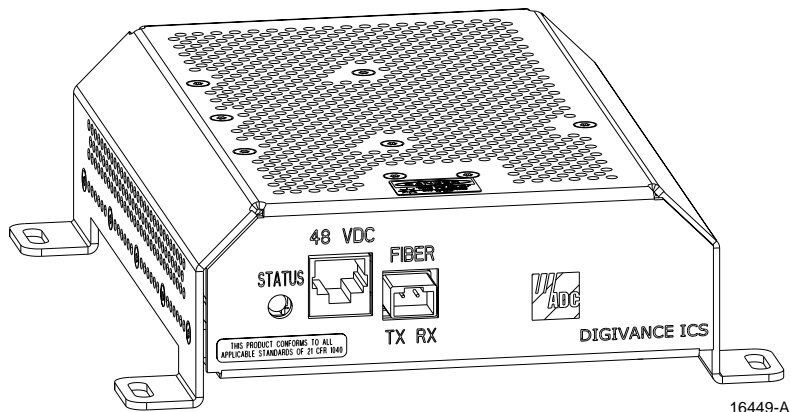




Digivance™ Indoor Coverage Solution 800/1900 MHz Digital Remote Unit Installation Instructions

Content	Page
INTRODUCTION	2
1 DESCRIPTION	3
1.1 Digital Remote Unit	3
1.2 Antenna Options	5
1.3 AC/DC Power Converter	6
2 INSTALLATION PROCEDURE	7
2.1 Tools and Materials	7
2.2 Unpacking and Inspection	8
2.3 Frequency Band Selection (1900 DRU Only)	8
2.4 DRU Mounting Procedure	9
2.5 Antenna Mounting Procedure	10
2.6 Antenna Connection	16
2.7 Optical Connection	17
2.8 DC Power Connection	18
3 CUSTOMER INFORMATION AND ASSISTANCE	21

DRAFT



Digital Remote Unit

INTRODUCTION

This publication provides instructions for installing the Digivance Indoor Coverage Solution (ICS) Digital Remote Unit (DRU). A more complete description of the DRU along with the operating and maintenance procedures is provided in the Digivance ICS Installation and Operation Manual (ADCP-75-110). The DRU is installed in conjunction with the Digital Host Unit (DHU) and the Digital Expansion Unit (DEU).

Revision History

ISSUE	DATE	REASON FOR CHANGE
Issue 1	04/2001	Original release.
Issue 2	06/2001	Changes in LED operation and new power cable maximum length recommendations
Issue 2A	06/2001	Updated to cover 1900 MHz version of product

Trademark Information

ADC is a registered trademark of ADC Telecommunications, Inc.
 Digivance is a trademark of ADC Telecommunications, Inc.
 LC is a trademark of Lucent Technologies Inc.

Admonishments

Important safety admonishments are used throughout this publication 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.*

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 extension 63475 (in U.S.A. or Canada) or 952-946-3475 (outside U.S.A. and Canada).

Title	ADCP Number
Digivance ICS Installation and Operation Manual	75-110
Digivance ICS Digital Expansion Unit Installation Instructions	75-111

1 DESCRIPTION

This section describes the DRU, the various DRU antennas, and the AC/DC power converter (optional accessory item).

1.1 Digital Remote Unit

The DRU, shown in Figure 1, serves as the cellular user servicing unit for the Digivance ICS. The DRU consists of an electronic circuit board assembly that is mounted within a powder-coated sheet metal enclosure. The electronic circuit board assembly is not user replaceable. The DRU is designed for use within a non-condensing indoor environment such as inside a building. All controls, indicators, and connectors (except the antenna connector) are mounted on the DRU front panel for convenient access.

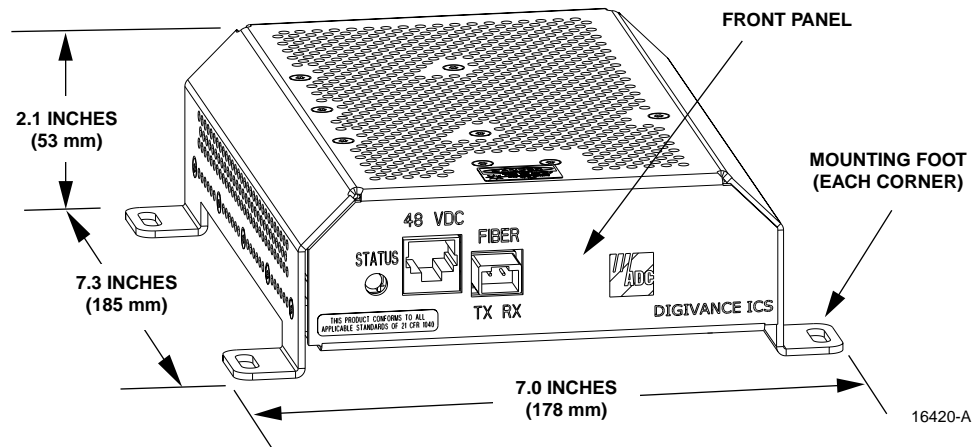


Figure 1. Digital Remote Unit

The DRU is equipped with four integral mounting feet that allow it to be mounted on any flat horizontal or vertical surface. A typical location for mounting the DRU would be above ceiling tiles where the optical fiber and power cables can be concealed or on a wall. Slots are provided in the mounting feet for securing the DRU to the mounting surface.

The RF signal interface between the DRU and the cellular users is provided through an external antenna connected to a female SMA connector. The antenna may be ordered separately from ADC. Several types of antennas with various patterns are available. Non-ADC antennas may also be used with the DRU to meet various application requirements.

The DRU is equipped with a small form factor LC type optical transceiver that provides a point for connecting the optical link cables. Depending on the application requirements, the optical transceiver may be connected to either a DHU or a DEU.

The DRU is equipped with a female RJ-45 jack that provides a point for connecting a DC power cable. The DRU is powered by 34–48 Vdc power which is supplied through the RJ-45 connector. Power to the DRU may be supplied by the DHU, DEU, or by a 120 Vac to 48 Vdc power converter (available separately as an accessory item) plugged into a properly grounded 120 Vac outlet. The AC/DC converter is a UL Listed stand alone Limited Power Supply (LPS) unit with a rated output of 48 Vdc at 1.2 A. When powered by the DHU or DEU, a category 3 or 5 twisted-pair cable terminated with RJ-45 connectors is required. The recommended maximum length of the power cable is 500 meters (1,641 feet). Any distance beyond 500 meters requires powering by the AC/DC converter.

The DRU user interface consists of the connectors and the LED that are provided on the DRU front and rear panels. The DRU user interface points are indicated in Figure 2 and described in Table 1.

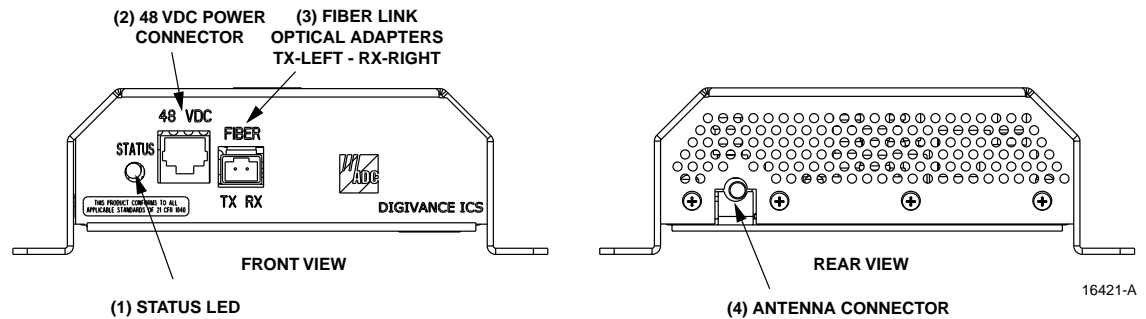


Figure 2. Digital Remote Unit User Interface

Table 1. Digital Remote Unit User Interface

REF No.	USER INTERFACE DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	STATUS	Multi-colored LED (Red/Green/Yellow)	Indicates if the status of the DRU is normal or faulty or if the forward path optical input is normal or lost. (see Note)
2	48 Vdc	RJ-45 jack (female)	Used for connecting a DC power cable.
3	FIBER TX RX	Small form factor LC-type optical transceiver	Used for connecting the forward path and reverse path optical links.
4	–	SMA-type coaxial connector (female)	Used for connecting the antenna coaxial cable lead.

Note: A detailed description of DEU LED operation is provided in the Digivance ICS Installation and Operation Manual (ADCP-75-110)

1.2 Antenna Options

Various antennas, shown in Figures 3 and 4, are available from ADC for use with the DRU. All antennas include a 6 foot (1.8 m) long 50-ohm coaxial cable (equipped with SMA male connector) for connection to the DRU. The DRU is equipped with an SMA female connector for connecting the antenna cable.

- **Note:** To comply with Maximum Permissible Exposure (MPE) requirements, antennas must be installed to provide at least **20 centimeters** (8 inches) of separation from all persons per FCC 47 CFR Part 2.1091.

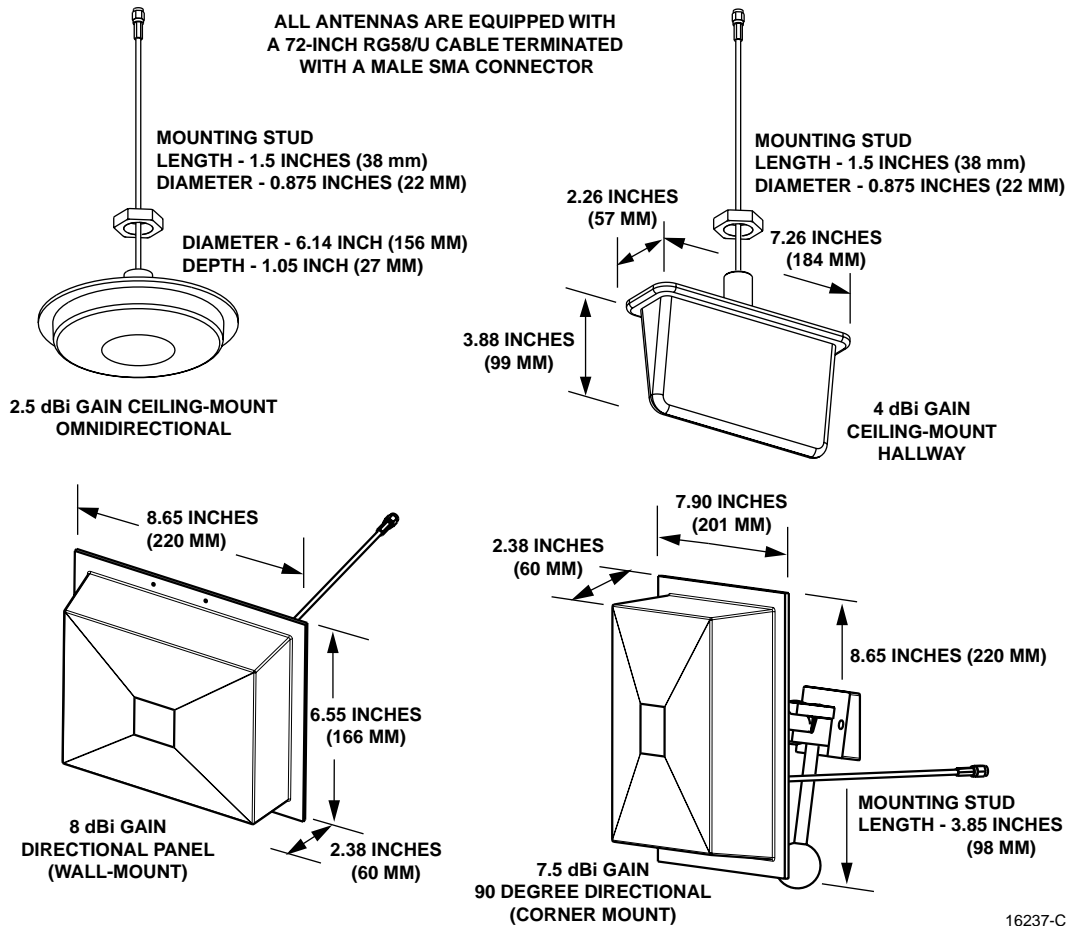


Figure 3. 800 MHz DRU Antenna Options

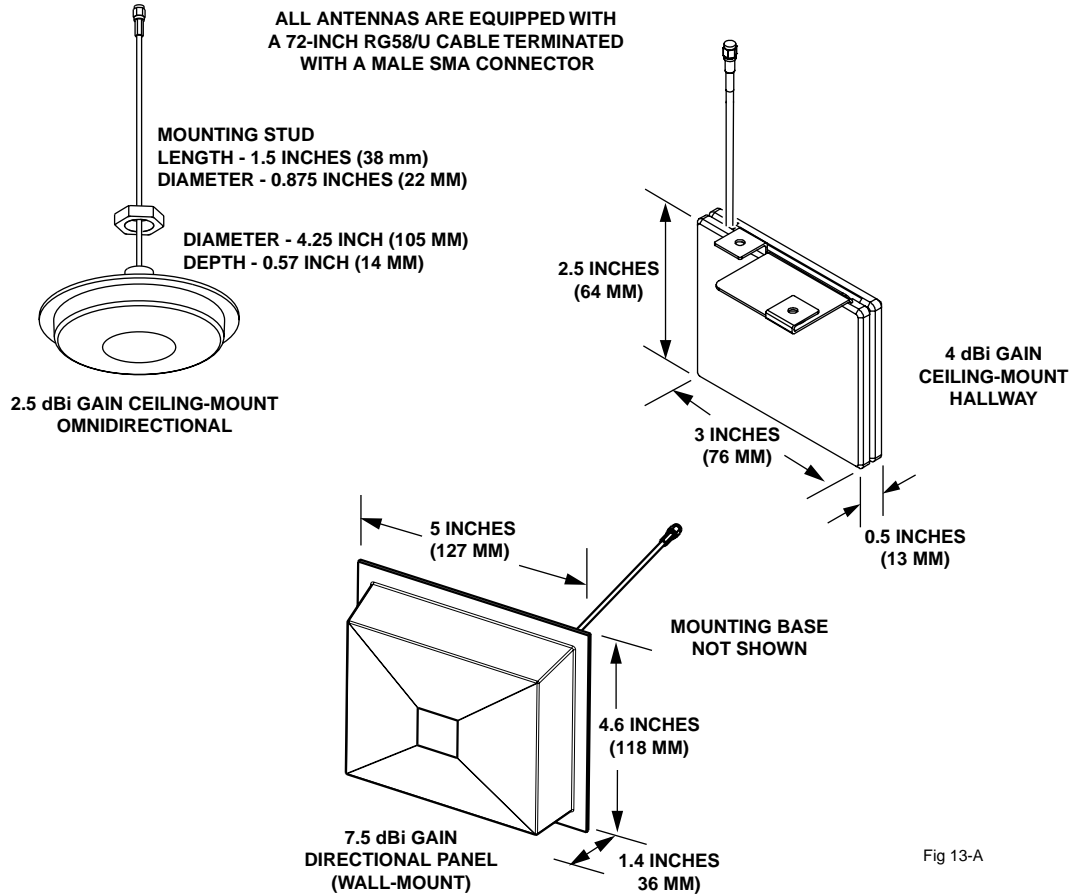


Fig 13-A

Figure 4. 1900 MHz DRU Antenna Options

1.3 AC/DC Power Converter

The DRU may be powered locally by the AC/DC converter, shown in Figure 6, which is available as an accessory item. The converter is a UL Listed stand alone Limited Power Supply (LPS) unit with a rated output of 48 Vdc at 1.2 A. The converter is equipped with a 6-foot (1.8 m) DC power cable which is terminated with an RJ-45 male connector. The converter is powered by 120–240 Vac (50–60 Hz) power which is supplied though a standard three-conductor AC power cord. The 120 Vac power cord is 6 feet (1.8 m) long and is provided with the converter.

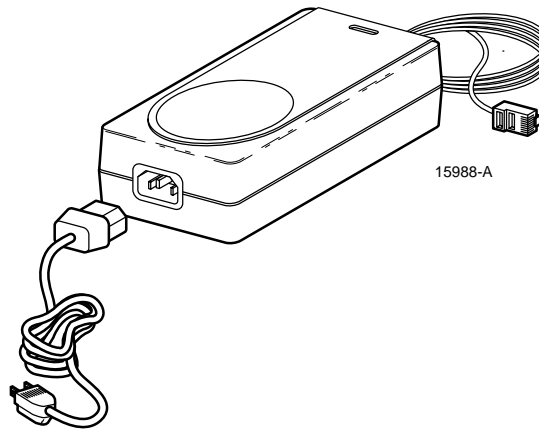


Figure 5. AC/DC Power Converter

2 INSTALLATION PROCEDURE

This section provides the installation procedures for the DRU, the antennas, and the AC/DC power converter (if used). Installation of the DRU may proceed separately from the installation of the DHU and the DEU. When the installation of the DRU is completed, refer to the Digivance ICS Installation and Operation Manual (ADCP-75-110) for the system turn-up and test procedures.

2.1 Tools and Materials

The following tools are required in order to complete the procedures in this instruction:

- Box cutter
- Pencil or scribe
- Medium size flat-bladed screwdriver
- Pliers
- Non-conductive probe (1900 MHz units only)
- Drill and assorted drill bits
- Torque wrench for SMA connectors (pre-set to apply 5 inch-pounds of torque)
- DRU installation template (Part # 1154319 - Optional)

The following materials are required in order to complete the procedures in this instruction:

- 4 - Mounting screws (if required)
- ▶ **Note:** Use four #8 screws (maximum diameter) with a minimum length of 0.5 inches or four 4 mm screws (maximum diameter) with a minimum length of 12 mm
- 4 - wall anchors (if required)
- Wire ties

2.2 Unpacking and Inspection

This subsection provides instructions for opening the shipping boxes, verifying that all parts have been received, and verifying that no shipping damage has occurred. Use the following procedure to unpack and inspect the DRU:

1. Open the shipping carton and carefully unpack the DRU from the protective packing material.
2. Check the DRU for broken or missing parts. If there are any damages, contact ADC Telecommunications (see Customer Information and Assistance section) for an RMA (Return Material Authorization) and to reorder if replacement is required.

2.3 Frequency Band Selection Procedure (1900 MHz DRU Only)

The 1900 MHz version of the DRU may be configured to operate at any one of four frequency bands. A DIP switch is provided on the underside of the DRU for selecting the required frequency band. Use the following procedure to set the DIP switch to provide the required DRU frequency band:

1. Determine the required frequency band for the DRU (AD, DBE, BEF, or EFC) as specified in the system design plan.
2. Orient the DRU as shown in Figure 6 and then locate the small opening in the bottom of the DHU that provides access to the band select DIP switch.
3. Use a non-conductive probe to align the DIP switch sliding handles to provide the required frequency band (see Figure 6).
4. Place the copper sticker provided with the DHU over the small opening that provides access to the DIP switch.

► **Note:** The copper sticker provides EMI/RFI shielding. Do not use some other type of material to cover the DIP switch access hole.

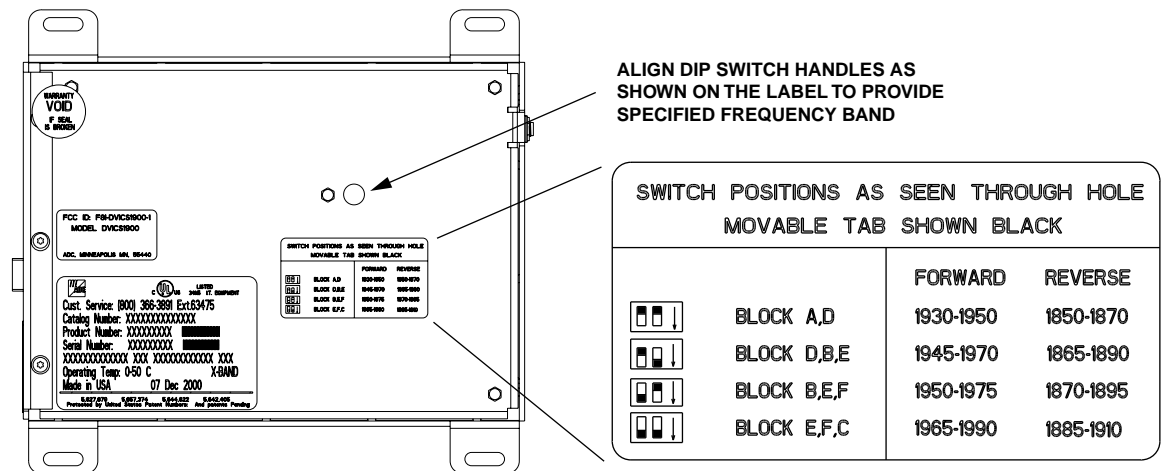


Fig 6-A

Figure 6. 1900 MHz DRU Frequency Band Selection

2.4 DRU Mounting Procedure

The DRU may be mounted on any flat vertical or horizontal surface. A slot is provided in each of the four mounting feet for inserting a fastener. The fasteners must be provided by the installer. Use the following procedure to mount the DRU:



Warning: *Wet conditions increase the potential for receiving an electrical shock when installing or using electrically-powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.*

► **Note:** **To insure that all optical connectors and transceivers remain dust-free during installation, leave all dust caps and dust protectors in place until directed to remove them for connection.**

1. Obtain the appropriate fasteners (lag bolts, screws, wall anchors, etc.) for securing the DRU to the mounting surface.
2. Position the DRU on the mounting surface in the specified location (per the system design). Make sure the LED will be visible when the unit is mounted.

► **Note:** To ensure there is adequate air circulation for cooling, provide a minimum of 3 inches (76 mm) of clearance space on all sides of the DRU (except the bottom). In addition, at least one surface of the DRU installation area must be open to the building's interior air space. If a portable/flexible antenna will be installed, allow a minimum of 9 inches (229 mm) clearance along the surface with the antenna.

► **Note:** In mounting situations where fiber, power, and coaxial cable pass-through holes are planned, it is critical that these holes be placed far enough away from their respective connectors to avoid forming overly tight bend radii. Tight bend radii can damage fiber optic cable and reduce RF signal levels. The DRU mounting template (part # 1154319) provides the clearances for the following cable types:

Power cable (cat 3 and 5):	0.2 inch (5.2 mm) diameter
Fiber optic cable (twin lead):	0.12 inch (3.0 mm) diameter
Antenna coaxial cable:	0.16 inch (4.0 mm) diameter

If planned cable diameters are greater than those listed, please consult with the cable manufacturer to determine the cable's recommended minimum bend radii.

3. Mark the location of the mounting holes and of any pass-through holes that may be required for fiber, power, or coaxial cables. Observe any additional instructions that may be printed on the template such as the recommended fasteners and clearance requirements.
4. Drill appropriately sized holes in the mounting surface for the mounting screws or wall anchors and for the fiber, power, or coaxial cables (if pass-through holes are required).
5. Place the DRU in position for mounting and then install the fasteners as shown in Figure 7.
6. Securely tighten each fastener.

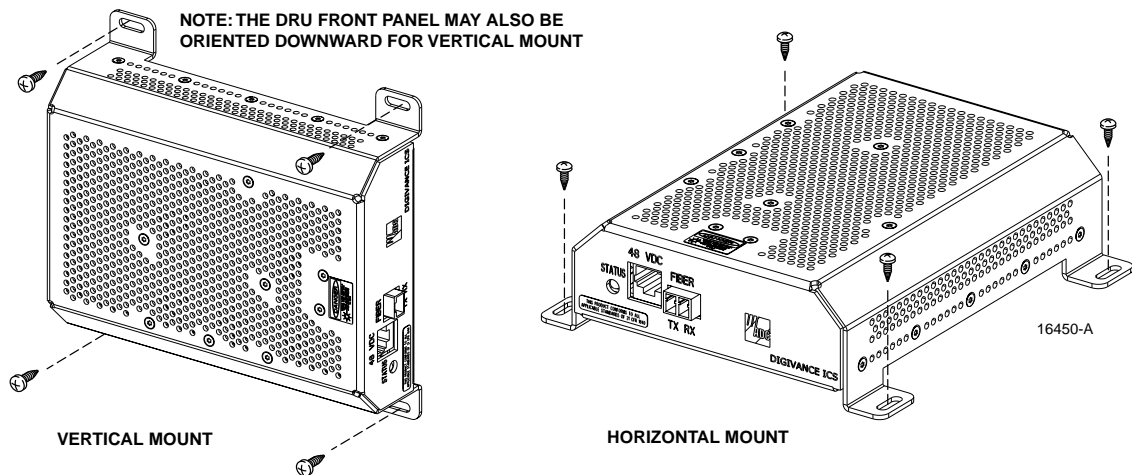


Figure 5. DRU Mounting

2.5 Antenna Mounting Procedure

Various types of antennas are available from ADC for use with the DRU. All antennas include a 6-foot (1.8 m) long 50-ohm coaxial cable for connection to the DRU. Each type of antenna provides a specific coverage pattern in order to accommodate the shape of the area where coverage is required. Mount the antenna in the location specified in the system design and orient according to the coverage pattern required.

- **Note:** To comply with Maximum Permissible Exposure (MPE) requirements, antennas must be installed to provide at least **20 centimeters** (8 inches) of separation from all persons per FCC 47 CFR Part 2.1091.

2.5.1 800 and 1900 MHz Ceiling-Mount Omnidirectional Antenna

The 800 and 1900 MHz ceiling-mount omnidirectional antennas are designed to mount in the center of the coverage area. Mount the ceiling-mount omnidirectional antenna as shown in Figure 8 and as described in the following procedure.

1. Remove ceiling tile.
2. Drill 1-inch (25 mm) hole in center of tile.
3. Insert antenna cable through hole.
4. Insert threaded stud on base of antenna through hold.
5. Secure antenna to ceiling tile with nylon jam nut.
6. Replace ceiling tile.
7. Route antenna cable to DRU.

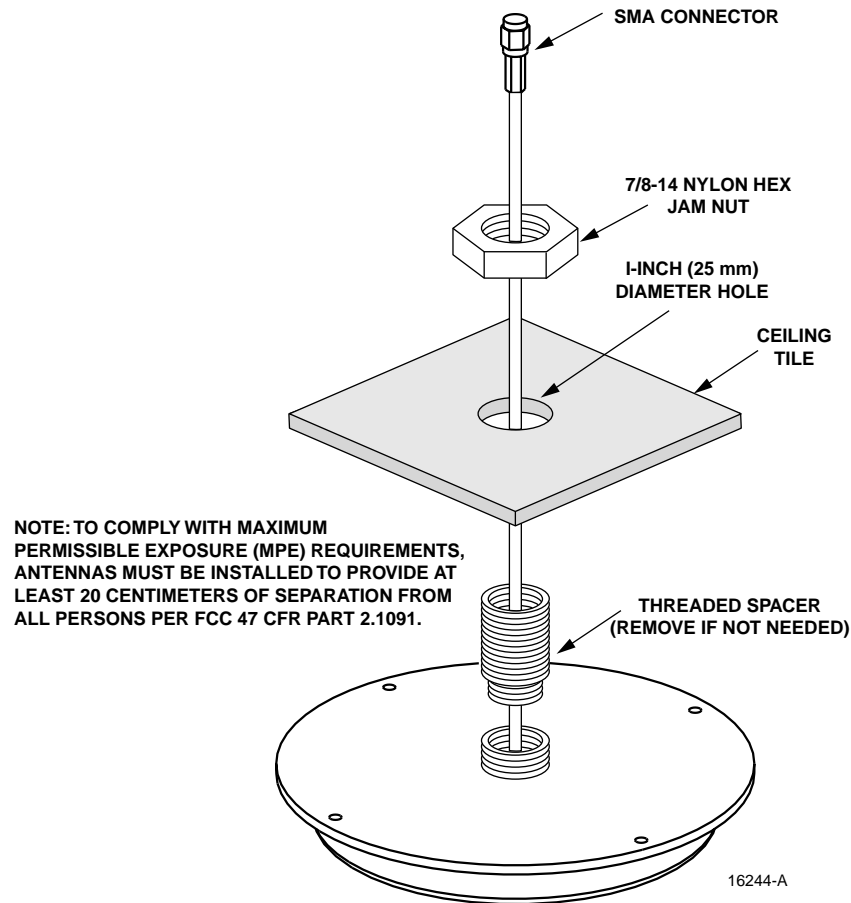


Figure 8. 800 and 1900 MHz Ceiling-Mount Omnidirectional Antenna Installation

2.5.2 800 MHz Ceiling-Mount Hallway Antenna

The 800 MHz ceiling mount hallway antenna is designed to mount in the center of long corridors. Mount the ceiling-mount hallway antenna as shown in Figure 9 and as described in the following procedure:

1. Remove ceiling tile.
2. Drill 1-inch (25 mm) hole in center of tile.
3. Insert antenna cable through hole.
4. Insert threaded stud on base of antenna through hole.
5. Secure antenna to ceiling tile with nylon jam nut.
6. Orient antenna so flat sides are perpendicular with hallway walls.
7. Replace ceiling tile.
8. Route antenna cable to DRU.

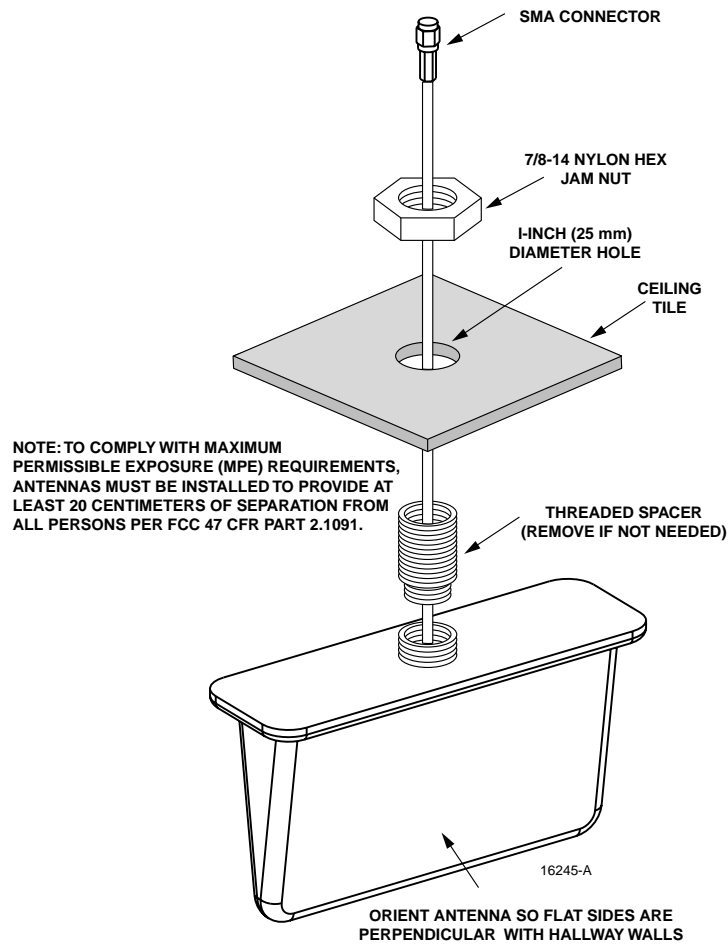


Figure 9. 800 MHz Ceiling-Mount Hallway Antenna Installation

2.5.3 1900 MHz Ceiling-Mount Hallway Antenna

The 1900 MHz ceiling mount hallway antenna is designed to mount in the center of long corridors. Mount the ceiling-mount hallway antenna as shown in Figure 10 and as described in the following procedure:

1. At the point where the antenna will be mounted, locate a suspended ceiling tile rail that is perpendicular to the hallway walls. If the hallway has a hard ceiling, locate a point where the antenna may be secured directly to the ceiling.
- ▶ **Note:** Whether mounted from a tile rail or hard ceiling, the flat sides of the antenna must be perpendicular to the hallway walls when mounted.
2. Drill a 5/8-inch (16 mm) hole in the ceiling at the point where the antenna will be mounted. If using a ceiling tile rail for mounting the antenna, the hole should be next to the tile rail
3. Insert the antenna cable through the hole in ceiling tile.
4. If using a tile rail for mounting the antenna, install the antenna bracket on the tile rail and proceed to step 9. If mounting the antenna from a hard ceiling, proceed to step 5.

5. Hold the antenna in position for mounting on the hard ceiling.
6. Mark the location of the two antenna bracket mounting holes on the hard ceiling.
7. Drill a 1/8-inch (3 mm) hole at each of the two locations marked in step 6.
8. Secure the antenna mounting bracket to the hard ceiling using two #4 screws (must be provided by installer).
9. Route antenna cable to DRU.

NOTE: TO COMPLY WITH MAXIMUM PERMISSIBLE EXPOSURE (MPE) REQUIREMENTS, ANTENNAS MUST BE INSTALLED TO PROVIDE AT LEAST 20 CENTIMETERS OF SEPARATION FROM ALL PERSONS PER FCC 47 CFR PART 2.1091.

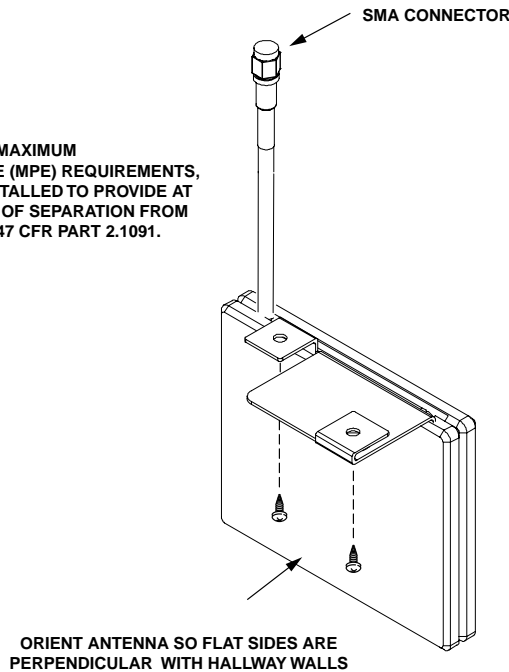


Fig 10-A

Figure 10. 1900 MHz Ceiling-Mount Hallway Antenna Installation

2.5.4 800 MHz Directional Panel Antenna

The 800 MHz directional panel antenna is designed to mount vertically on one side of the coverage area. Mount the directional panel antenna as shown in Figure 11 and as described in the following procedure:

1. Drill holes in antenna plastic cover for fasteners (see rear side for hole location).
2. Drill 5/8-inch (16 mm) hole in wall for antenna cable.
3. Insert antenna cable through hole in wall.
4. Place antenna on wall, making sure arrow on rear side of antenna points up.
5. Drill holes in wall for fasteners (installer provided).
6. Secure antenna to wall with fasteners.
7. Route antenna cable to DRU.

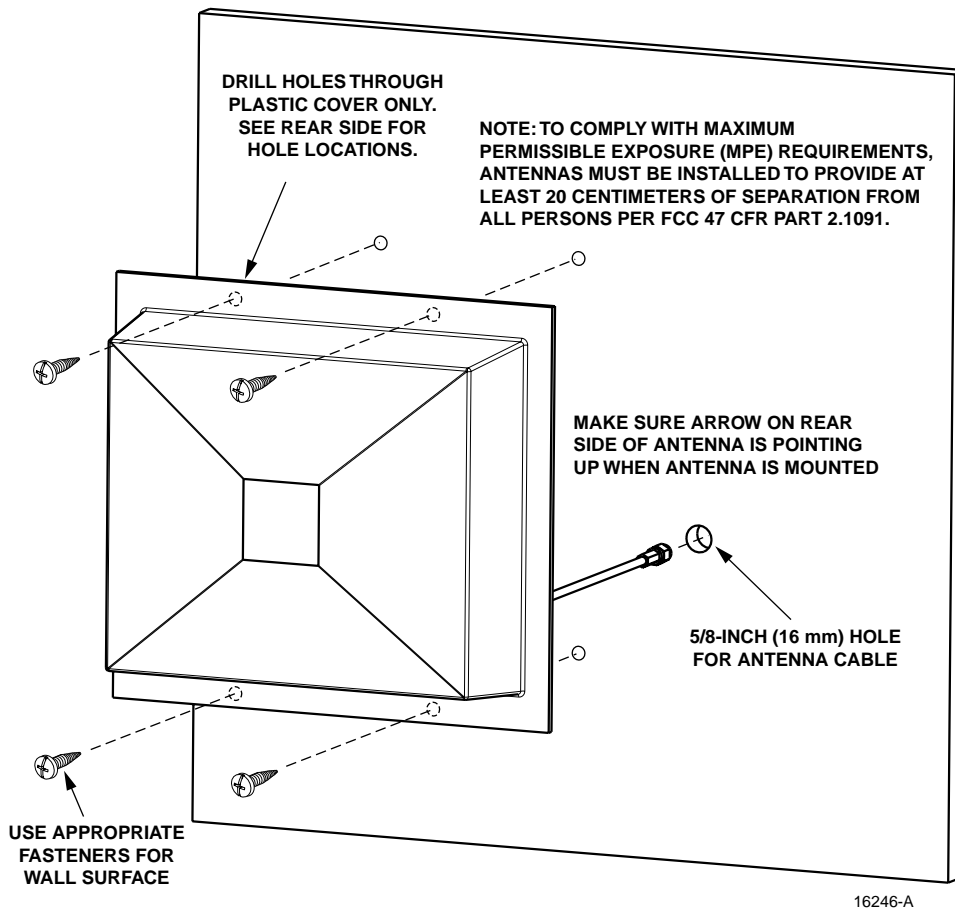


Figure 11. 800 MHz Directional Panel Antenna Installation

2.5.5 1900 MHz Directional Panel Antenna

The 1900 MHz directional panel antenna is designed to mount vertically on one side of the coverage area. Mount the directional panel antenna as shown in Figure 12 and as described in the following procedure:

1. Drill holes in antenna plastic cover for fasteners (see rear side for hole location).
2. Drill 5/8-inch (16 mm) hole in wall for antenna cable.
3. Insert antenna cable through hole in wall.
4. Place antenna on wall, making sure arrow on rear side of antenna points up.
5. Drill holes in wall for fasteners (installer provided).
6. Secure antenna to wall with fasteners.
7. Route antenna cable to DRU.

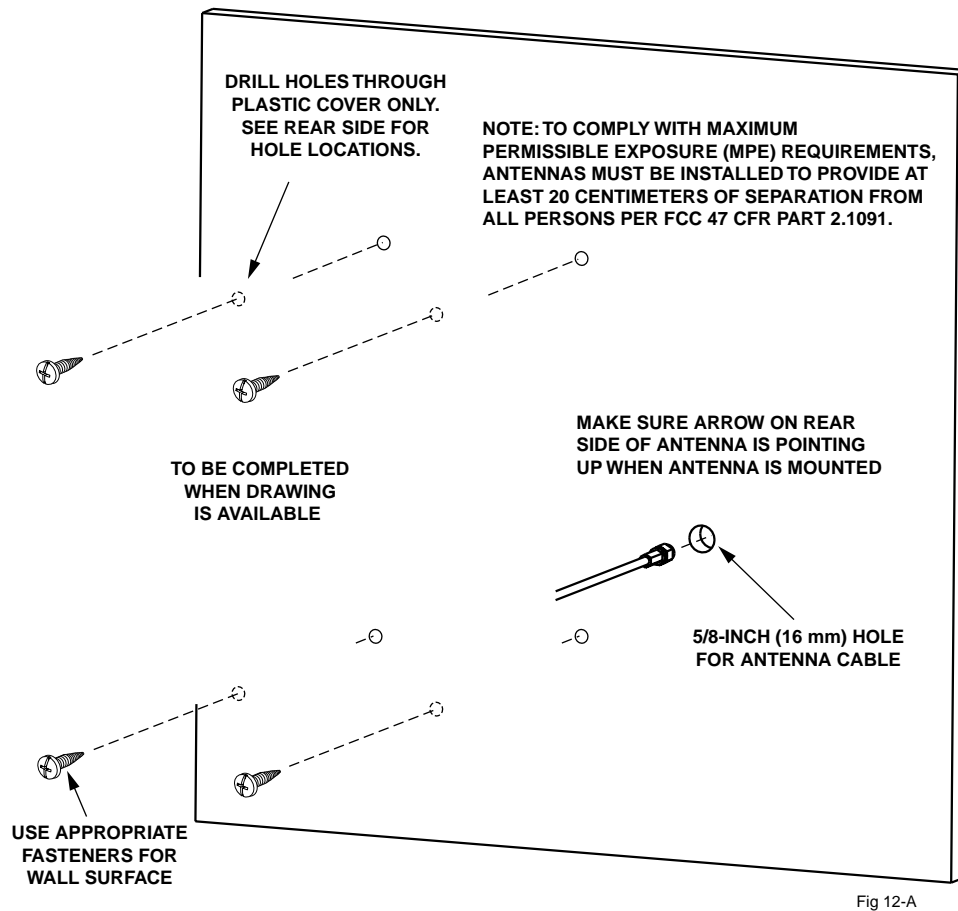


Figure 12. 1900 MHz Directional Panel Antenna Installation

2.5.6 800 MHz 90° Panel Antenna

The 800 MHz 90° panel antenna is designed to mount vertically in the corner of the coverage area. Mount the 90° panel antenna as shown in Figure 13 and as described in the following procedure:

1. Loosen base assembly handle until antenna can be separated from base assembly.
2. Place base assembly against wall near corner and drill holes in wall for fasteners (installer provided).
3. Secure base assembly to wall with fasteners.
4. Drill 5/8-inch (16 mm) hole in wall for antenna cable.
5. Insert antenna cable through hole in wall.
6. Reinstall antenna on base assembly.
7. Direct antenna toward center of coverage area and tighten base assembly handle.
8. Route antenna cable to DRU.

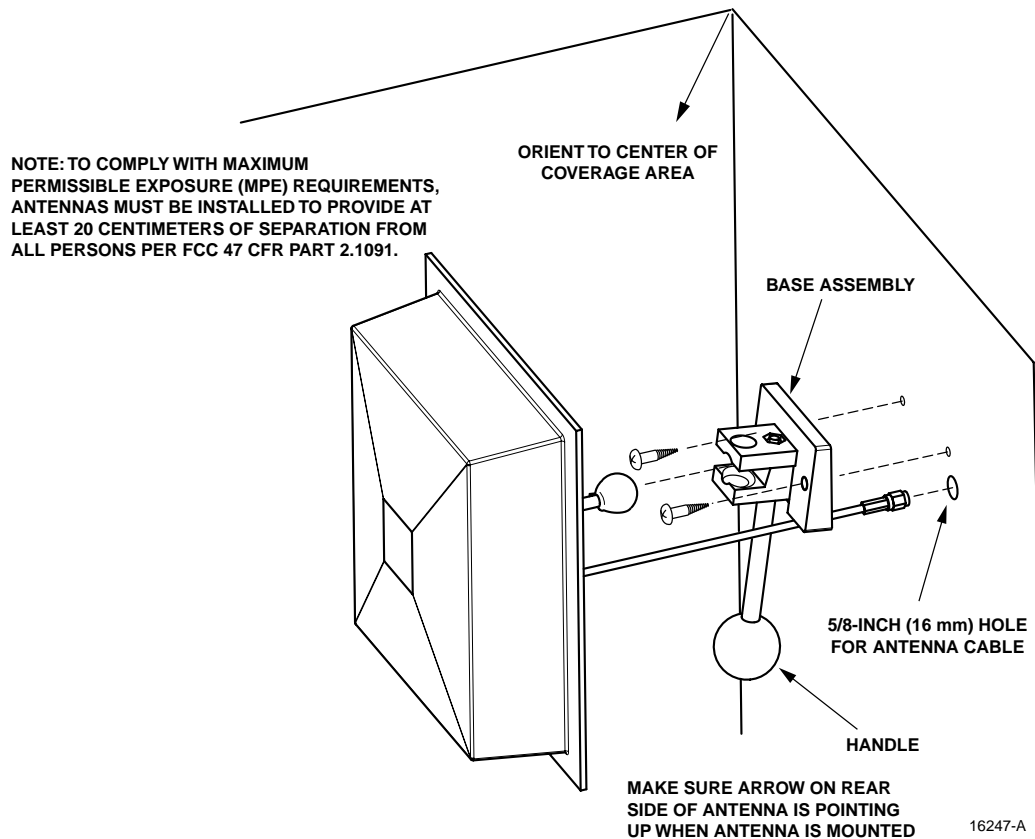


Figure 13. 800 MHz 90° Panel Antenna Installation

2.6 Antenna Connection

The DRU is equipped with an SMA female connector for connecting the antenna cable. Use the following procedure to connect the antenna cable to the DRU:

1. Locate the antenna cable that was routed to the DRU from the antenna.
2. Connect the antenna cable to the SMA connector on the DRU as shown in Figure 14 and using a torque wrench, tighten connector to 5 inch-pounds (45 N.cm).



Warning: *Over-tightening the SMA connector can break the solder joint between the connector and the DRU circuit board assembly. Tighten connector to specified torque value.*

3. Dress and secure the antenna cable per standard industry practice.

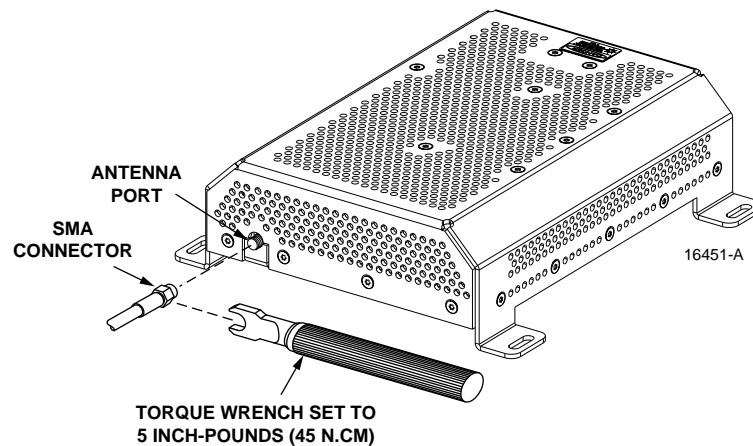


Figure 14. DRU Antenna Connection

2.7 Optical Connection

The optical interface between the DRU and the DHU or DEU is supported by a small form factor LC-type optical transceiver which is mounted on the DRU front panel. One side of the transceiver provides the optical fiber connection for the forward path (downlink) signal. The other side of the transceiver provides the optical fiber connection for the reverse path (uplink) signal. Use the following procedure to connect the forward and reverse path optical fibers to the DRU:



Danger: *This equipment uses a Class 1 Laser according to FDA/CDRH rules. Laser radiation can seriously damage the retina of the eye. Do not look into the ends of any optical fiber. Do not look directly into the optical transceiver of any digital unit or exposure to laser radiation may result. An optical power meter should be used to verify active fibers. A protective cap or hood **MUST** be immediately placed over any radiating transceiver or optical fiber connector to avoid the potential of dangerous amounts of radiation exposure. This practice also prevents dirt particles from entering the transceiver or connector.*

1. Locate the forward and reverse path optical links that were routed to the DRU from the DHU or DEU.
 - ▶ **Note:** The procedures for routing the forward and reverse path optical links from the DHU or DEU to the DRU are covered in either the Digivance ICS Installation and Operation Manual (ADCP-75-110), which is provided with the DHU, or the Digivance ICS Digital Expansion Unit Installation Instructions (ADCP-75-111), which is provided with the DEU.
2. Determine which of the optical cable pairs is designated as the forward path link and which is designated as the reverse path link.
3. Use the plastic joiner provided with the LC optical connectors to join the DRU forward and reverse path connectors together as shown in Figure 15. Make sure the **forward path** and the **reverse path** connectors are oriented as shown.
 - ▶ **Note:** When viewing the DRU optical transceiver from the front, the forward path port is on the right (RX) and the reverse path port is on the left (TX).

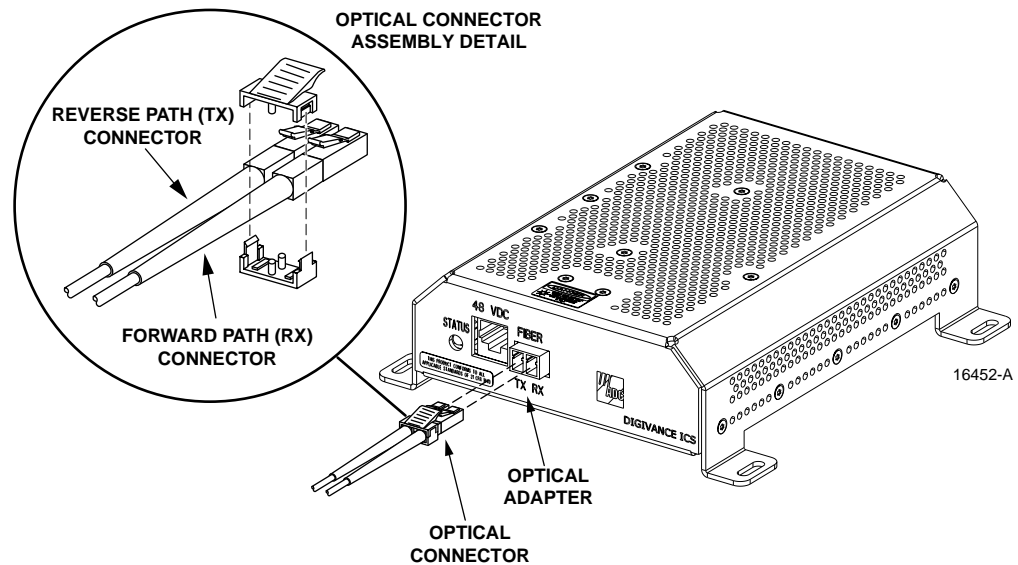


Figure 15. Optical Port Fiber Optic Cable Connection

4. Remove the dust caps from the optical fiber connectors and from the DRU optical port.
5. Clean each connector (follow connector supplier's recommendations) and then insert the optical link connector pair into optical port as shown in Figure 15.
6. Dress and secure the fibers at the DRU per standard industry practice.

2.8 DC Power Connection

The DC power interface for the DRU is supported by an RJ-45 female connector located on the DRU front panel. The DRU is powered by nominal 48 Vdc power which may be provided by the DHU, DEU, or by an AC/DC converter (accessory item). Use whichever of the following procedures is appropriate for the installation.

2.8.1 Power Provided by the DHU or DEU

Use the following procedure to connect the DC power cable when the DRU is powered by the DHU or DEU.

1. Locate the DC power cable that was routed to the DRU from the DHU or DEU.
 - ▶ **Note:** The procedures for routing the DC power cable from the DHU or DEU to the DRU are covered in either the Digivance ICS Installation and Operation Manual (ADCP-75-110), which is provided with the DHU, or the Digivance ICS Digital Expansion Unit Installation Instructions (ADCP-75-111) which is provided with the DEU.
 - ▶ **Note:** The power cable maximum length is 500 meters (1,641 feet).
2. Connect the DC power cable to the **48 Vdc** connector on the DRU as shown in Figure 16.

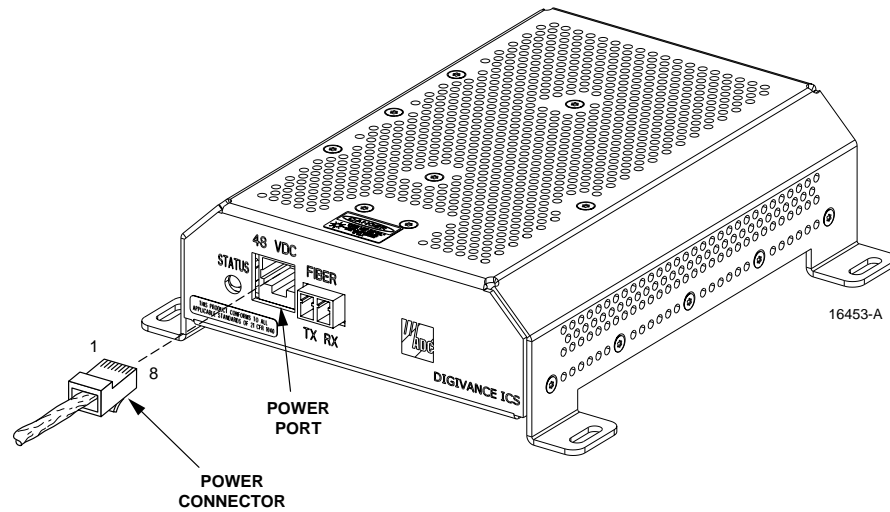


Figure 16. DC Power Cable Connection

3. Dress and secure the power cable at the DRU per standard industry practice.
4. When the installation of the DRU is completed, refer to Section 4 of the Digivance ICS Installation and Operation Manual (ADCP-75-110) for the system turn-up and test procedures.

2.8.2 Power Provided by AC/DC Converter

When the DRU is powered by an AC/DC converter, it must be powered by a UL Listed stand alone Limited Power Supply (LPS) unit with a rated output of 48 Vdc at 1.2 Amps. Use the following procedure to connect the DC and AC power cables when the DRU is powered by an AC/DC converter.

1. Locate the DC power cable that is attached to the AC/DC converter as shown in Figure 17.

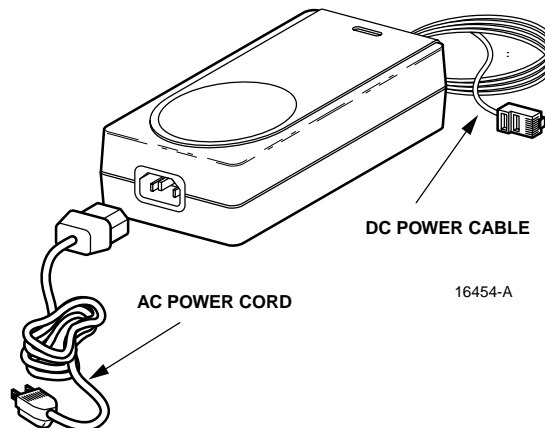


Figure 17. AC/DC Converter Installation

2. Connect the DC power cable to the **48 Vdc** connector on the DRU (see Figure 16).
3. Locate the AC power cord which is provided with the AC/DC power converter. Use only the AC power cord provided with the power converter or an equivalent UL/CUL listed and certified 3-conductor, 18 AWG cord terminated in a molded-on plug cap rated 125 V, 15 A with a maximum length of 6 feet (1.8 m).
 - ▶ **Note:** The AC/DC converter is intended to be used with a 3-wire grounding type plug which has a grounding pin. Equipment grounding is to ensure safe operation. Do not defeat the grounding means. Verify converter is reliably grounded when installed.
4. Connect the receptacle end of the power cord to the AC connector on the AC/DC converter (see Figure 17).
5. Route the plug end of the power cord to the specified AC outlet (per the system design) and connect plug to outlet.



Warning: *Be sure to check the nameplate rating of the AC/DC converter to avoid overloading circuits which may cause damage to over-current protection devices and supply wiring.*

6. Verify that the STATUS LED on the DRU turns red or blinking red. This indicates that the DRU is powered but not receiving a forward path optical signal.
 - ▶ **Note:** Early versions of the DRU use a steady red LED to indicate all major fault conditions including no optical signal received. Later versions of the DRU use a blinking red LED to indicate no optical signal received.
7. Dress and secure both power cables per standard industry practice.
8. When the installation of the DRU is completed, refer to Section 4 of the Digivance ICS Installation and Operation Manual (ADCP-75-110) for the system turn-up and test procedures.

3 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	<ul style="list-style-type: none"> • Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration Extension 63000	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Technical Information • System/Network Configuration • Product Specification and Application • Training (Product-Specific) • Installation and Operation Assistance • Troubleshooting and Repair
Product Return Department Extension 63478 E-Mail: repair&return@adc.com	<ul style="list-style-type: none"> • ADC Return Authorization number and instructions must be obtained before returning products.

Product information may also be obtained using the ADC web site at **www.adc.com** or by writing ADC Telecommunications, Inc., P.O. Box 1101, Minneapolis, MN 55440-1101, U.S.A.

Contents herein are current as of the date of publication. ADC reserves the right to change the contents without prior notice. **In no event shall ADC be liable for any damages resulting from loss of data, loss of use, or loss of profits and ADC further disclaims any and all liability for indirect, incidental, special, consequential or other similar damages. This disclaimer of liability applies to all products, publications and services during and after the warranty period.**

This publication may be verified at any time by contacting ADC's Technical Assistance Center at 1-800-366-3891, extension 63475 (in U.S.A. or Canada) or 952-946-3475 (outside U.S.A. and Canada), or by e-mail to bcg_tac@adc.com.

