Digivance™ Long Range Coverage Solution
Single Band SMR Remote Unit
Installation Instructions

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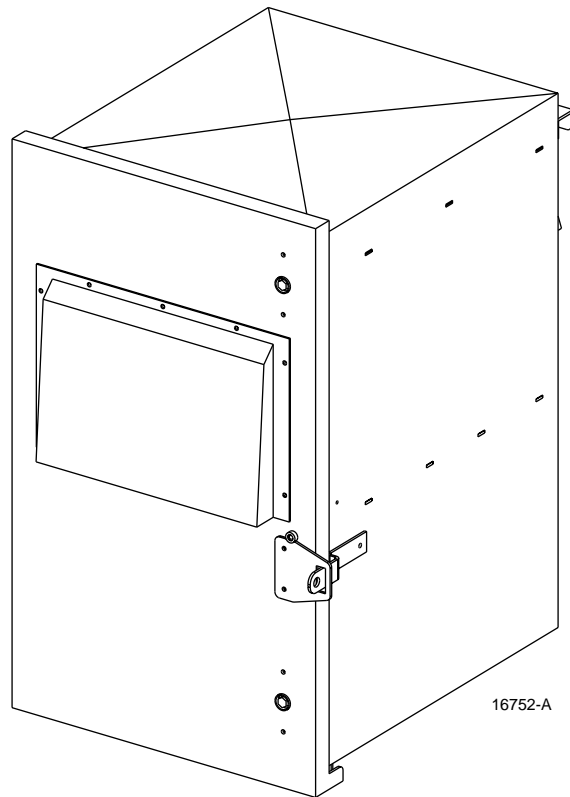
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INTRODUCTION

This publication provides instructions for installing the Digivance Long Range Coverage Solution (LRCS) Single Band Specialized Mobile Radio (SMR) Remote Unit (RU). A more complete description of the RU along with operating and maintenance procedures is provided in the Digivance LRCS Single Band SMR Installation and Operation Manual (ADCP-75-116). The RU is installed in conjunction with the Digivance LRCS Single Band SMR Host Unit (HU).

Installation of the RU involves completion of the following basic steps:

1. Unpacking and inspecting the RU modules and optional components

2. Installing the RU cabinet

3. Installing the modules and optional components in the cabinet

4. Installing a 20-Amp AC circuit with service disconnect breaker.

5. Routing a pre-connectorized indoor/outdoor pigtail cable into the cabinet.

6. Connecting the fiber cable pigtal leads to the STM and WDM (if used).

7. Connecting the external coaxial antenna cable(s) to the lightning protector(s) on the underside of the cabinet.

8. Installing internal coaxial jumper cable(s) and between the lightning protector(s) and the STM.

9. Connectorizing the door open switch

10. Applying AC power

11. Performing final tests and adjustments

This manual provides information about each of the preceding steps, except step 2. The information required to complete step 2 is contained in the Digivance LRCS Single Band Remote Cabinet Installation Instructions (ADCP-75-117). This manual assumes that the RU installation site has been selected and all of the procedures descibed in the cabinet installation instructions have already been completed. In addition, it assumes that the required OSP fiber optic cables have already been routed between the HU and RU, that the required antennas have been installed (one or two antennas may be required depending on RU configuration), and that a connectorized coaxial cable with an N-type connector has been routed to the underside of the RU for each antenna.

The ADC-provided RU cable installation loose parts hardware are listed in Table 1.

Table 1. Cable Installation Loose Parts Hardware

ITEM	QUANTITY
brown cable grip ring, 0.5-inch to 0.63-inch cable diameter	1
yellow cable grip ring, 0.63-inch to 0.75-inch cable diameter	1
purple cable grip ring, 0.75-inch to 0.88-inch cable diameter	1
neoprene bushing-, 0.500 to 0.625-inch cable diameter	1
neoprene bushing, 0.625 to 0.750-inch cable diameter	1
neoprene bushing, 0.750 to 0.875-inch cable diameter	1
wire nuts	3
reducer, 3/4-inch to 1/2-inch	1
right angle plug	1

Revision History

ISSUE	DATE	REASON FOR CHANGE
Issue A	08/2001	Original

Trademark Information

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Related Publications

Listed below are related manuals and their publication numbers. Copies of these publications can be ordered by contacting the ADC Technical Assistance Center at 1-800-366-3891 (in U.S.A. or Canada) or 952-946-3000, extension 63475 (outside U.S.A. and Canada).

Title	ADCP Number
Digivance LRCS Single Band SMR Installation and Operation manual	75-116
Digivance LRCS Single Band Remote Unit Cabinet Installation Instructions	75-117
Digivance Element Management System User Manual	75-118

Admonishments

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.

⚠️ **Danger:** *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*

⚠️ **Warning:** *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*

⚠️ **Caution:** *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

⚠️ **Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio co*

1 DESCRIPTION

The Digivance LRCS Single Band SMR Remote Unit (RU), serves as the cellular user servicing unit for the Digivance LRCS Single Band SMR system. The system consists of up to 15 Host Units (HUs) each of which is attached to a single RU. In the forward direction, the RU receives digital optical signals from the HU, converts the digital optical signals into an RF signal format, and transmits these signals to cellular phones. In the reverse path, the RU receives RF signals from cellular phones, digitizes the RF signals, converts the signals to digital optical format, and transmits the signals to the HU. RUs configured with the Diversity option require a redundant fiber optic reverse path to the HU. All RUs are configured with a minimum of one antenna to transmit and receive RF signal transmissions between the RU and the cellular phones. On RUs configured with the Diversity option, a second antenna is connected to the RU to provide a redundant receive RF signal path from the cellular phones. The RU also transports alarm status to and from the HU using the optical link.

2 UNPACKING AND INSPECTION

After receiving the components of the RU, unwrap each item and inspect for damage or missing parts. The basic RU components package includes the following items:

- Spectrum Transport Module (STM)
- Linear Power Amplifier (LPA) Module

The following optional components may also be shipped with the basic component package:

- Battery Backup Kit
- Wave Division Multiplexer (WDM) Kit

3 STM USER INTERFACE

The STM user interface consists of the various connectors, switches, and LEDs that are provided on the STM front panel. The STM user interface points are indicated in Figure 1 and described in Table 2.
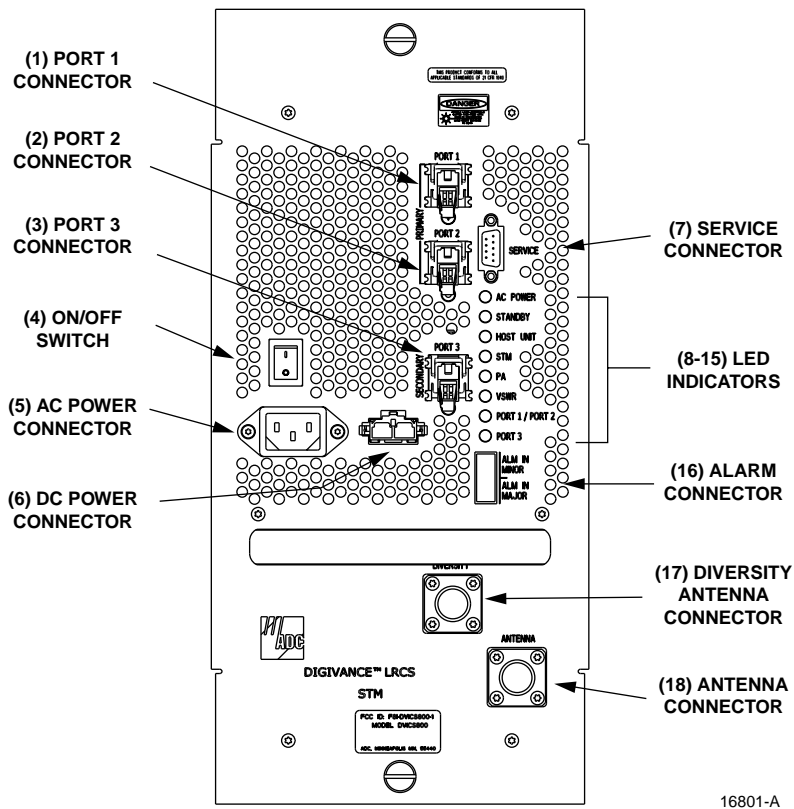

Figure 1. Spectrum Transport Module User Interface

Table 2. Spectrum Transport Module User Interface

REF NO	USER INTERFACE DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	PORT 1	SC connector	Connection point for the forward path fiber optic link.
2	PORT 2	SC connector	Connection point for the reverse path primary fiber optic link.

Table 2. Spectrum Transport Module User Interface, continued

REF NO	USER INTERFACE DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
3	PORT 3 (diversity unit only)	SC connector	Connection point for the reverse path diversity fiber optic link.
4	I/O	On/Off rocker switch	Provides AC power on/off control.
5	No designation	3-wire AC power cord connector	Connection point for the AC power cord.
6	No designation	2- wire DC power cord connector	Connection point for the battery back-up power cord.
7	SERVICE	DB-9 connector (female)	Connection point for the RS-232 service inter-face cable.
8	AC POWER	Multi-colored LED (green/yellow)	Indicates if the STM is powered by the AC power source (green) or the battery back-up system (red). See Note.
9	STANDBY	Multi-colored LED (green/yellow)	Indicates if the system is in the Normal state (off) Standby state (blinking green), Test state (blinking red), or Program Load state (blinking yellow). See Note.
10	HOST UNIT	Multi-colored LED (green/yellow/red)	Indicates if the HU is normal (green) or faulty (red). See Note.
11	STM	Multi-colored LED (green/yellow/red)	Indicates if the STM is normal (green) or faulty (red). See Note.
12	PA	Multi-colored LED (green/yellow/red)	Indicates if the power amplifier is normal (green), over temperature (yellow), has a fan failure (yellow), or is faulty (red). See Note.
13	VSWR	Multi-colored LED (green/yellow/red)	Indicates if the forward path VSWR is above (red) or below (green) the fault threshold.
14	PORT 1/PORT 2	Multi-colored LED (green/yellow/red)	Indicates if the forward path optical signal received from the HU is normal (green), if no signal is detected (red), or if errors are detected (red). See Note.
15	PORT 3 (diversity unit only)	Multi-colored LED (green/yellow/red)	Indicates if the diversity reverse path optical signal received by theHU is normal (green), if no signal is detected (red), or if errors are detected (red). See Note.
16	ALARM IN MINOR ALARM IN MAJOR	Screw-type terminal connector (14–26 AWG)	Connection point for two external alarm inputs. The door-open switch lead wires are typically connected to the major alarm terminals.
17	DIVERSITY (diversity unit only)	N-type female RF coaxial connector	Connection point for the diversity antenna.
18	ANTENNA	N-type female RF coaxial connector	Connection point for the primary antenna.

Note: A more detailed description of LED operation is provided in the Digivance LRCS Single Band SMR Installation and Operation Manual (ADCP-75-116).

4 LPA USER INTERFACE

The LPA user interface consists of the various LEDs, message displays, and switches that are provided on the LPA front panel. The LPA user interface points are described in Table 3 and indicated in Figure 2.

Table 3. Linear Power Amplifier User Interface

| REF NO	USER INTERFACE DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	RESET	Momentary contact push button switch	Momentarily pressing the switch push button clears all alarms and restarts the amplifier
2	RF ON OFF	2-position switch	Placing the switch in the OFF position puts the LPA in a standby state with RF output disabled. Placing the switch in the ON position puts the LPA in the normal state with RF output enabled.
3	FAIL	LED indicator (yellow)	Indicates the LPA is normal (off) or faulty (yellow).
4	SHUTDOWN	LED indicator (red)	Indicates the LPA is in service (off) or shutdown (red).
5	No designation	Digital display	Provides status and alarm messages. See Note.
Note: A more detailed description of the digital display messages is provided in the Digivance LRCS Single Band SMR Installation and Operation Manual (ADCP-75-116).			
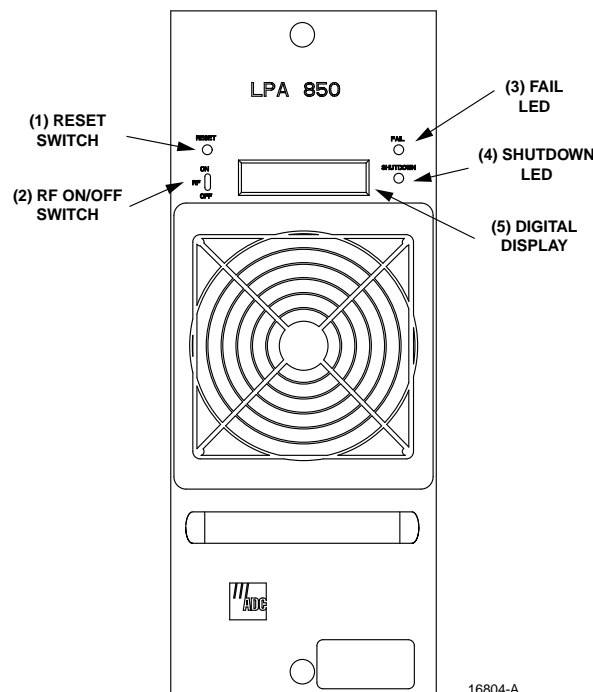
Figure 2. Linear Power Amplifier User Interface

5   WDM USER INTERFACE

The WDM user interface consists of a connector and two trailing cables provided on the WDM front panel. The WDM user interface connectors are described in Table 4 and indicated in Figure 2.

Table 4. Wave Division Multiplexer (WDM) User Interface

REF NO	USER INTERFACE DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	WDM	SC Connector	Connection point for the bi-directional indoor/ outdoor cable from the splice tray enclosure.
2	OUT	Cable with SC Connector	Connection point for the forward path trailing cable to the PORT 1 connector on the STM.
3	IN	Cable with SC Connector	Connection point for the reverse path trailing cable to the PORT 2 connector on the STM.

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Figure 3. WDM User Interface

6   INSTALLATION PROCEDURES

This section provides installation instructions for the STM and LPA modules, the battery backup option and the WDM option. Use the ADC-provided 7/16-inch nut driver taped to the outside of the cabinet to open the door latches and gain access to the interior of the cabinet.

6.1   STM Module

Perform the following steps to install the Spectrum Transport Module (STM):

1. Check to ensure that the PWR ON/OFF switch on the STM is set to OFF (refer to item 4 on Figure 1).

2. Gently slide the STM into the cabinet at the location shown in Figure 4. If resistance is encountered, remove the STM and check the alignment of the mating connector on the backplane.

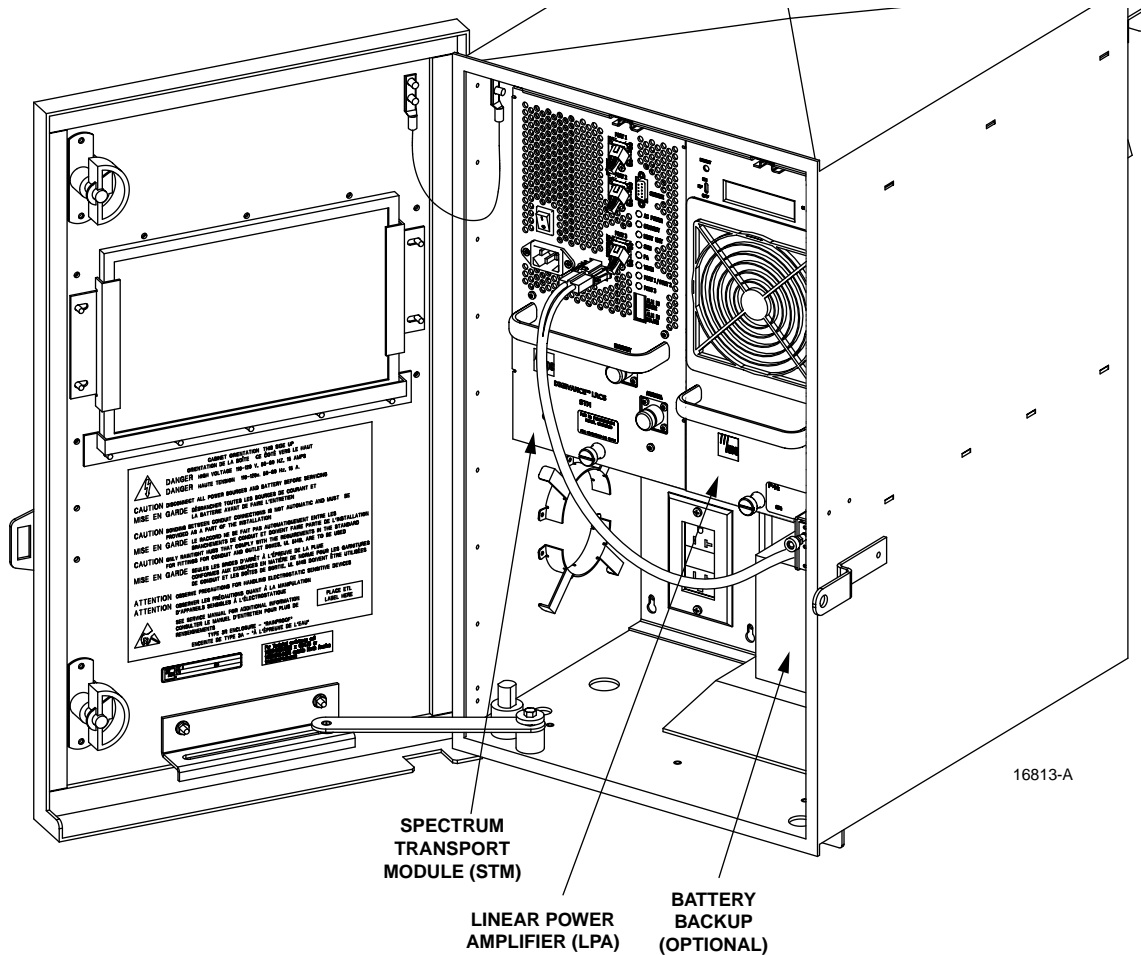3. Tighten the two compression screws that secure the STM to the cabinet mounting shelf.

SPECTRUM TRANSPORT MODULE (STM)

LINEAR POWER AMPLIFIER (LPA)

BATTERY BACKUP (OPTIONAL)

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Figure 4. Installing RU Components

6.2 LPA Module

perform the following steps to install the Linear Power Amplifier (LPA):

1. Check to ensure that the RF ON/OFF switch on the LPA is set to OFF (refer to item 2 on Figure 2).

2. Gently slide the LPA into the cabinet at the location shown in Figure 4. If resistance is encountered, remove the LPA and check the alignment of the mating connector on the backplane.

3. Tighten the two compression lock screws that secure the LPA the cabinet mounting shelf.

6.3   Battery Backup Kit Installation (Optional)

⚠️ **Caution:** *The battery pack weighs approximately 75 lb (34 kg). Enlist sufficient aid to lift the battery pack into position inside the cabinet.*

Perform the following steps to install the optional battery pack:

1. Slide the battery pack into position on the heated tray within the cabinet as shown in Figure 4.

2. Route the trailing battery cable from the battery pack to the battery connector on the front of the STM (refer to item 6 on Figure 1).

Refer to the Digivance LRCS Single Band Installation and Operation Manual (ADCP-75-116) for a description of the monthly, semi-annual, and biennial maintenance procedures for the battery pack.

6.4   WDM Installation (Optional)

Perform the following steps to install the WDM:

1. Slide the WDM into position underneath the cabinet mounting shelf as shown in Figure 4.

2. Use the four 6 x 24 mounting screws and washers provided with the WDM to secure the WDM to the underside of the mounting shelf.

7   CABLING

There are three cable types that must be installed as part of RU installation: power, fiber optic, and coaxial. The power cables are routed between the RU and an AC power breaker box. The fiber optic cables are routed between the HU and the RU. The coaxial cables are routed between the antenna(s) and the RU.

7.1   AC Power Wiring

⚠️ **Danger:** *The RU power circuits are High Voltage. Use extreme caution. Ensure all power is disconnected before working on power circuits.*

⚠️ **Caution:** *For proper equipment operation a good earth ground or water pipe ground connection must be provided. The recommended minimum wire size for use is #6 AWG wire.*

▶ **Note:** All electrical work must comply with Local Codes. A local licensed electrical contractor is best qualified to perform this work.

A dedicated customer-provided external breaker box supplying 120 Vac, 50/60 Hz, 20 Amp, single-phase, AC power is required to operate the components in the cabinet. The RU is pre-

wired for 120 Vac but can be converted to 240 Vac operation through the installation of a 240 Vac outlet kit (accessory item). Connect the AC power wiring as follows:

1. Obtain access to the internal power wiring harness inside the auxilary junction box by loosening the four screws securing the auxiliary box cover, pulling up and removing the cover. see Figure 5.

2. Route the external AC power conduit to the AC power 3/4-inch NPT threaded hole on the left-rear underside of the cabinet directly underneath the auxiliary junction box. See Figure 6. Use the conduit fitting provided, or a UL approved equivalent, to provide a moisture barrier. The 3/4-inch (19.0 mm) conduit fitting mounted on the underside of the cabinet is designed to accept threaded rigid conduit.

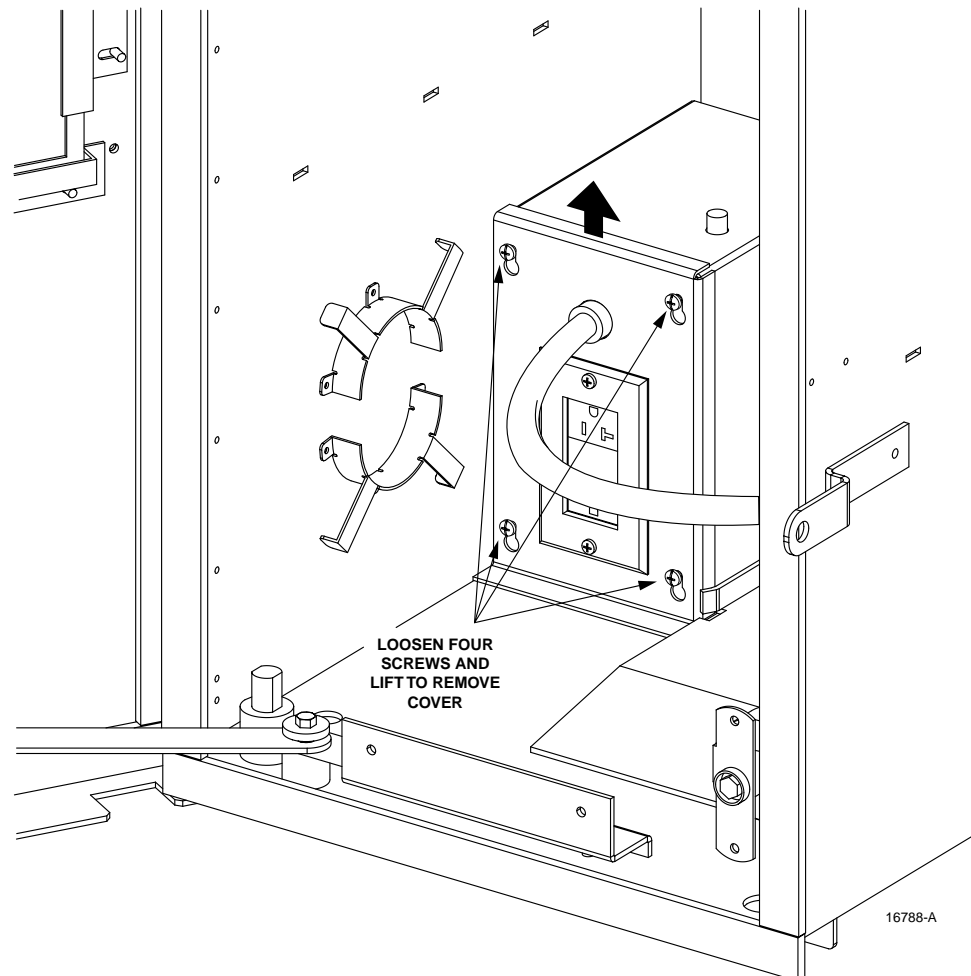▶ **Note:** A 3/4-inch to 1/2-inch (12.7 mm) reducer fitting is provided to accommodate 1/2-inch threaded conduit.

LOOSEN FOUR SCREWS AND LIFT TO REMOVE COVER

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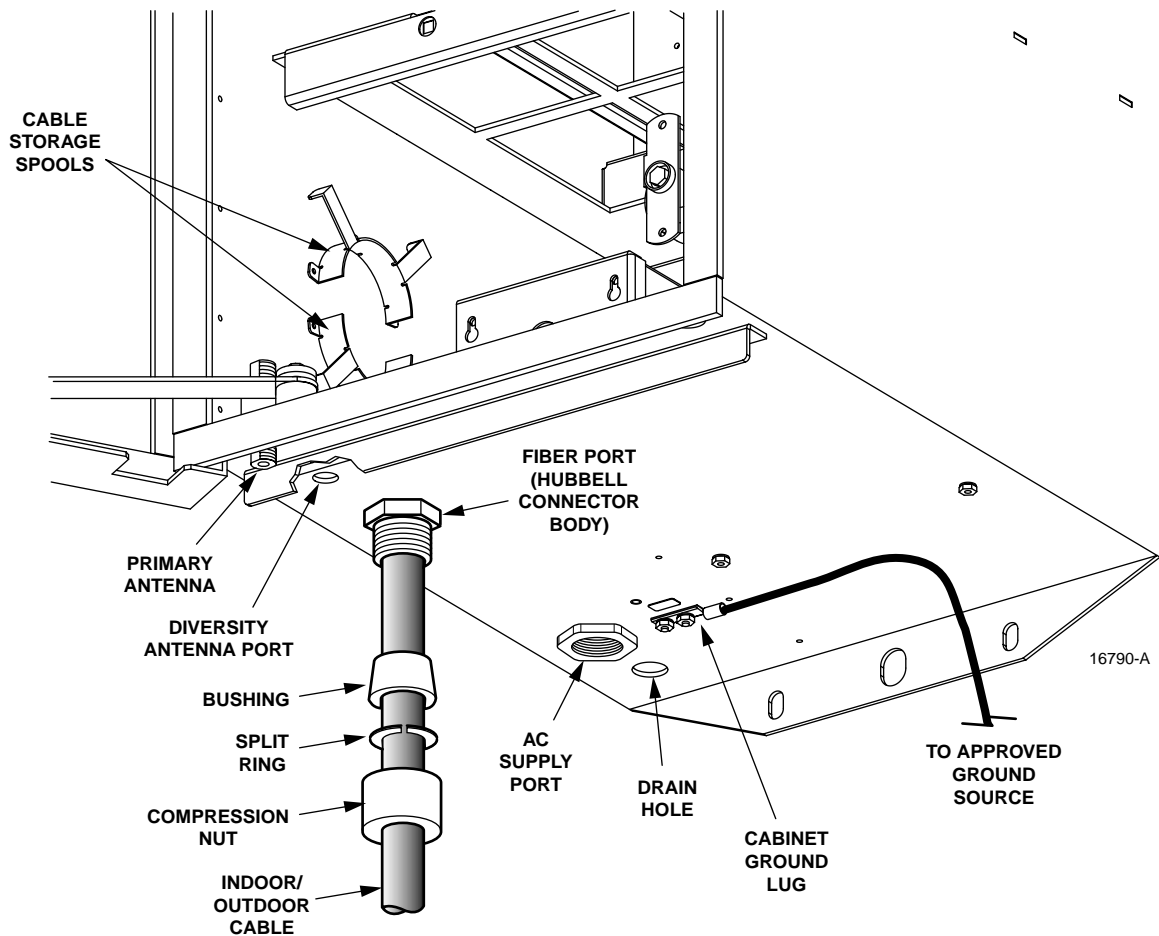**Figure 5. Accessing AC Power Wiring**

Figure 6. Cable Entry Ports on Cabinet

3. A grounding lug is provided on the underside of the cabinet. Connect a ground wire to this lug as required to meet local codes.

4. Attach the white (neutral), green (ground) and black (hot) wires from the internal AC harness coiled up inside the junction box to the corresponding conductors in the external conduit using the twist-lock fasteners provided.

5. Re-position the auxilary junction box cover on the front of the junction box and tighten the four screws securing the cover.

6. Connect the power cord trailing from the cover of the auxiliary junction box to the AC connector on the front of the STM (refer to item 5 on Figure 1).

▶ **Note:** The duplex Ground Fault Circuit Interrupter (GFIC) outlet provided on the cover of the auxiliary junction box is wired to accept 120 Vac appliances. If the cabinet is re-wired for 240 Vac, the 120 Vac outlet must be replaced.

7.2   Routing Pre-Connectorized Indoor/Outdoor Fiber Optic Cable

Fiber optic cable termination typically consists of routing a pre-connectorized indoor/outdoor fiber optic cable between the cabinet and an external splice tray enclosure, securing the cable to the cabinet, breaking out the individual jacketed pigtail fibers inside the cabinet, and connecting the fibers to the WDM (optional) or STM.

> ◆   **Note:** The routing of an OSP fiber optic cable from the HU to a splice tray enclosure in the vicinity of the RU and the splicing of selected OSP cable fibers to fibers in the indoor/outdoor cable is the responsibility of the customer.

Cable storage spools is provided on the interior wall of the cabinet to accumulate excess indoor/outdoor cable length and also serve as a long-term storage location for redundant cable. All fiber optic cable connections within the RU require SC cable connectors.

7.2.1   Terminating the Indoor/Outdoor Cable(WDM Feature Not Installed)

Use the following procedure to terminate the individual pigtails in the indoor/outdoor cable:

⚠   **Warning:** *To avoid exposure to to invisible laser radiation, do not look into the ends of any optical fiber or bulkhead connector. Never assume laser power is turned off or that the fiber is disconnected at the other end. Use an optical power meter to identify active fibers. Always place a protective cap over any unused bulkhead connector or optical fiber connector.*

1. Insert an appropriate sized compression fitting into the water-resistant connector installed on the bottom of the cabinet (see Figure 6).

2. Route the stub end of the pre-connectorized indoor/outdoor cable down throuth the water-resistant connector to the external splice tray enclosure.

3. Tighten the compression fitting on the cable port to secure the cable.

4. Strip back the outer sheathing of the customer-provided indoor/outdoor cable inside the cabinet to allow the connectorized individual jacketed pigtails to be routed to the STM or cabinet storage spools.

    a. Connect the forward path fiber to the PORT 1 SC connector on the STM (refer to item 1 on Figure 1).

    b. Connect the reverse path fiber to the PORT 2 SC connector on the STM (refer to item 2 on Figure 1).

    c. On units with the Diversity feature, connect the secondary reverse path fiber to the PORT 3 SC connector on the STM (refer to item 3 on Figure 1).

5. Coil up the excess cable length on the cabinet cable storage spools.

7.2.2   Terminating the Indoor/Outdoor Cable (WDM Feature Installed)

Use the following procedure to terminate the individual pigtails in the indoor/outdoor cable:

⚠ **Warning:** *To avoid exposure to to invisible laser radiation, do not look into the ends of any optical fiber or bulkhead connector. Never assume laser power is turned off or that the fiber is disconnected at the other end. Use an optical power meter to identify active fibers. Always place a protective cap over any unused bulkhead connector or optical fiber connector.*

1. Insert an appropriate sized compression fitting into the water-resistant connector installed on the bottom of the cabinet (see Figure 7).

2. Route the stub end of the pre-connectorized indoor/outdoor pigtail down throuth the water-resistant connector to the external splice tray enclosure.

3. Tighten the compression fitting on the cable port to secure the cable.

4. Strip back the outer sheathing of the customer-provided indoor/outdoor pigtail inside the cabinet to allow the connectorized individual jacketed fibers to be routed to the WDM or cabinet storage spools.

   a. Connect the bi-directional pigtail fiber to the WDM SC connector on the WDM (see Figure 7).

   b. On units with the Diversity feature, connect the secondary reverse path pigtail fiber directly to the PORT 3 SC connector on the STM (refer to item 3 on Figure 1).

5. Coil up the excess cable length on the cabinet cable storage spools.

6. Refer to Subsection 7.4, Terminating WDM Forward and Reverse Cables for information on routing and terminating the WDM Forward and Reverse jumper cables.

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Figure 7. Terminating Indoor/Outdoor Pigtail (WDM Option Installed)

7.3 Antenna Cables

A customer supplied coaxial antenna cable must be routed from each antenna and attached to a lightning protector mounted on the underside of the cabinet (see Figure 6). The cable must be connectorized with an N-type connector for attachment to the to the underside of the lightning protector. ADC-provided coaxial jumper cables configured with N-type connectors on both ends are used to route RF from the top of each lightning protector to connectors on the STM. Each cabinet is shipped to the field configured with one lightning protector (primary), and one coaxial RF jumper cable that must be attached to the Antenna connector on the STM (refer to item 18 on Figure 1). A second lightning protector and RF jumper cable is provided in the

Diversity Cable kit. The Diversity jumper cable must be attached to the Diversity connector on the STM (refer to item 17 on Figure 1).

▶ **Note:** To comply with Maximum Permissible Exposure (MPE) requirements, the maximum composite output from the antenna cannot exceed 1000 Watts EIRP and the antenna must be permanently installed in a fixed location that provides at least **6 meters** (20 feet) of separation from all persons.

7.4   Terminating WDM Forward and Reverse Cables

Use the following procedure to terminate the WDM forward and reverse cables :

⚠ **Warning:** *To avoid exposure to to invisible laser radiation, do not look into the ends of any optical fiber or bulkhead connector. Never assume laser power is turned off or that the fiber is disconnected at the other end. Use an optical power meter to identify active fibers. Always place a protective cap over any unused bulkhead connector or optical fiber connector.*

1. Connect the 1-meter trailing FORWARD cable (Figure 8) from the WDM to the PORT 1 SC connector on the STM (refer to item 1 on Figure 1).

2. Connect the 1-meter trailing REVERSE cable (Figure 8) from the WDM to the PORT 2 SC connector on the STM (refer to item 2 on Figure 1).

3. Attaching the indoor/outdoor cable to the WDM connector is decribed in Subsection 7.2.2, Terminating the Indoor/Outdoor Cable (WDM Feature Installed) .

4. Coil up the excess cable length on the cabinet cable storage spools.

Drawing not available

Figure 8. Terminating WDM Forward and Reverse Cables

8   CONNECTORIZING THE DOOR OPEN SWITCH

The door open switch is shipped to the field with stubbed power conductors. Install the stubbed conductors from the door open switch in the ADC-provided right angle plug at the pin locations shown in Figure 9. After completing this step, insert the right angle connector into the alarm connector on the front of the STM (refer to item 16 on Figure 1). A door open condition typically generates a Major Alarm.
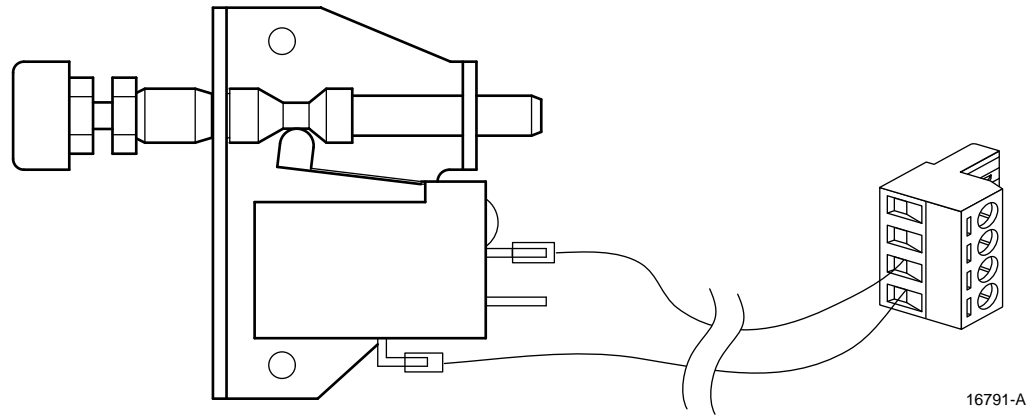
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Figure 9. Connectorizing Door Open Switch

9 FINAL TEST AND ADJUSTMENTS

When the installation is completed, refer to the Digivance Single Band LRCS Installation and Operation Manual (ADCP-75-116) for system turn-up and test procedures.

This section under construction

10 CUSTOMER INFORMATION AND ASSISTANCE

For customers wanting information on ADC products or help in using them, ADC offers the services listed below. To obtain any of these services by telephone, first dial the central ADC telephone number, then dial the extension provided below.

The central number for calls originating in the U.S.A. or Canada is **1-800-366-3891**. For calls originating outside the U.S.A. or Canada, dial country code "1" then dial **952-946-3000.**

Sales Assistance **Extension 63000**	• Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration **Extension 63000**	• Complete Solutions (from Concept to Installation) • Network Design and Integration Testing • System Turn-Up and Testing • Network Monitoring (Upstream or Downstream) • Power Monitoring and Remote Surveillance • Service/Maintenance Agreements • Systems Operation
BCG Technical Assistance Center **Extension 63475** **E-Mail: bcg_tac@adc.com**	• Technical Information • System/Network Configuration • Product Specification and Application • Training (Product-Specific) • Installation and Operation Assistance • Troubleshooting and Repair
Product Return Department **Extension 63748** **E-Mail: repair&return@adc.com**	• ADC Return Authorization number and instructions must be obtained before returning products.

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