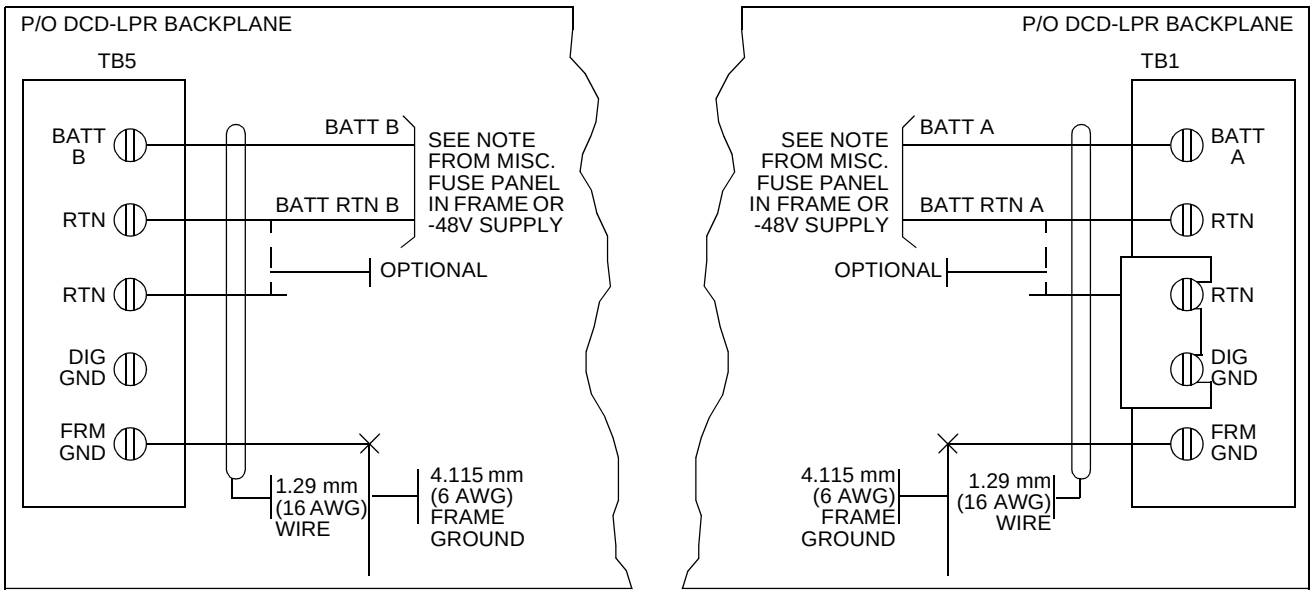
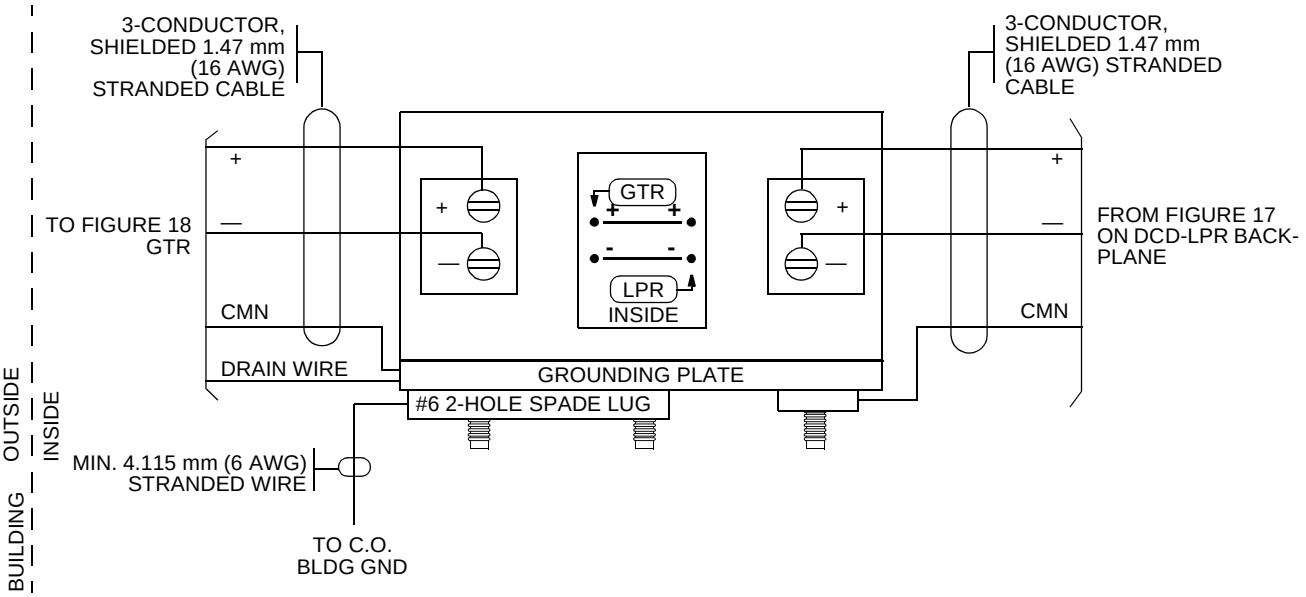


FIGURE 12.
DCD-LPR BACKPLANE

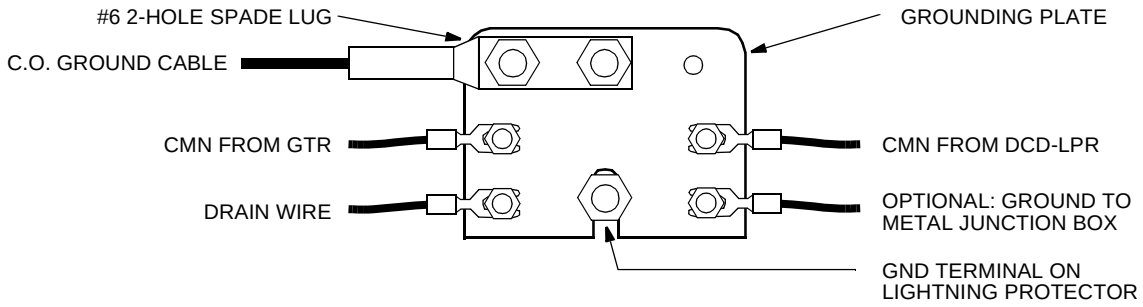


Note: For max. 30 m (100 ft), use 4.115 mm (6 AWG); for min. 30 m (100 ft), use 5.189 mm (4 AWG).

FIGURE 13.
-48 V POWER (LOADS A AND B) CONNECTIONS (NOTE 7)

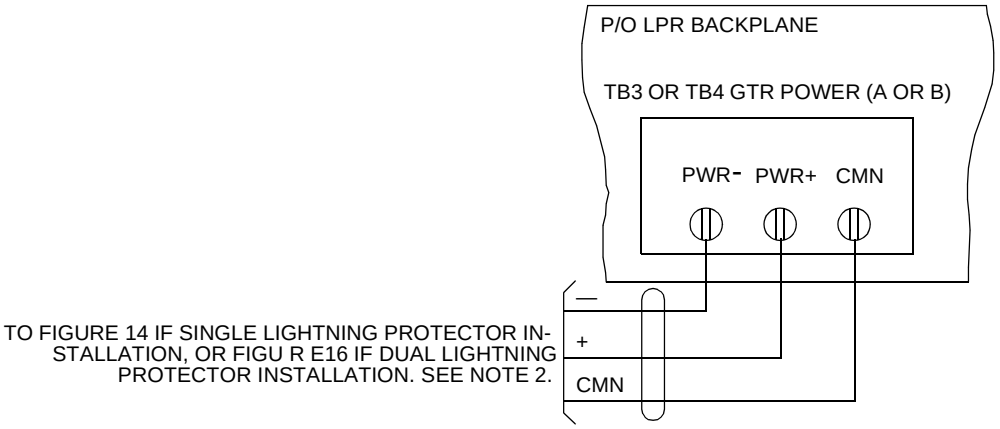


A. LIGHTNING PROTECTOR AND GROUNDING PLATE—TOP VIEW



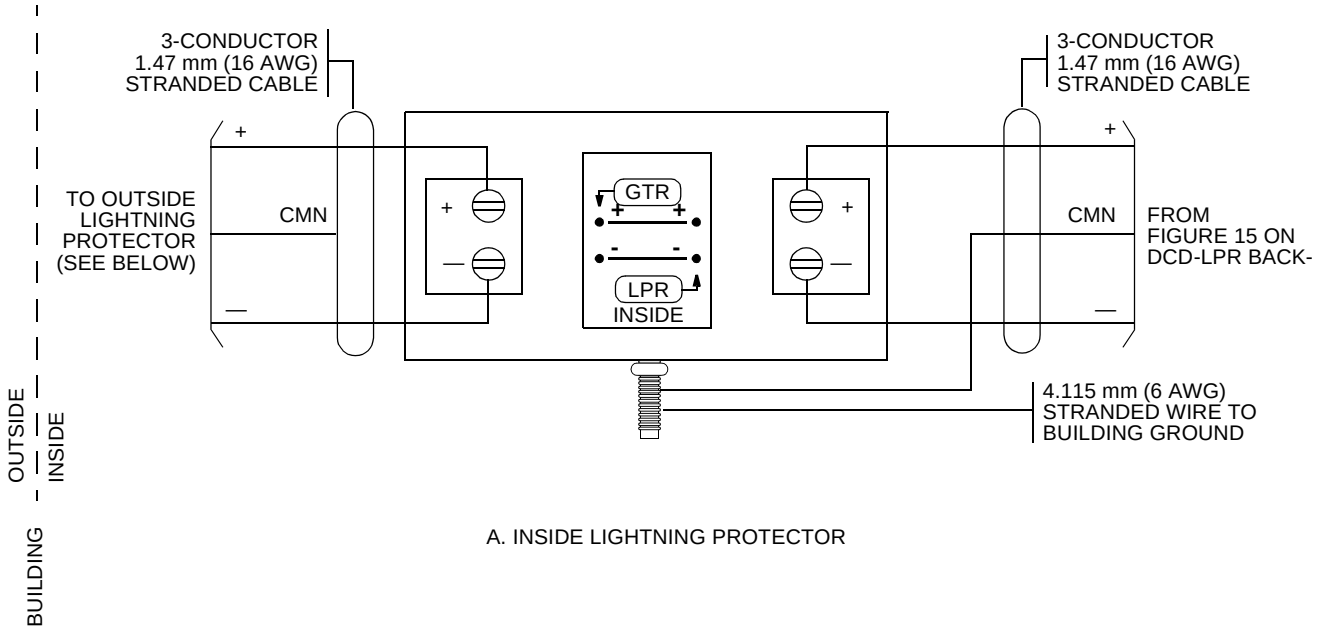
B. GROUNDING PLATE—FRONT VIEW

FIGURE 14.
GTR LIGHTNING PROTECTOR AND GROUNDING PLATE CONNECTIONS
(NOTES 2 AND 8)

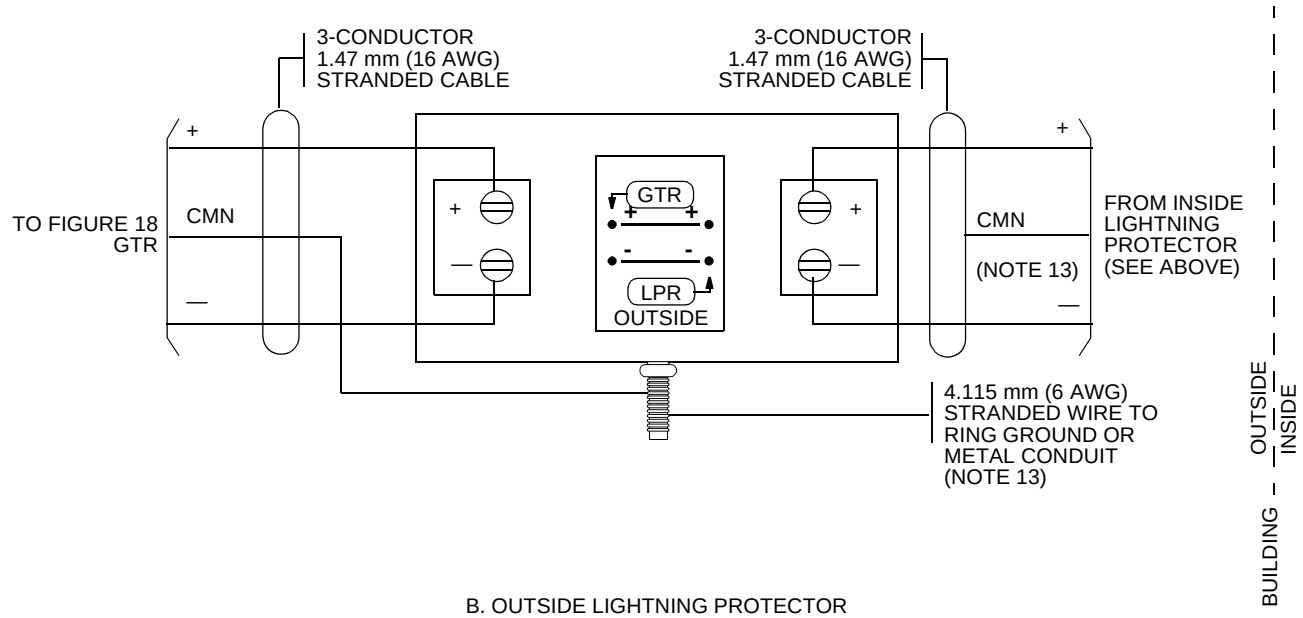


Notes:
1. Application of this figure is dependent upon cards installed in front panel of DCD-LPR, i.e., if a GTI is installed in Slot A and/or Slot B, wire FIGURE 15, GTR POWER A. and/or GTR POWER B. If GTI cards are not installed, skip FIGURE 15 and go to FIGURE 6.
2. Maintain wire polarity from the GTR to the shelf, otherwise, low voltage will occur and the GTR will not function properly.

FIGURE 15.
GTR POWER CONNECTIONS A OR B (NOTES 9 AND 10)

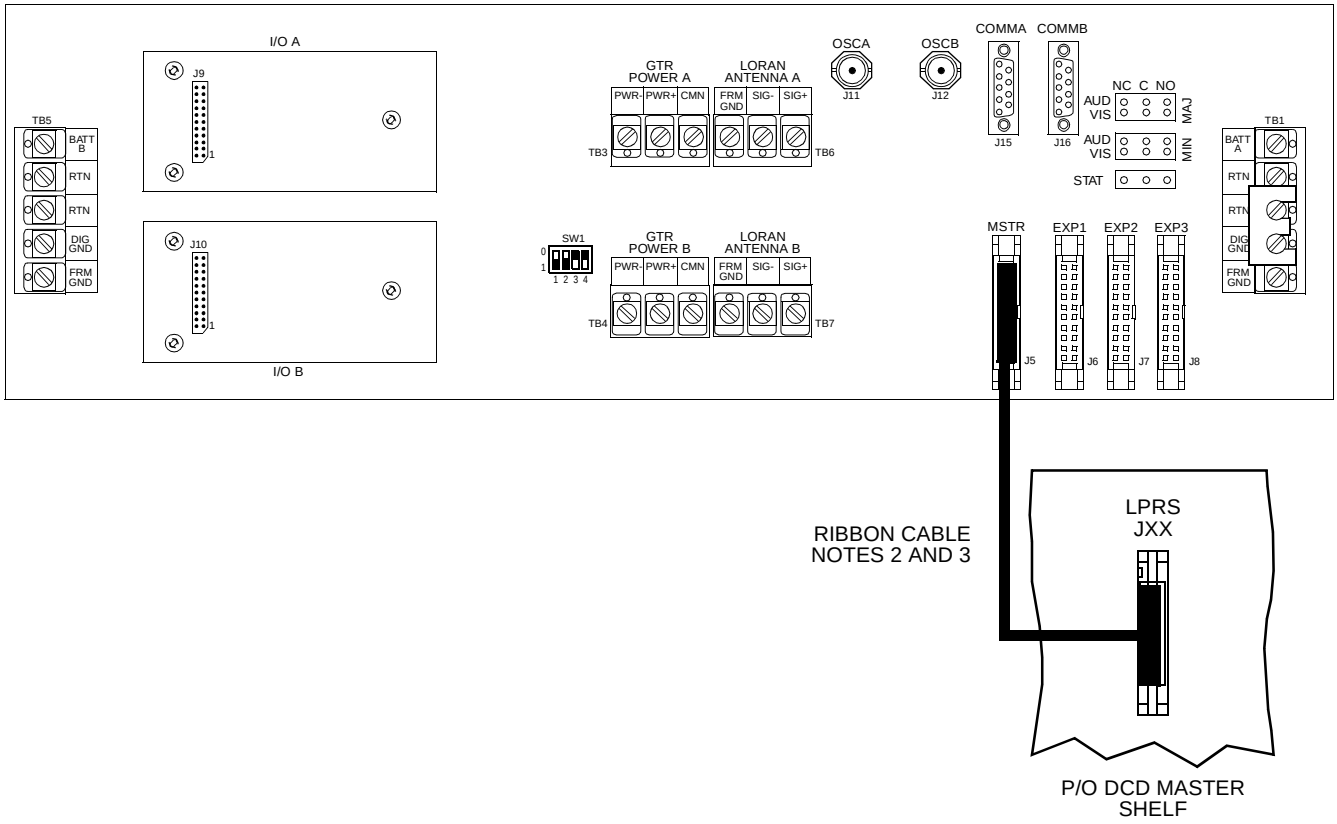


A. INSIDE LIGHTNING PROTECTOR



B. OUTSIDE LIGHTNING PROTECTOR

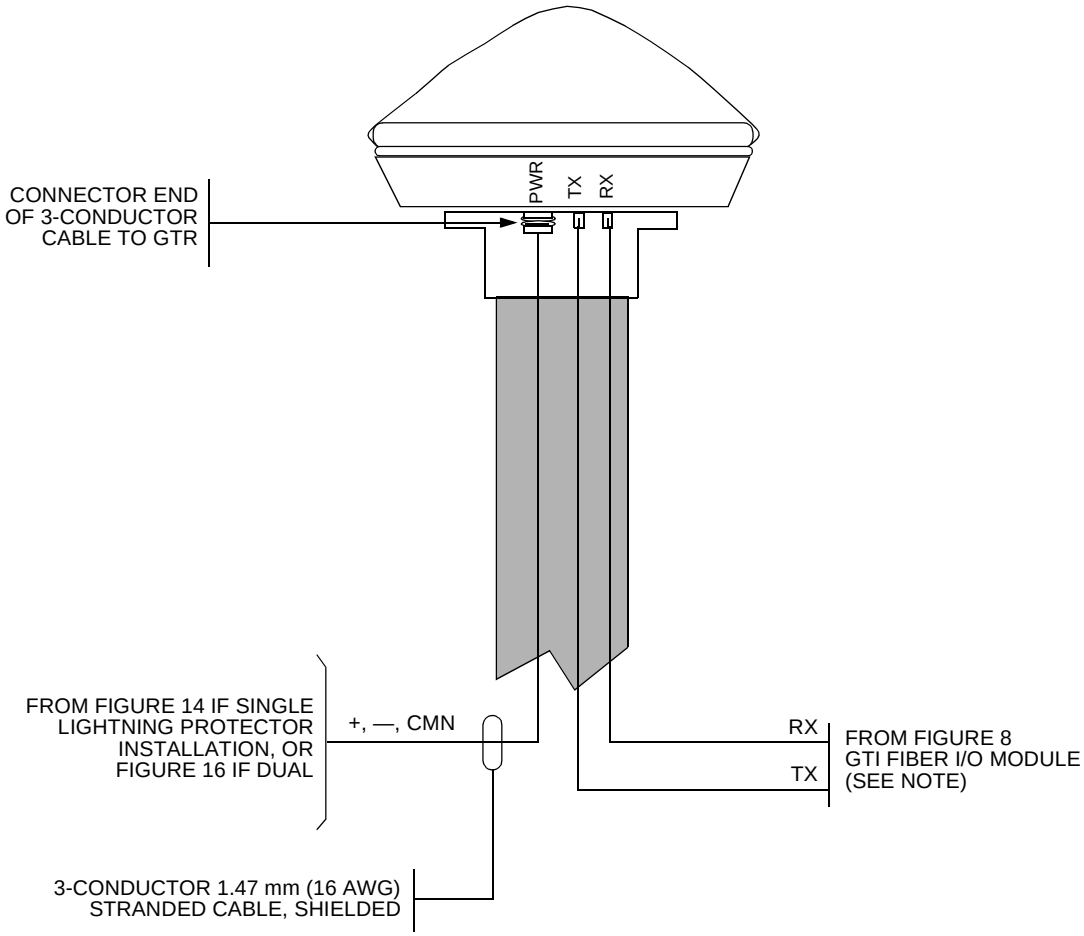
FIGURE 16.
GTR DUAL LIGHTNING PROTECTOR CONNECTIONS
(NOTE 9)



Notes:

1. To DCD master shelf with MIS card installed. Connect if communication with MIS card is desired and TOD is not required; cable is factory-provided.
2. To DCD master shelf with MIS card installed. Connect if communication with MIS card is desired and TOD is not required; cable is factory provided.
3. If TOD is required, the ribbon cable used will be the 3-connector cable shown in FIGURE 21, and connect to the adapter as shown in FIGURE 21.

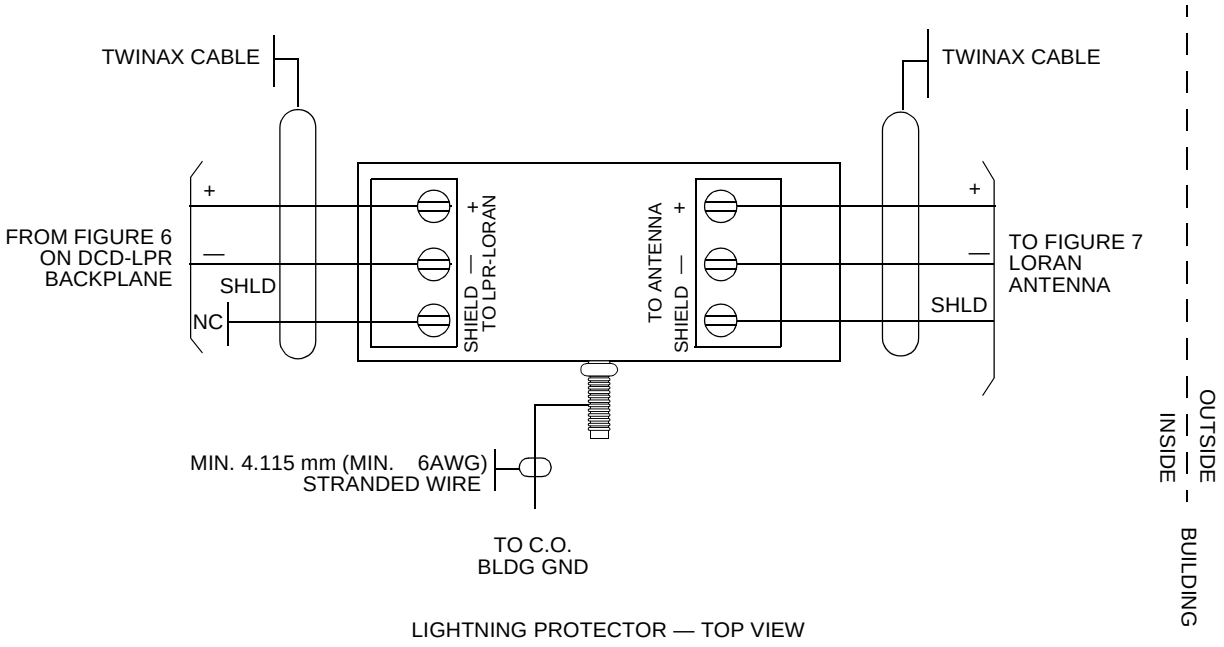
FIGURE 17.
DCD-LPR TO MIS CARD COMMUNICATION CONNECTION



Notes:

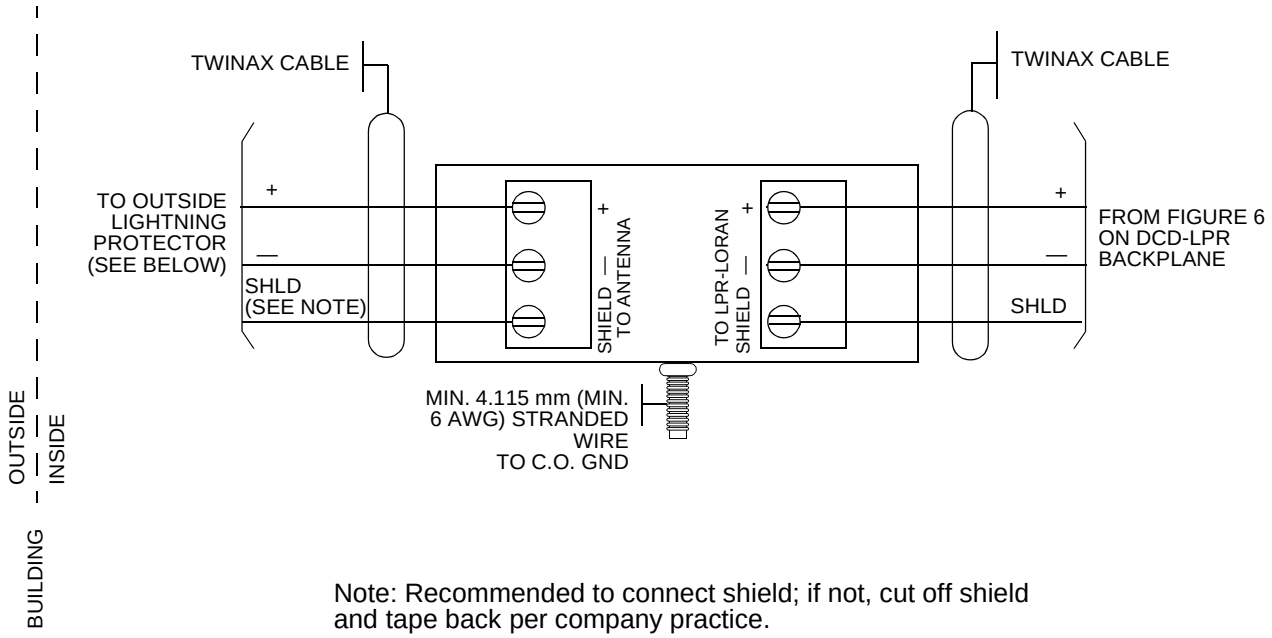
1. The TX and RX connectors are made of plastic and can be easily broken if over-tightened.
2. The TX fiber will be connected to the RCV connector and the RX fiber will be connected to the XMIT connector on the GTI Fiber I/O Module (FIGURE 8).

FIGURE 18.
GLOBAL POSITIONING SYSTEM (GPS) ANTENNA/RECEIVER (GTR)



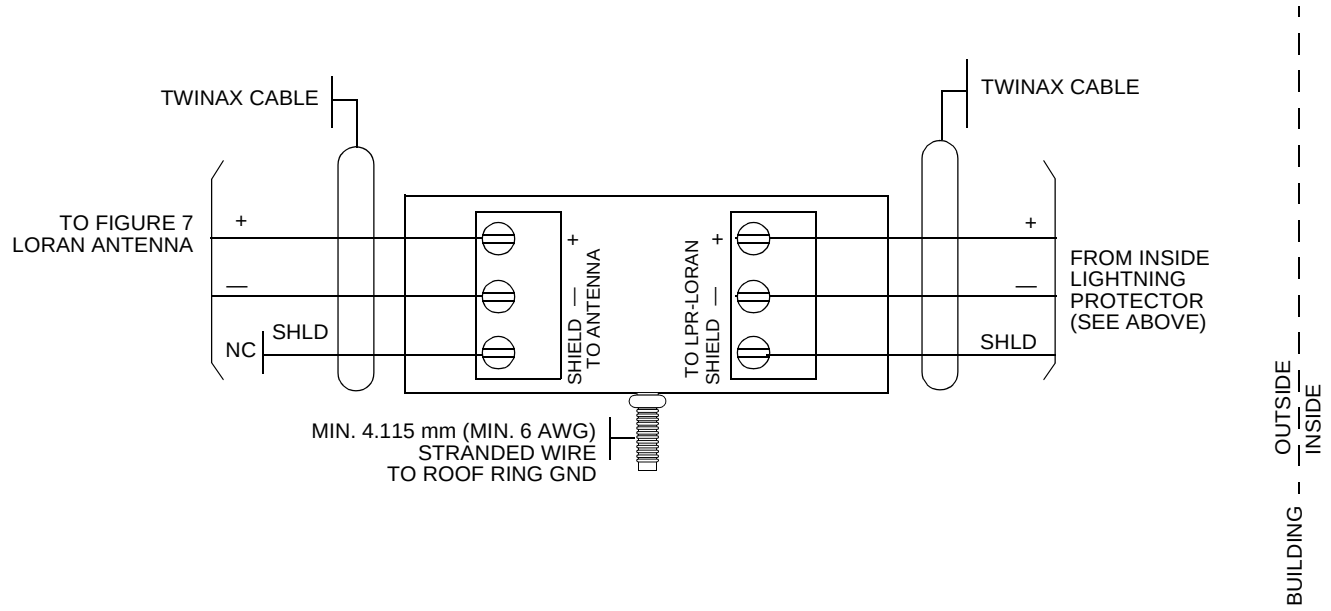
LIGHTNING PROTECTOR — TOP VIEW

FIGURE 19.
LORAN ANTENNA TYPE 2 SINGLE LIGHTNING PROTECTOR CONNECTIONS



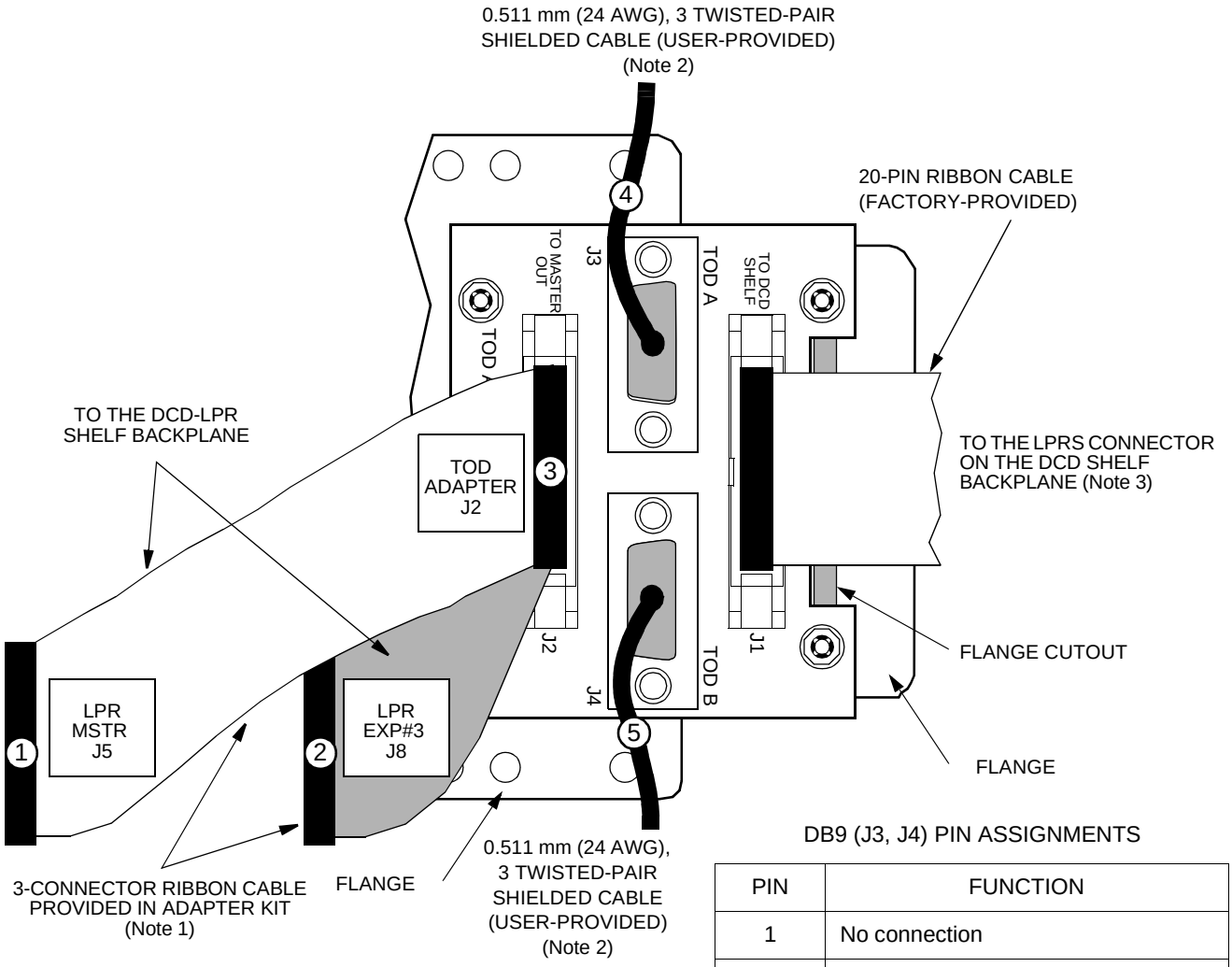
Note: Recommended to connect shield; if not, cut off shield and tape back per company practice.

A. INSIDE LIGHTNING PROTECTOR



B. OUTSIDE LIGHTNING PROTECTOR

FIGURE 20.
LORAN ANTENNA TYPE 2 DUAL LIGHTNING PROTECTOR CONNECTIONS



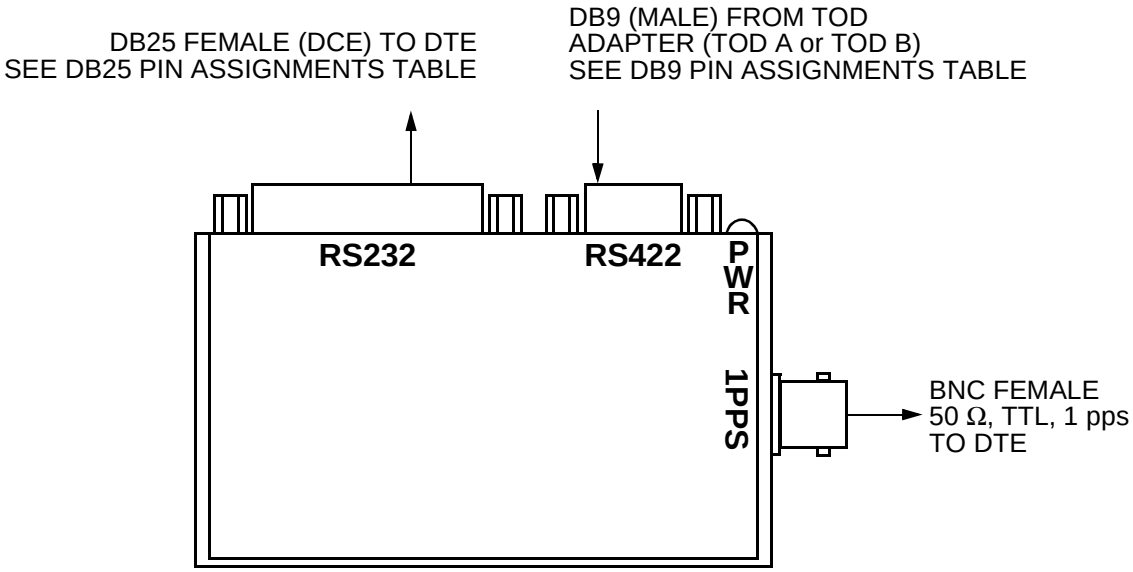
DB9 (J3, J4) PIN ASSIGNMENTS

PIN	FUNCTION
1	No connection
2	Data + Output (RS-422) (see Note)
3	Data – Output (RS-422) (see Note)
4	No connection
5	Ground (see Note)
6 and 7	No connection
8	1 pps Output (RS-232) (see Note)
9	+12V for RS-232 levels, max. 100 mA (see Note)
Note: Connect pins to 3 twisted-pairs: Pins 2 and 3 to one twisted pair, 5 and 8 to second pair; 9 to both wires of third pair.	

(1) Connect to the MSTR connector (J5) on the DCD-LPR backplane.
(2) Connect to the EXP 3 connector (J8) on the DCD-LPR backplane.
(3) Connect to the TOD adapter connector (J2).
(4) Connect to the RS-422 connector on the DTE; if an RS-232 connector is on the DTE, connect to the DB9 connector on the converter designated for GTI A.
(5) Connect to the RS-422 connector on the DTE; if an RS-232 connector is on the DTE, connect to the DB9 connector on the converter designated for GTI B.

Notes:
1. Use care when making the 3-connector ribbon cable connections; the applicable connectors are in close proximity of each other.
2. Belden 9680 or equivalent; see table for pin assignments.
3. For use with The MIS Card.

FIGURE 21.
DCD-LPR TOD CONNECTIONS



DB25 CONNECTOR PIN ASSIGNMENTS

PIN	FUNCTION
1 and 2	No connection
3	Data Output (RS-232)
4	No connection
5	1pps (RS-232)
6	No connection
7	Ground
8 through 25	No connection

DB9 CONNECTOR PIN ASSIGNMENTS

PIN	FUNCTION
1	No connection
2	Data + Input (RS-422)
3	Data – Input (RS-422)
4	No connection
5	Ground
6 and 7	No connection
8	1pps (RS-232)
9	+12 V Input

FIGURE 22.
RS-422–TO–RS-232 CONVERTER CONNECTIONS