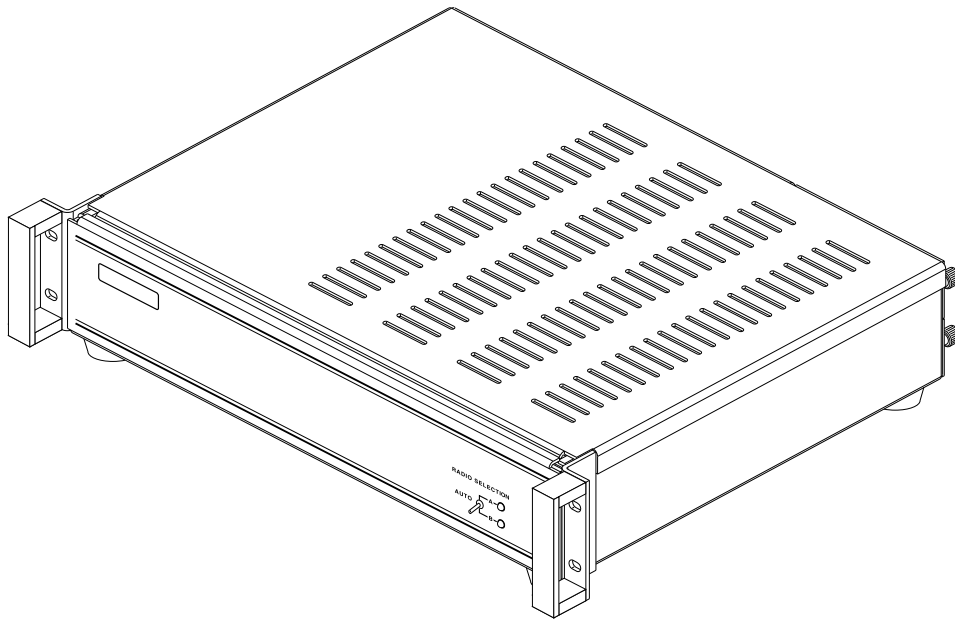


MDS SDx Packaged Stations

*Including Master/Repeater/Remote
and Protected Network Configurations*



Covering all SDxP, SDxDP, and SDxDT Models

MDS 05-6312A01, Rev. B
MAY 2011



Digital Energy
MDS

QUICK START GUIDE

Below are the basic steps for configuring a Packaged Station. Detailed instructions are given in the "INSTALLATION" section of this manual.

1. Remove top cover, connect the internal back-up battery (if equipped). Re-install cover.

- Units are shipped with the battery disconnected.
- Use care not to short-circuit the battery terminals.
- After the unit is powered up on mains power, allow several hours for the battery to fully charge.

2. Connect external wiring

- Connect chassis ground stud to facility's Earth ground.
- Connect antenna feedline(s), data interface cabling, input power, and any alarm devices.

3. Program transceivers

- Units are normally pre-programmed at the factory, per order requirements.
- If programming is required, it can be performed with a PC terminal connected to the appropriate Data I/O connector on the rear panel.
- Consult transceiver manual(s) for programming details.

4. Apply primary power

- Observe proper input voltage and polarity.
- Verify that power supply has enough current capacity to power the chassis.

5. Select the active transceiver

- Set the front panel RADIO SELECTION Switch to A (Transceiver A, no auto switchover), B (Transceiver B, no auto switchover), or AUTO (automatic switchover), as desired. AUTO is the default/normal setting.

6. Verify proper operation

- Observe LEDs on transceivers for proper indications (see radio manual).
- Refine directional antenna headings for maximum RF signal strength.
- Double-check that all rear panel cable connections are secure.

TABLE OF CONTENTS

1.0 ABOUT THIS MANUAL	1
<hr/>	
2.0 PRODUCT DESCRIPTION	1
<hr/>	
2.1 Redundant Models	2
Alarm Relay Contacts	2
2.2 Key Product Features	2
Configuration Codes	2
2.3 SDxP Protected Station	3
Antenna Port Configurations	3
2.4 SDxDP (Dual Protected Station)	3
2.5 SDxDT (SD Dual Transceiver Station)	4
3.0 INSTALLATION.....	5
<hr/>	
3.1 Installation Planning	5
Mounting Location	6
3.2 Installing the SDxP Station	6
Safety Ground	7
Antenna Port Connection(s)	7
Data Connections	7
Alarm Equipment Connections	8
Primary Power Connections	8
3.3 Installing the SDxDP Station	10
Safety Ground	10
Antenna Port/Duplexer Connections	10
COM2 Inter-Unit Cable Connection	10
Data Connections	11
Alarm Equipment Connections	12
Primary Power Connections	13
3.4 Installing the SDxDT Station	14
Antenna Port/Duplexer Connections	14
Data Connections	15
Primary Power Connections	16
4.0 Configuration	17
<hr/>	
4.1 Initial Startup—All Units	17
4.2 SDxP Configuration	17
“Mirrored Configuration” of Transceivers	17
Redundancy	18
4.3 SDxDP/SDxDT Configuration	19
Master-Specific Configuration.....	19
Automatic Settings.....	19
Repeater-Specific Configuration.....	20
Redundancy	20

Internal Configuration Detail	21
5.0 OPERATION—All Units	23
5.1 Radio Selection Switch	23
6.0 TROUBLESHOOTING	25
6.1 LED Indicators	25
6.2 Alarm Codes	25
7.0 TECHNICAL REFERENCE	26
7.1 Field-Replaceable Assemblies and Parts	26
Replacing Power Supply Modules	26
Replacing Other Assemblies	26
7.2 Replacing Transceiver(s)	27
7.3 Internal Cabling & Connections	29
SDxP and SDxDP Stations	29
SDxDT Stations	32
7.4 Specifications	33
Use of INIT Commands (Optional)	35

Copyright Notice

This manual and all software described herein are protected by **copyright: 2011 GE MDS, LLC**. All rights reserved.

GE MDS reserves its right to correct any errors and omissions in this document.

Operational Safety Notices

RF Exposure



The radio equipment described in this guide emits radio frequency energy. Although the power level is low, the concentrated energy from a directional antenna may pose a health hazard. *Do not allow people to come closer to the antenna than the distance(s) as specified in the radio manual* while the transmitter is operating. More information on RF exposure is on the Internet at www.fcc.gov/oet/info/documents/bulletins.

This manual is intended to guide a *professional installer* to install, operate, and perform basic system maintenance on the described radio.

Electrostatic Discharge (ESD) Notice



To prevent malfunction or damage to the unit, which may be caused by ESD, it should be properly grounded at the ground stud on the rear panel. In addition, the installer or operator should follow proper ESD precautions, such as touching a grounded bare metal object to dissipate body charge, prior to adjusting front panel controls or connecting or disconnecting cables on the front or rear panels.



Environmental Information

The equipment that you purchased has required the extraction and use of natural resources for its production. Improper disposal may contaminate the environment and present a health risk due to hazardous substances contained within. To avoid dissemination of these substances into our environment, and to diminish the demand on natural resources, we encourage you to use the appropriate recycling systems for disposal. These systems will reuse or recycle most of the materials found in this equipment in a safe way. Please contact the factory or your supplier for more information on the proper disposal of this equipment.

Battery Disposal-This product may contain a battery. Batteries must be disposed of properly, and may not be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. Batteries are marked with a symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling return the battery to your supplier or to a designated collection point. For more information see: www.weerohsinfo.com

Quality Policy Statement

We are committed to understanding and exceeding our customers' needs and expectations.

- We appreciate our customers' patronage. They are our business.
- We promise to serve them and anticipate their needs.
- We are committed to providing solutions that are cost effective, innovative and reliable, with consistently high levels of quality.

We are committed to the continuous improvement of all of our systems and processes, to improve product quality and increase customer satisfaction.

ISO 9001 Registration

GE MDS adheres to this internationally accepted quality system standard.

Manual Revision Notice

While every reasonable effort has been made to ensure the accuracy of this manual, product improvements may result in minor differences between the manual and the product shipped to you. If you have additional questions or need an exact specification for a product, please contact our Customer Service Team using the information at the back of this guide. In addition, manual updates can often be found on the GE MDS web site at www.gemds.com.

Product Test Data Sheets

Test Data Sheets showing the original factory test results for this unit are available upon request from the GE MDS Quality Leader. Contact the factory using the information at the back of this manual. Serial numbers must be provided for each product where a Test Data Sheet is required.

1.0 ABOUT THIS MANUAL

This manual provides instructions for installation, operation, and maintenance of the following SD-based packaged stations:

- SDxP (Standard Protected Station)
- SDxDP (Dual Protected Station)
- SDxDT (Dual Transceiver Station; non-protected)

The “x” in the model number strings indicates the frequency range of the transceivers installed in a packaged station. Refer to the transceiver manual for details.

This manual is a *system-level* guide for the Packaged Station. As such, it does not contain specific information on the radio transceivers installed in the chassis. For radio-specific information, consult the transceiver manual supplied with your system. For future reference, keep this guide, the transceiver manual, and all other related information near the equipment.

2.0 PRODUCT DESCRIPTION

The SD Packaged Station ([Figure 1](#)) is a tabletop or rack-mount unit designed to hold two MDS SD Series transceivers, two power supplies, and a switch-over logic board that selects between transceiver A or B as the active unit. Manual selection may also be made using a front panel switch.

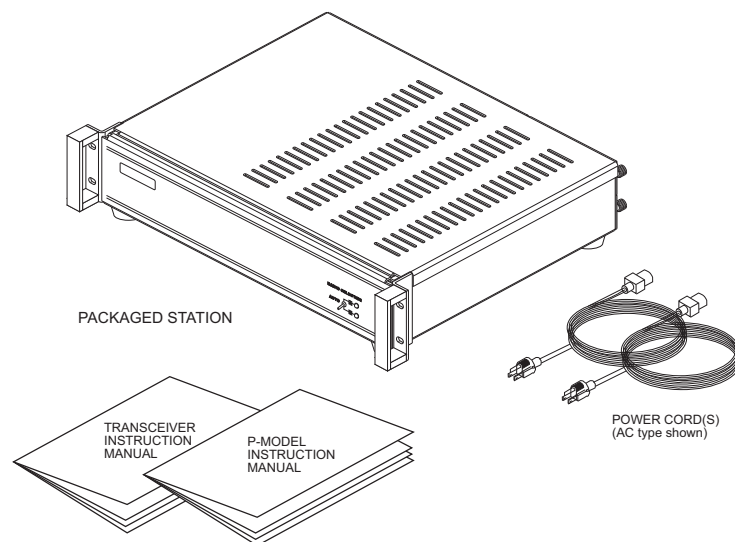


Figure 1. Packaged Station, Typical Shipment
(Two such units, a duplexer chassis, and null-modem interconnect cable are supplied with SDxDP stations)

2.1 Redundant Models

In redundant units containing two transceivers and two power supplies, the station continues to operate even if a failure occurs in one of the transceivers, or an associated power supply. This capability is important in mission-critical applications where uninterrupted service is required.

NOTE: When switchover occurs, a delay of approximately 5 seconds occurs as the new radio initializes.

Alarm Relay Contacts

The unit is equipped with alarm connections at the rear panel which activate whenever a standby transceiver is placed online. These are “dry” (isolated) contacts that may be connected to customer-supplied external alarm equipment, such as a visual or audible alerting device.

2.2 Key Product Features

Listed below are key features of the SD Packaged Station:

- Fully-protected capability for redundant models (SDxP, SDxDP). Standard chassis contains two transceivers and two power supplies. Automatic switchover to alternate transceiver occurs if there is a failure in the primary unit or its power supply. For the SDxDT, a provision for an optional redundant antenna port is also available.
- Optional built-in battery backup for AC-powered units
- Rear panel relay connections for customer-supplied alarm equipment
- Tabletop or 19-inch rack mount installation
- Standard MDS SD Transceivers used inside

NOTE: The SD Packaged Series can only be ordered with transceivers pre-installed in the chassis.

Configuration Codes

The model number label on the outside of the chassis provides the configuration details of the station (as shipped from the factory). This information should be available when calling for factory assistance.

2.3 SDxP Protected Station

An SDxP is two rack units (2RU) high, and contains two transceivers, two power supplies, and a switchover logic board that automatically selects between transceiver A or B as the active transceiver. You can also select the transceiver manually using the front panel RADIO SELECTION switch.

With two transceivers and power supplies installed, each SDxP continues to communicate even if a failure occurs in one of the transceivers or its associated power supply.

NOTE: The SDxP is the building block for the SDxDP discussed in Section 2.4 below.

Antenna Port Configurations

The Protected Network Station can be configured with a single antenna, or with two separate antennas to provide fully redundant operation in case the primary antenna system is physically damaged, or is otherwise inoperative. The following configurations are available:

- **Single antenna port**

The port is automatically switched to the active transceiver by an internal relay.

- **Two antenna ports**

Each port is connected to one of the transceivers and to separate station antennas.

2.4 SDxDP (Dual Protected Station)

The SDxDP is a dual protected station that uses the same hardware as an SDxP, but its functionality is very different. The SDxDP consists of *two* SDxP units, one configured as a transmitter and the other configured as a receiver. In addition, it includes a duplexer chassis. It is fully redundant, measuring 6U high (each unit measuring 2U). Below is a listing of the three major components:

- **Transmit Radio Chassis:** Consists of two redundant SD radios (active and standby). It serves as the master unit of the system, and is the connection point for all application data (COM1 serial port, Ethernet LAN port). This chassis is linked to the Receive chassis via an RS-232 null-modem cable.
- **Receive Radio Chassis:** Consists of two redundant SD radios (active and standby). Links to the Transmit chassis via COM2.
- **Duplexer Chassis:** Contains a tuned cavity bandpass filter, allowing

a single antenna to be used for simultaneous transmission and reception of the station.

NOTE: An SDxDP is shipped with these components packaged in separate boxes. Assembly requires connection of COM2 of the Transmitter chassis to COM2 of the Receiver chassis, using the supplied null-modem serial cable.

In an SDxDP, only two radios are active at any time. One radio in the Transmit chassis performs transmit duties and one radio in the Receive chassis performs receive duties. Special software settings ensure that the master transmit radio mutes any received over-the-air data, and the receive radio prevents any transmissions.

The receive radio's responsibility is to receive over-the-air data and direct this to the transmit radio via COM2. The transmit radio functions as the controller and has multiple responsibilities. It processes data received on COM2, provides the external interface to the network, and coordinates all transmit operations. Customer payload connections (for example, COM1 and LAN ports) are made at the transmit radio.

Each radio component (transmit or receive) performs only a single operation, so only the corresponding transmit or receive parameter is essential. However, for simplified configuration management, it is recommended that all radios be set to the desired frequency plan (for example, TX=928.125 and RX=952.125) on *all four* radios.

NOTE: The SDxDP can be software-configured to behave as either a full duplex master or a streaming repeater station.

2.5 SDxDT (SD Dual Transceiver Station)

The SDxDT is a dual transceiver that uses the same chassis as the SDxP, but it employs a unique interface board. Configuration and operation is similar to the SDxDP just described, but these functions are achieved within in a *single chassis*. There is no redundancy protection for the radios installed in the chassis.

The SDxDT contains one dedicated transmit radio and one dedicated receive radio. It also includes a duplexer chassis. The unit measures 4U high (including the 2U high duplexer chassis). It can be software configured to behave as either a full duplex master or streaming repeater station.

3.0 INSTALLATION

This section provides details for:

- **Installation planning.** Information common to all packaged stations.
- **Step-by-step installation.** Use these steps to connect external wiring and prepare the unit for regular service. A specific section of the manual is provided for each model type.
- **Configuration.** This section describes how to configure the station for desired operation in the network.

3.1 Installation Planning

Additional advice for planning a radio system, including site and antenna selection, is available in the radio manual supplied with your transceivers.

The Protected Network Station is typically installed at an Access Point (AP) site to ensure uninterrupted communication with remote radios. [Figure 2](#) shows a typical installation arrangement.

The installation site should have adequate and stable primary power, suitable access for cabling, and should not be subject to temperature extremes or poor ventilation.

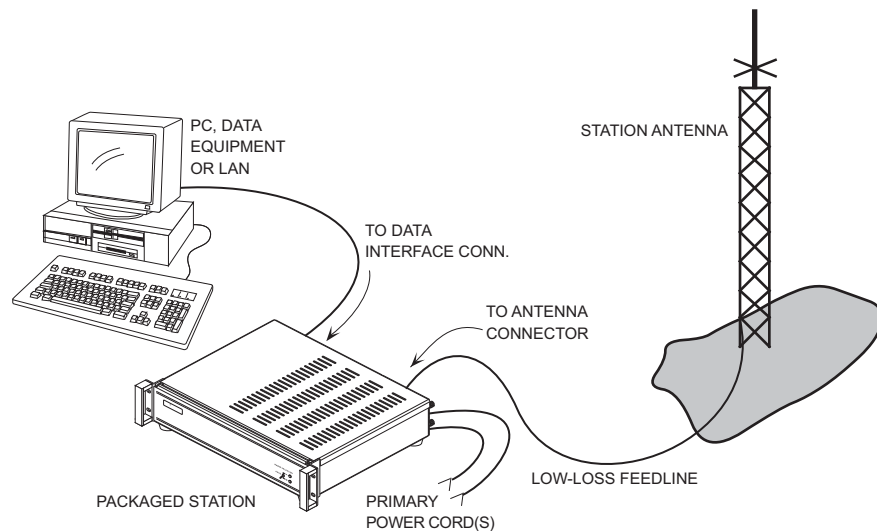


Figure 2. Typical SDxP Series Installation
(Other models may include a duplexer, requiring additional connections)

Mounting Location

The equipment may be placed on a sturdy tabletop or mounted in a 19-inch rack cabinet. Choose a location that provides easy access to the rear panel connectors and allows viewing the LED status indicators (through the viewing slots). For planning purposes, Figure 3 shows the dimensions of a single packaged station.

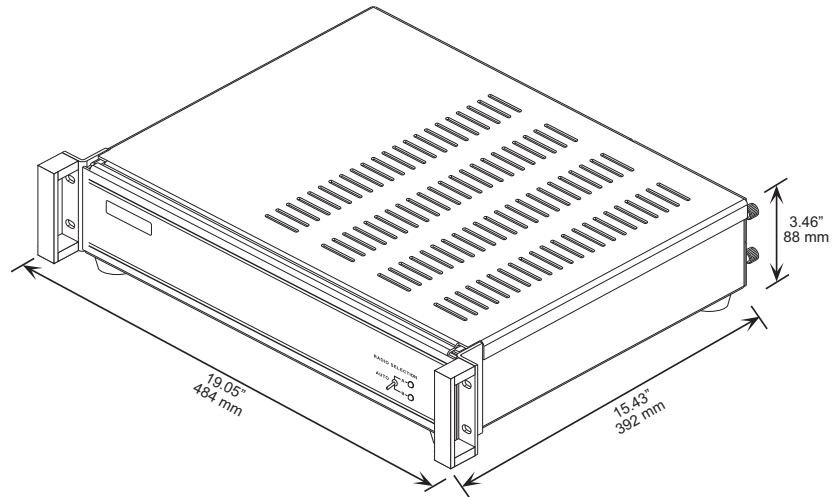


Figure 3. Mounting Dimensions

3.2 Installing the SDxP Station

All external connections are made at the unit's rear panel. Refer to Figure 4 for connector definitions. The text that follows gives instructions for each connector.

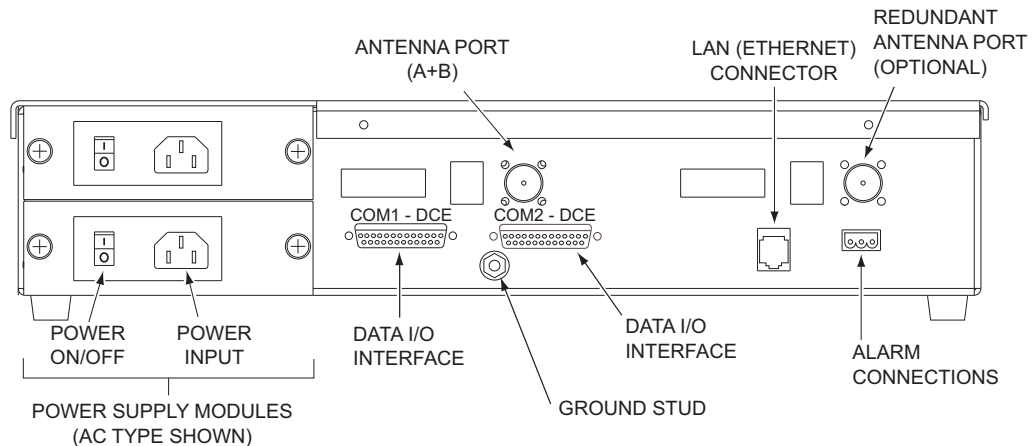


Figure 4. SDxP Protected Station Rear Panel

Safety Ground

Connect the rear panel ground stud to the facility’s safety ground (Earth) system.

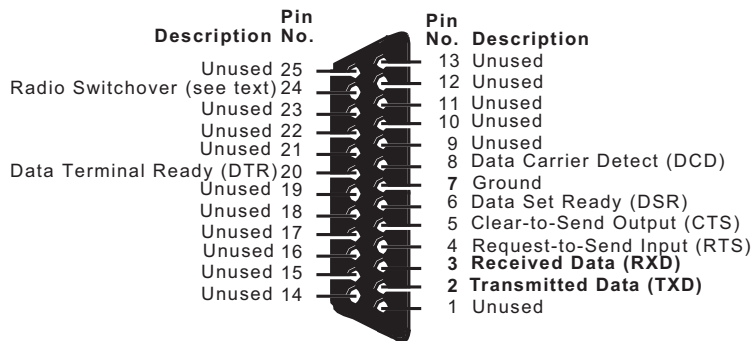
Antenna Port Connection(s)

- Using low-loss coaxial cable, connect the antenna feedline to the coaxial fitting provided on the rear of the chassis. Two such connections are required if the unit is equipped with the Redundant Antenna Option.
- If a directional antenna is used, set its heading in the desired direction of transmission/reception. Ensure that lightning protection is properly installed for all antenna systems.

Data Connections

For the following connections, use only the required pins for the application. Do *not* use a fully-wired (25 conductor) cable on the DB-25 port. Refer to [Figure 5](#) for detailed views of the DB-25 interface connector.

- Connect the facility’s Ethernet cable (if used) to the rear panel LAN connector.
- Connect the facility’s serial data equipment to the COM1 Data I/O connector on the rear panel.



COM1 and COM2 are configured as DCE (female)

Figure 5. COM1/COM2 Pinouts
(As viewed from outside the chassis)

NOTE: Pin 24 is not required, but may be used by external equipment to prompt a remote switchover from one radio to the other within the chassis. Application of a voltage over +5 Vdc toggles the radio selection.

Alarm Equipment Connections

If alarm equipment (lamp, audible device, etc.) will be used with the station, make the appropriate connections to the rear panel ALARM terminals.

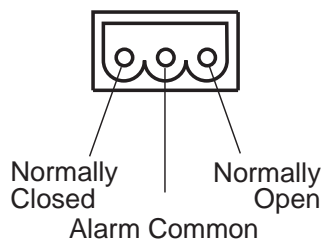


Figure 6. Rear Panel Alarm Contacts
(For use when two radios are installed)

The ALARM terminals are “dry” (isolated) alarm contacts that close (connect to the alarm common) when the Switchover Logic Board detects that operation has switched to the secondary radio. Figure 6 is shown in the *absence* of an alarm condition—the right pin is Normally Open (NO) and the left pin is Normally Closed (NC), with respect to the Common terminal.

The alarm contacts are rated for the following service: 0.5 Ampere at 125 Vac or 1.0 Ampere at 24 Vdc. The common terminal in the connector’s middle “floats” and is not connected to ground or any internal power supply voltage source.

NOTE: The front panel switch should normally be set to the AUTO position so that a fault in the primary transceiver causes an automatic switchover to the secondary transceiver. It is this switchover that applies power to the secondary radio and causes the alarm contacts to change state.

Manual switchover to the secondary transceiver may also be performed with the front panel switch, but note that it immediately causes the alarm contacts to change state, as a failure is assumed in the primary radio.

Primary Power Connections

Connect input power to the power supply modules. See Figure 7 (AC units) and Figure 8 (DC units).

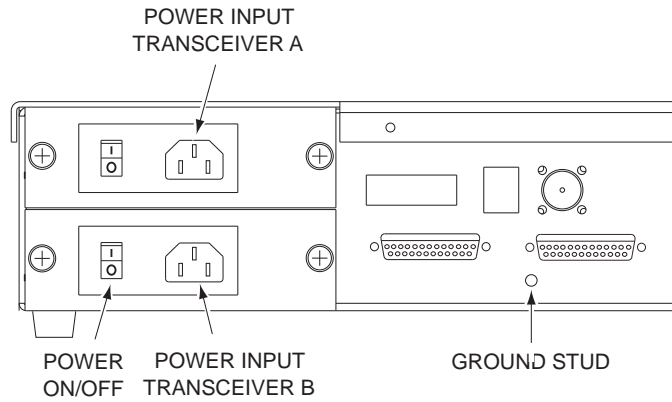


Figure 7. Input Power Connections (AC Units)

NOTE: The internal back-up battery (if installed) is disconnected for shipment. To enable back-up power, remove the top cover of the chassis and connect the battery cable to the battery control board.

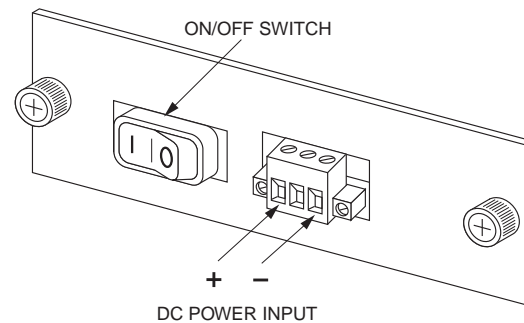


Figure 8. Input Power Connection (DC Units)

3.3 Installing the SDxDP Station

All external connections are made at the rear panel of the Transmit and Receive chassis. The layout of both units are identical. Refer to [Figure 9](#) for SDxDP connector definitions. The text that follows gives instructions for each connector.

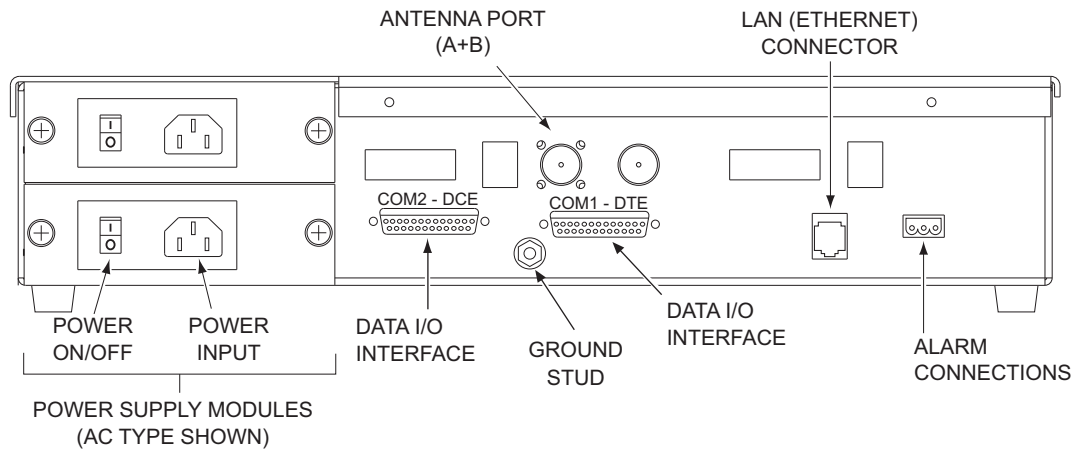


Figure 9. SDxDP Rear Panel Connections

Safety Ground

Connect the rear panel ground stud to the facility's safety ground (Earth) system.

Antenna Port/Duplexer Connections

1. Using low-loss coaxial cable, connect the antenna ports of the Transmit and Receive units to the appropriate ports on the Duplexer chassis based on transmit high or transmit low frequency operation. See [Figure 10](#) for further guidance.
2. If a directional antenna is used, set its heading in the desired direction of transmission/reception. Ensure that lightning protection is properly installed for all antenna systems.

COM2 Inter-Unit Cable Connection

Connect the supplied linking cable between COM2 of the Receive chassis to COM2 of the Transmit chassis (see [Figure 10](#)).

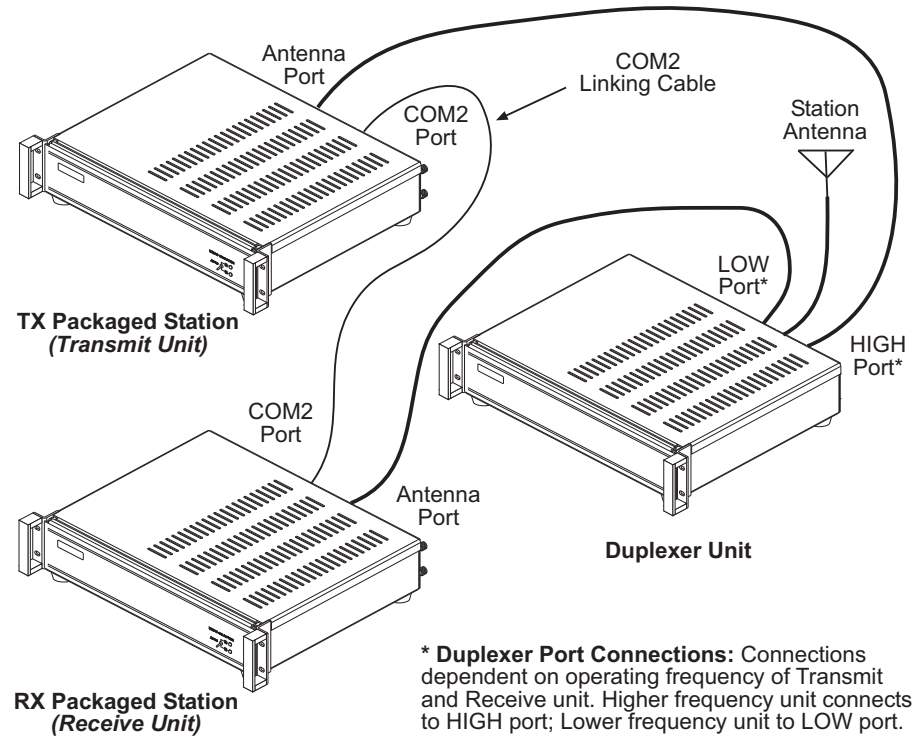
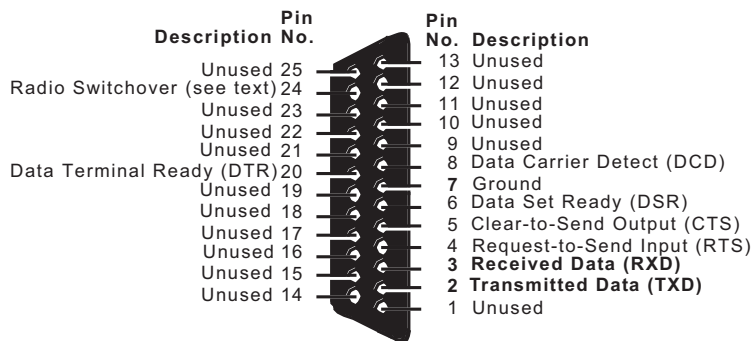


Figure 10. Inter-Unit Cabling for SDxDP

Data Connections

For the following connections, use only the required pins for the application. Do *not* use a fully-wired (25 conductor) cable on the DB-25 port. Refer to [Figure 5 on Page 7](#) for detailed views of the DB-25 interface connector.

1. Connect the facility's Ethernet cable (if used) to the rear panel LAN connector.
2. Connect the facility's serial data equipment to the COM1 Data I/O connector on the rear panel.



COM1 and COM2 are configured as DCE (female)

Figure 11. COM1/COM2 Pinouts
(As viewed from outside the chassis)

NOTE: Pin 24 is not required, but may be used by external equipment to prompt a remote switchover from one radio to the other within the chassis. Application of a voltage over +5 Vdc toggles the radio selection.

Alarm Equipment Connections

If alarm equipment (lamp, audible device, etc.) will be used with the station, make the appropriate connections to the rear panel ALARM terminals.

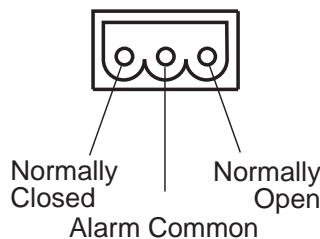


Figure 12. Rear Panel Alarm Contacts
(For use when two radios are installed)

The ALARM terminals are “dry” (isolated) alarm contacts that close (connect to the alarm common) when the Switchover Logic Board detects that operation has switched to the secondary radio. Figure 6 is shown in the *absence* of an alarm condition—the right pin is Normally Open (NO) and the left pin is Normally Closed (NC), with respect to the Common terminal.

The alarm contacts are rated for the following service: 0.5 Ampere at 125 Vac or 1.0 Ampere at 24 Vdc. The common terminal in the connector’s middle “floats” and is not connected to ground or any internal power supply voltage source.

NOTE: The front panel switch should normally be set to the AUTO position so that a fault in the primary transceiver causes an automatic switchover to the secondary transceiver. It is this switchover that applies power to the secondary radio and causes the alarm contacts to change state.

Manual switchover to the secondary transceiver may also be performed with the front panel switch, but note that it immediately causes the alarm contacts to change state, as a failure is assumed in the primary radio.

Primary Power Connections

Connect input power to the power supply modules. See [Figure 7](#) (AC units) and [Figure 8](#) (DC units).

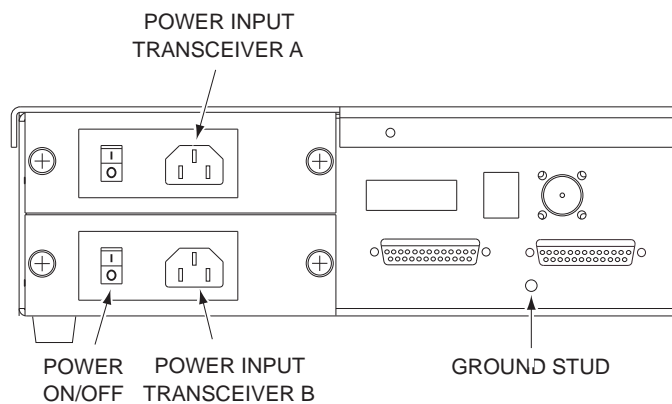


Figure 13. Input Power Connections (AC Units)

NOTE: The internal back-up battery (if installed) is disconnected for shipment. To enable back-up power, remove the top cover of the chassis and connect the battery cable to the battery control board.

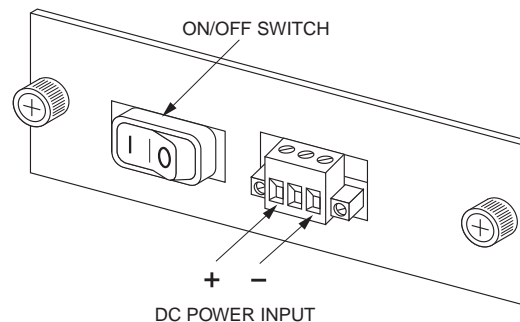


Figure 14. Input Power Connection (DC Units)

3.4 Installing the SDxDT Station

All external connections are made at the unit's rear panel. Refer to [Figure 15](#) for SDxDT connector definitions. The text that follows gives instructions for each connector.

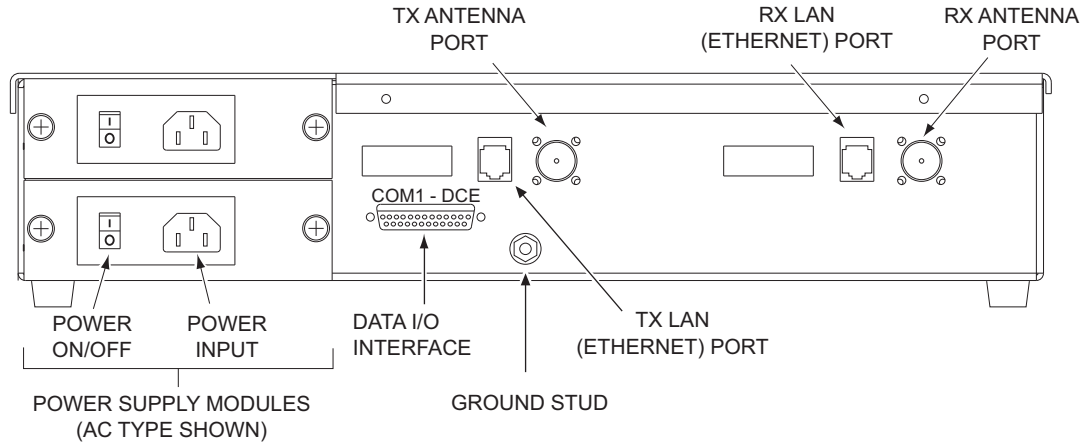


Figure 15. SDxDT Rear Panel

Antenna Port/Duplexer Connections

1. Using low loss coaxial cable, connect the TX and RX antenna ports to the appropriate port on the duplexer chassis based on transmit high or transmit low frequency operation. See [Figure 16](#) for further guidance.
2. If a directional antenna is used, set its heading in the desired direction of transmission/reception. Ensure that lightning protection is properly installed for all antenna systems.

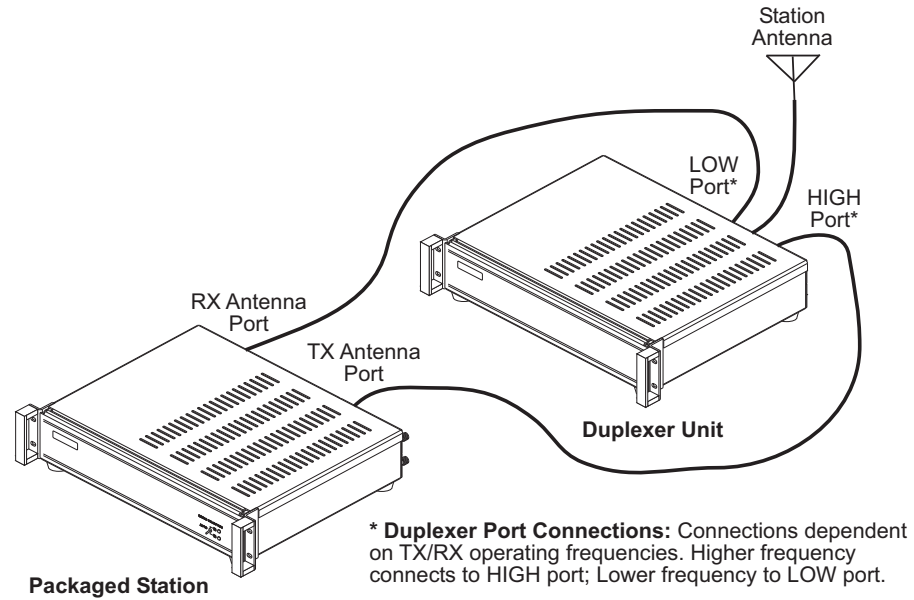
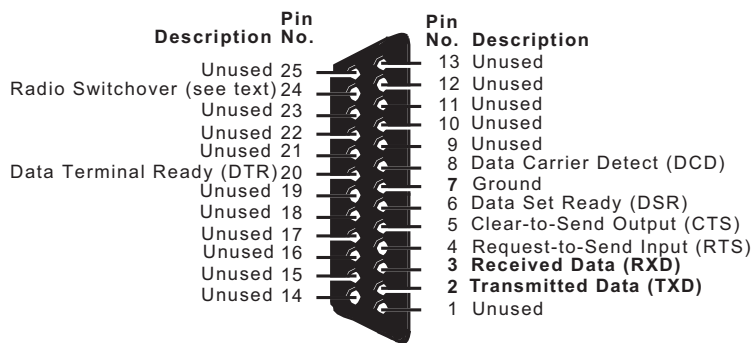


Figure 16. Antenna Port/Duplexer Cabling for SDxDT

Data Connections

For the following connections, use only the required pins for the application. Do *not* use a fully-wired (25 conductor) cable on the DB-25 port.

1. Connect the facility’s Ethernet cable (if used) to the rear panel LAN connector.
2. Connect the facility’s serial data equipment to the COM1 Data I/O connector on the rear panel.



COM1 and COM2 are configured as DCE (female)

Figure 17. COM1/COM2 Pinouts
(As viewed from outside the chassis)

NOTE: Pin 24 is not required, but may be used by external equipment to prompt a remote switchover from one radio to the other within the chassis. Application of a voltage over +5 Vdc toggles the radio selection.

Primary Power Connections

Connect input power to the power supply modules. See [Figure 7](#) (AC units) and [Figure 8](#) (DC units).

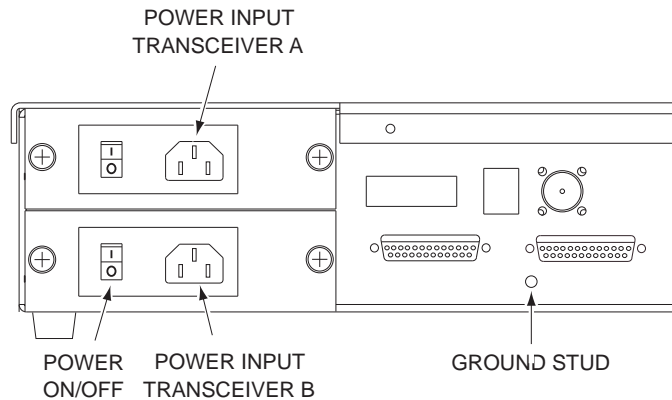


Figure 18. Input Power Connections (AC Units)

NOTE: The internal back-up battery (if installed) is disconnected for shipment. To enable back-up power, remove the top cover of the chassis and connect the battery cable to the battery control board.

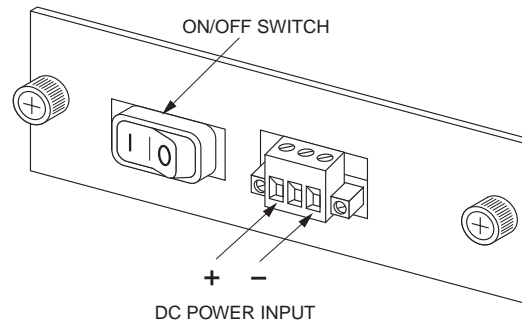


Figure 19. Input Power Connection (DC Units)

4.0 Configuration

4.1 Initial Startup—All Units

This section assumes all unit(s) have been installed as described earlier. To prepare the unit(s) for configuration, follow these steps:

1. Apply primary power. Set the power supply switches on the rear panel to ON.
2. Select the active transceiver by setting the front panel RADIO SELECTION switch to A, B or AUTO (see [Table 1 on Page 23](#) for an explanation of the switch positions). For the SDxDP, this step must be performed on *both* chassis.

4.2 SDxP Configuration

NOTE: Radios are normally pre-configured at the factory. The following instructions are for use only in a replacement/spare radio that has just been installed in the chassis.

“Mirrored Configuration” of Transceivers

To ensure proper operation after a switchover, it is important that both transceivers in the Station have identical configuration profiles. You can accomplish this using a configuration file from one transceiver to configure the second transceiver mounted in the protected chassis. For more information on using configuration files, refer to “Dump/Load Configuration File” in the *SD Technical Manual* (05-4846A01).

For SD radios, it is especially important to set the following items properly, and identically in each unit:

- COM port
- Baud rates
- IP and Ethernet settings
- RADIO mode
- MODEM setting
- TX and RX frequencies

Mirrored configuration can also be done manually, by applying the same commands on one radio first, and then repeating the sequence on the second radio. This can be accomplished using Configuration Files on menu-controlled models. See the transceiver manual for details.

Redundancy

Radios in a protected system are factory configured to switchover based on major alarm conditions. Critical pre-set configuration items for redundancy are:

- CLI command **asig level=major**
- CLI command **asig asense=low**
- On RX radios only, CLI command **setadv rxtotdelay=30**
- On RX radios only, CLI command **setadv rxtotsta=ON**

In the event of a major alarm, the active radio automatically switches to the standby radio. This redundancy is on a per component basis. An alarm on the TX radio switches to the standby TX radio, and an alarm on the RX radio switches to the standby RX radio.

Software Activated Radio Switch

The radio supports the ability to create a temporary major alarm which supports fail-over switch testing. To do this, select **Maintenance/Tools > Radio Test > Alarm Test** from the menu interface.

1926374

Alarm Test Menu

```

=====
A) Force Alarm      OFF
  
```

When the alarm is forced to **ON**, a radio switch occurs immediately.

The same can be done from the command line interface as follows:

```

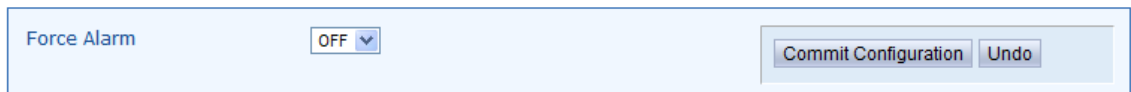
>>alarmtest
FORCEALARM=OFF
>>alarmtest FORCEALARM=ON
  
```

If operating in x710 command line:

```
>forcealarm ON
```

This function is also supported in the Web interface under **Maintenance & Status > Radio Test** screen.

Alarm Test



The screenshot shows a web interface for the 'Alarm Test' function. It features a 'Force Alarm' label followed by a dropdown menu currently set to 'OFF'. To the right of the dropdown are two buttons: 'Commit Configuration' and 'Undo'.

Once enabled, a major alarm is temporarily forced. This immediately triggers a switchover from the active radio to the standby radio.

NOTE: This is a temporary alarm, and automatically resets after 30 seconds, and following a power cycle.

4.3 SDxDP/SDxDT Configuration

SDxDP chassis communicate to each other over COM2 using a null modem serial cable between the units. SDxDT units communicate internally via wiring inside the chassis. To maximize throughput between radios, the data rate is set to **115200** bps.

Master-Specific Configuration

NOTE: The unit is pre-configured at the factory based on the whether Master site or Streaming Repeater operation was ordered. The steps below are provided for informational purposes only, or for use under special circumstances, such as replacing a radio.

1. Connect to the *Transmit* Chassis. From menu mode, enter **x** to obtain the **>>** prompt. Configure a radio as Master TX by entering **patch repeater=master**.
2. Return to the menu mode by typing **menu**, then press the Enter key.
3. Press Escape to reach the **Device Configuration** menu and select **Media Access Control**. Next, select **Device Type** and set it to **Access Point**.
4. Connect to the *Receive* Chassis. From the menu mode, enter **x** to obtain the **>>** prompt. Configure a radio as Master RX by entering **patch repeater =RX**.

Additional configuration:

- Frequency configuration: Set the same RX and TX frequency on all four radios. (There are only two radios in an SDxDT chassis.)
- Configure the TX radio for the desired operating mode of the SD network. Refer to the SD transceiver manual for more information.

In this scenario, the master TX radio mutes any received over the air data, and the RX radio prevents all transmissions.

Automatic Settings

When the radios are setup in Master or Repeater configurations the following settings are automatically set.

- **COM2 baud** is set to **115200**
- **Listen Before Talk** is **disabled**
- The Receive radio(s) operating mode is set to **Transparent Mode**.

Repeater-Specific Configuration

Repeater configurations have two active transceivers; one responsible for transmit functions and the other for receive functions. The same methodology used in the protected unit is followed. The receiver radio is responsible only for receiving over-the-air data, and then forwarding

this data to the transmitter via COM2. The transmitter radio is then responsible for decoding data on COM2, transmit operations, and also providing the interface to the customer's network. Unlike traditional MDS x710 repeaters, SD repeater configurations support local data handling on the serial and Ethernet interfaces.

Frequency configuration is the same as the TX and RX frequency plan used in the Master station.

NOTE: Repeaters operate in a streaming full-duplex mode and therefore cannot be used in single-frequency operation.

NOTE: The unit is pre-configured at the factory based on the whether Master site or Streaming Repeater operation was ordered. The steps below are provided for informational purposes only, or for use under special circumstances, such as replacing a radio.

- Connect to the *Transmit* Chassis. From menu mode, enter **x** to obtain the **>>** prompt. Enter **patch repeater=REMOTE** to configure the radio as a Repeater TX.
- Connect to the *Receive* Chassis. From menu mode, enter **x** to obtain the **>>** prompt. Enter **patch repeater=RX** to configure the radio as a Repeater RX.

Additional configuration:

- Frequency configuration: Set the RX and TX frequency pairs identically on all radios.
- Configure the transmitter radio for the desired operating mode of the SD network. Refer to the SD transceiver manual for details.
- If no local data is required, set the operating mode to **Transparent** mode and do not connect to any local interfaces.

Redundancy (*Disregard for SDxDT*)

Radios in a protected system are factory configured to switchover based on major alarm conditions. Critical pre-set configuration items for redundancy are:

- CLI command **asig level=major**
- CLI command **asig asense=low**
- On RX radios only, CLI command **setadv rxtotdelay=30**
- On RX radios only, CLI command **setadv rxtotsta=ON**

In the event of a major alarm, the active radio automatically switches to the standby radio. This redundancy is on a per component basis. An alarm on the TX radio switches to the standby TX radio, and an alarm on the RX radio switches to the standby RX radio.

**Software Activated
Radio Switch**

The radio supports the ability to create a temporary major alarm which supports fail-over switch testing. To do this, select **Maintenance/Tools > Radio Test > Alarm Test** from the menu interface.

1926374

Alarm Test Menu

=====

A) Force Alarm OFF

When the alarm is forced to **ON**, a radio switch occurs immediately.

The same can be done from the command line interface as follows:

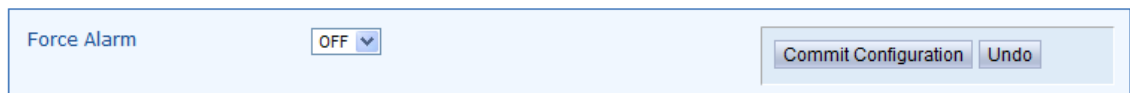
```
>>alarmtest
FORCEALARM=OFF
>>alarmtest FORCEALARM=ON
```

If operating in x710 command line:

```
>forcealarm ON
```

This function is also supported in the Web interface under **Maintenance & Status > Radio Test** screen.

Alarm Test



Once enabled, a major alarm is temporarily forced. This immediately triggers a switchover from the active radio to the standby radio.

NOTE: This is a temporary alarm, and automatically resets after 30 seconds, and following a power cycle.

Internal Configuration Detail

After enabling Master or Repeater configurations using the **patch** command (by typing **x** at the main menu), the radio automatically preselects and programs certain parameters. Specifically:

- COM2 baud is set to **115200** bps
- **Listen Before Talk** is set to **disabled**
- The RX unit (**patch repeater=RX**) is set to **Transparent Mode**

5.0 OPERATION—All Units

In-service operation of the Packaged Station is completely automatic. Once it is properly installed and configured, operator actions are limited to observing the LED status indicators for proper operation. Once all configuration parameters have been properly set, begin operation as follows:

1. Apply primary power to the unit. Set the rear panel power supply switches to ON.
2. Select the active transceiver by setting the front panel RADIO SELECTION switch to A, B or AUTO (see [Table 1](#) on [Page 23](#) for an explanation of switch positions). For the SDxDP, this step must be performed on *both* radio chassis.
3. If desired, you can observe the transceiver LED status panel(s) through the viewing slots, or by removing the top cover. Refer to the SD transceiver manual for an explanation of LED functions.
4. After basic operation of the Station is checked, performance of the radio link may be optimized using the suggestions in the transceiver manual.

5.1 Radio Selection Switch

The Radio Selection Switch ([Figure 20](#)) sets the active transceiver inside the chassis (A, B, or AUTO). On redundant units, this switch is ordinarily set to AUTO, as this preserves the ability for automatic switchover in the event of a radio fault.

See [Table 1](#) for a full explanation of the switch settings. For the SDxDP, this selection must be performed on *both* radio chassis.

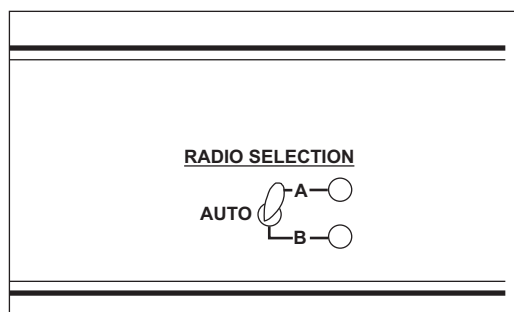


Figure 20. Radio Selection Switch

Table 1. Radio Selection Switch Positions

Switch Position	Function
A	Transceiver A is selected as the active unit. Switchover does <i>not</i> occur if a failure occurs in Transceiver A, or if Remote Switchover is invoked.
AUTO (Normal/Default)	<p>The most recently selected transceiver is active. If a failure occurs with that unit, switchover automatically occurs to the other transceiver. This is the normal/default position for the switch.</p> <p>Also, when the switch is in this position, the Remote Switchover command can be invoked.</p>
B	Transceiver B is selected as the active unit. Switchover does <i>not</i> occur if a failure occurs in Transceiver B, or if Remote Switchover command is invoked.

6.0 TROUBLESHOOTING

There are four main requirements for proper operation in all cases:

- Adequate and stable primary power
- An efficient and properly installed antenna system
- Correct interface connections between the transceiver and other elements of the system
- Secure cable connections

6.1 LED Indicators

The internal radio LED status indicators are an important troubleshooting tool and should be checked whenever a problem is encountered. The packaged station cover can be removed to view them. Consult the transceiver manual for a discussion of LED functions.

6.2 Alarm Codes

When an alarm condition exists, the transceiver creates an alarm code or message that can be read in the Device Manager. This information can be helpful in resolving many system difficulties. Consult the transceiver manual for descriptions of alarm messages, and corresponding corrective actions.

7.0 TECHNICAL REFERENCE

7.1 Field-Replaceable Assemblies and Parts

Table 2 lists field-replaceable internal assemblies and parts available to implement repairs. Contact the factory for price and availability.

Table 2. Field Replaceable Assemblies and Parts

Assembly	Part Number
Power Supply Module	03-1143A12 (115/230 Vac)
	03-4065A01 (18-36 Vac)
	03-4065A02 (36-75 Vac)
	03-4064A01 (10.5-16 Vac)
Switchover Logic Board (SDxP)	03-6061A04
Battery Control Board	03-3362A01
Indicator Board	03-3307A01
Backup Battery (1.2 Ah)	28-1575A03
Top Cover Plate	82-3365A01
SD Radio Transceiver	<i>Per order—Consult factory</i>

7.1.1 Replacing Power Supply Modules

Power supply modules are held in place with two knurled thumbscrews at the rear of the chassis. To remove a power supply, loosen the two captive screws and slide the unit straight out. (There are no cables to disconnect, as the modules are fitted with in-line connectors.)

To re-install the modules, make sure that the slides are properly aligned with the guide slots on the chassis, and push straight in. Tighten the thumbscrews to secure the assembly.

7.1.2 Replacing Other Assemblies

The Switchover Logic Board and the front panel Indicator Board (03-3307A01) are held in place with Phillips screws. To remove these assemblies, disconnect all connectors from the board and remove the mounting screws. The boards can then be removed from the chassis.

The Backup Battery (28-1575A03) and Battery Control Board (03-3362A01), if present, can be removed by loosening the bracket that holds it to the chassis and disconnecting its push-on terminals. Use care not to short-circuit the battery terminals during removal. Figure 21 shows the battery, control board and associated interface cables.

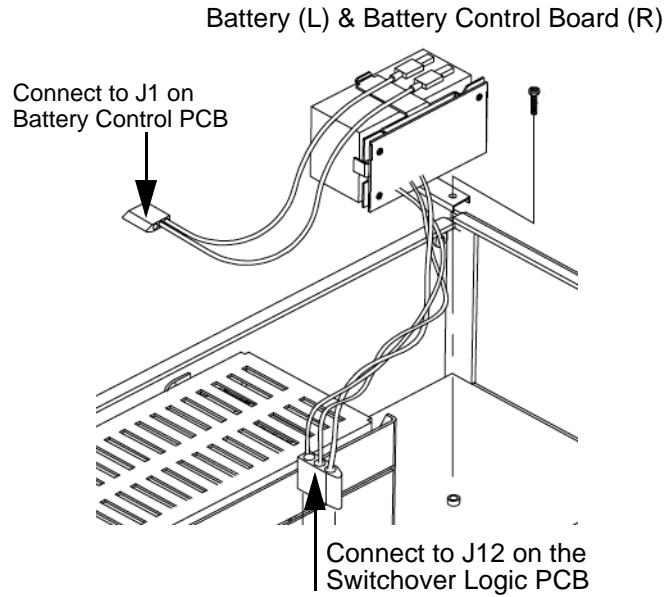


Figure 21. Backup Battery and Control Board Assemblies

7.2 Replacing Transceiver(s)

NOTE: In a new unit, transceivers are pre-installed at the factory. The following is provided as an aid in the event they are removed for maintenance, or a spare radio is installed in the chassis.

Proceed as follows to remove a transceiver from the chassis and install a replacement unit.

1. Remove chassis cover.
2. Remove the transceiver mounting plates from the chassis and radio.
3. Attach plates to the replacement radio. Secure transceiver/plate assemblies to chassis. (Note that the radios are stacked as shown in [Figure 22](#).)
4. Connect internal cabling between transceivers and the Switchover Logic Board. See the internal cabling arrangements that follow in this section.

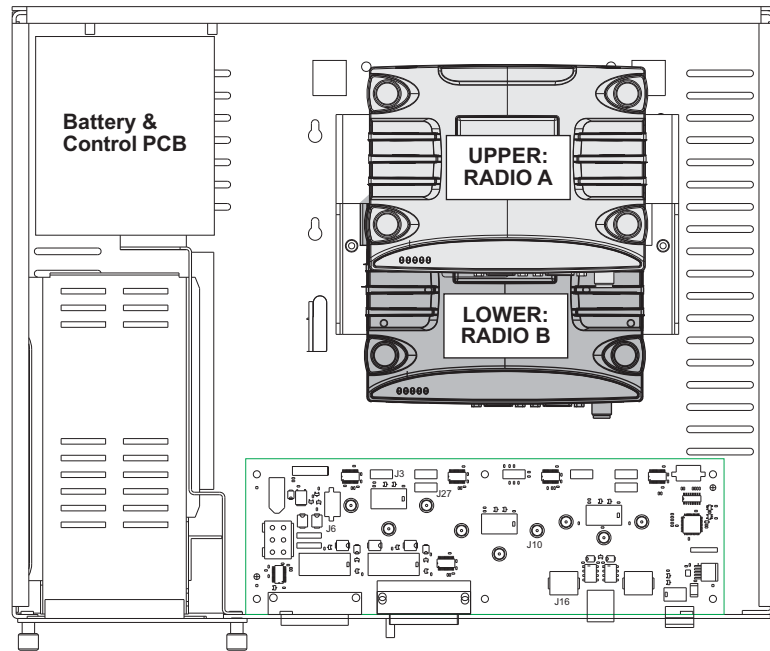
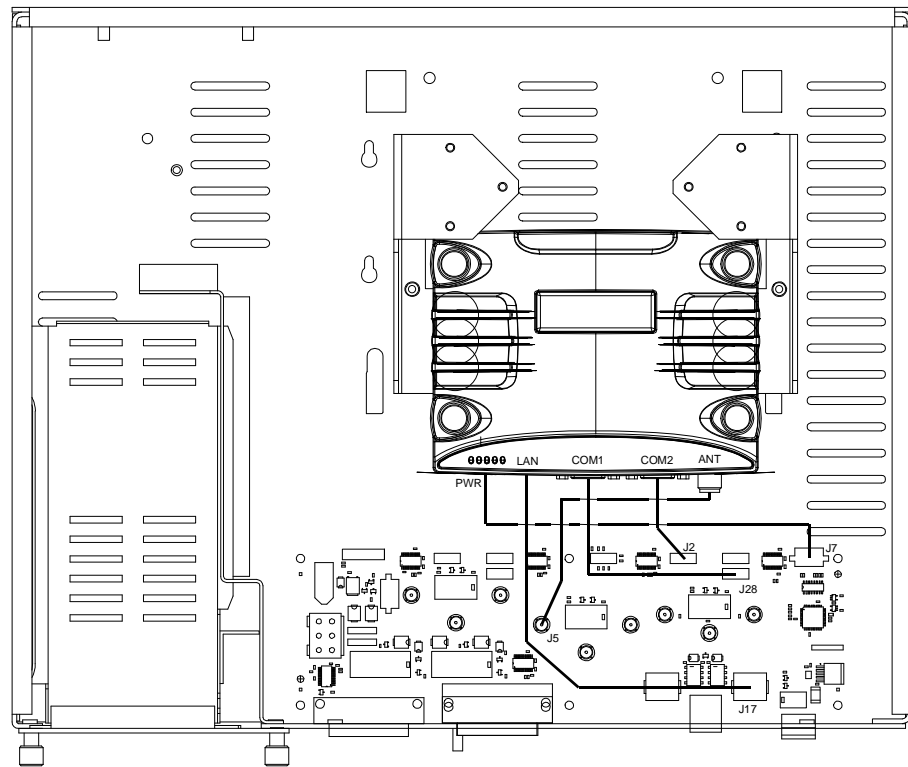


Figure 22: Top View Showing Two MDS SD Series Radios Installed

7.3 Internal Cabling & Connections

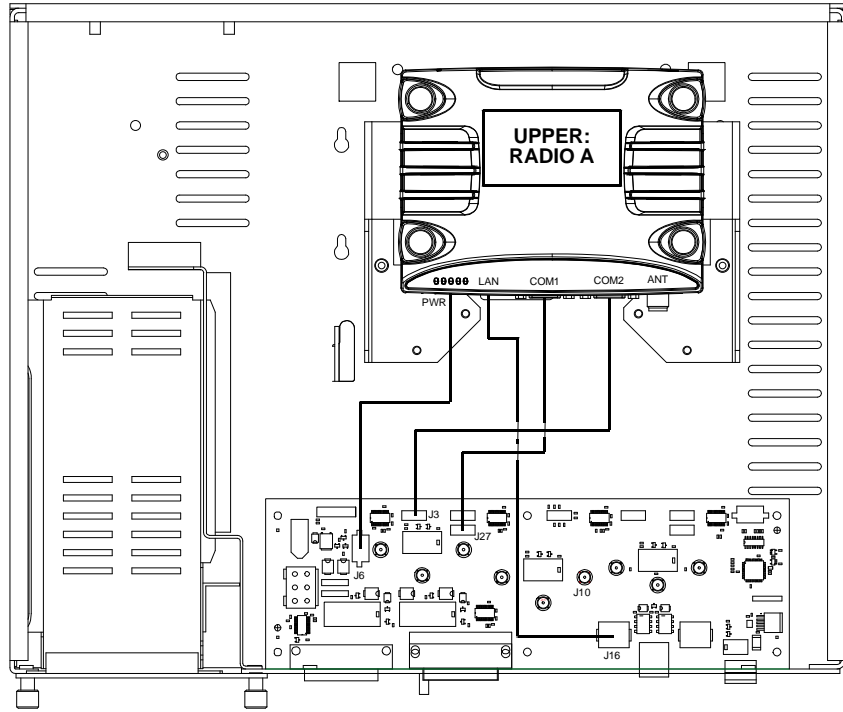
SDxP and SDxDP Stations

NOTE: There are two internal cabling options for the SDxP radios: single port antenna cabling and redundant antenna cabling. Cabling is normally pre-installed at the factory. [Figure 23](#) to [Figure 26](#) are for reference only.



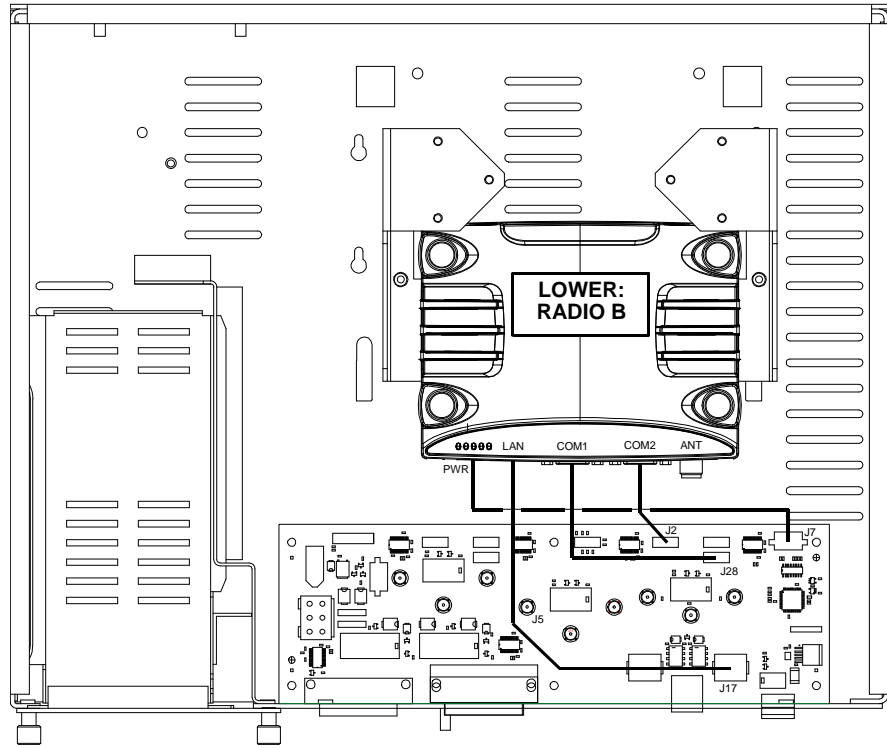
Lower Radio B	Switchover Logic PCB Assy.	Cable
PWR	J7	Item 73
LAN	J17	Item 71
COM1	J28	Item 55
COM2	J2	Item 55
ANT	J5	Item 34

Figure 23. Single Port Antenna Cabling—Lower (B) Radio



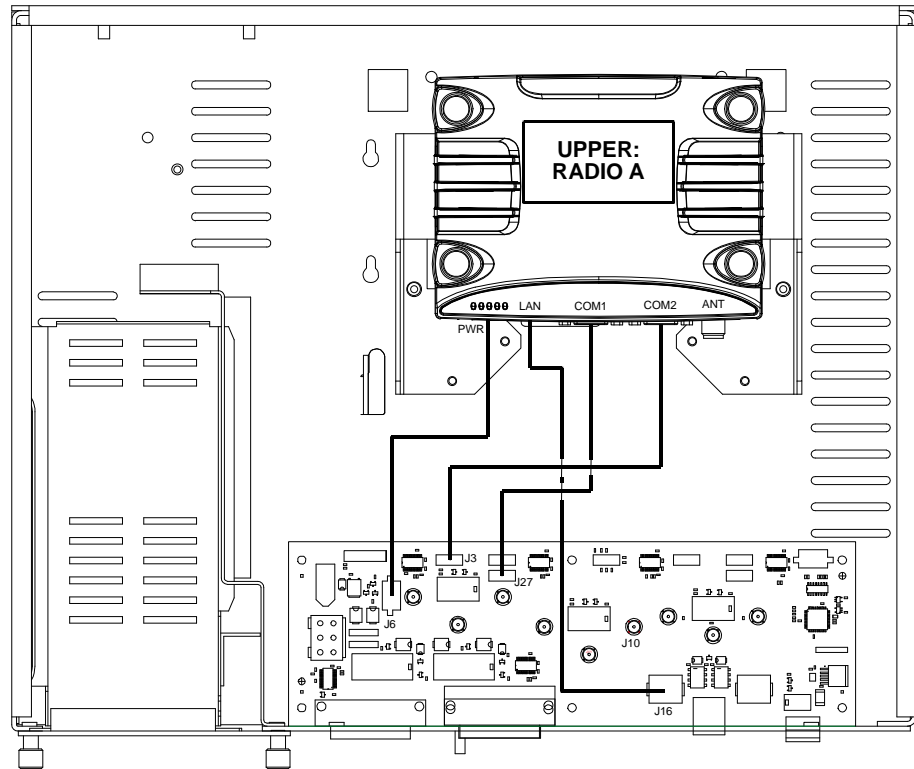
Upper Radio A	Switchover Logic PCB Assy.	Cable
PWR	J6	Item 3
LAN	J16	Item 54
COM1	J27	Item 55
COM2	J3	Item 55
ANT	J10	Item 34

Figure 24. Single Port Antenna Cabling—Upper (A) Radio



Lower Radio B	Switchover Logic PCB Assy.	Cable
PWR	J7	Item 73
LAN	J17	Item 71
COM1	J28	Item 55
COM2	J2	Item 55

Figure 25. Redundant Port Antenna Cabling—Lower (B) Radio



Upper Radio A	Switchover Logic PCB Assy.	Cable
PWR	J6	Item 3
LAN	J16	Item 54
COM1	J27	Item 55
COM2	J3	Item 55

Figure 26. Redundant Port Antenna Cabling—Upper (A) Radio

SDxDT Stations

Internal cabling for SDxDT stations is similar to that shown above, but there are some specific differences, including the addition of a crossover cable in the chassis. When removing a transceiver for service or replacement, make careful note of the cable connections, and re-install in the same manner. For additional guidance, consult your factory representative.

7.4 Specifications

Physical

Packaged Station Case:	Aluminum (rack mountable 2U)
Dimensions:	8.9 cm (3.5") high 48.3 cm (19.0") wide 35.6 cm (14.0") deep
Weight:	5.74 kg (12.65 lbs.) w/o transceivers Approx. 1 kg (2.2 lbs.) additional for each transceiver

Environmental

Temperature Range:	0°C to +50°C (32° to 122° F)
Humidity:	95% at 40°C (104° F), non-condensing

Power Supplies

115/230 Vac with battery backup
12 Vdc (10.5-15 Vdc Operating Range)
24 Vdc (18-36 Vdc Operating Range)
48 Vdc (36-72 Vdc Operating Range)

General

Frequency Range:	Dependent on transceiver(s) installed. See transceiver manual.
Data Interface:	IP/Ethernet, Serial (RS-232). Provided by two rear panel DB-25 connectors (DCE and DTE)
Diagnostic Interface:	Serial (RS-232), Telnet, or Web browser. Provided by a rear panel DB-25 connector.
Alarm Output:	Dry (isolated) contacts for controlling an alarm device upon primary power failure or transceiver switchover.

TECHNICAL NOTES

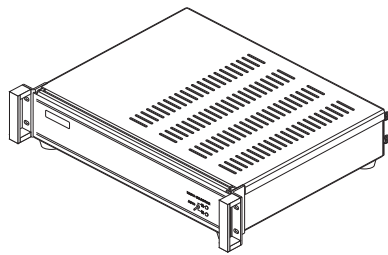
Use of INIT Commands (Optional)

Previous users of MDS packaged models may be familiar with legacy command structures for initializing radios. The legacy commands **INIT P-20** and **INIT SDXP** are still supported in this current version, but Command Line Interface (CLI) script configuration is the preferred method of initialization.

An **INIT SDXP** or **INIT P-20** command entered at the x710 (>) prompt, performs the equivalent of the following settings at the CLI (>>) prompt:

```
>>ASIG "ASENSE"=LOW
>>ASIG "AMASK"="FFFF0000000000000000000000000000"
>>SETADV "RXTOTSTA"=ON
>>SETADV "RXTOTDELAY"=20
```

NOTE: This command should not be used by a transmit-only system.



INDEX

A

Access Point 5
Antennas
 selection of 6

C

Cables
 feedline selection 7, 10
Configurations
 antenna port 3

F

Feedline
 selection 7, 10
Field-replaceable assemblies and parts 26

I

Indicator Board
 replacing 26
Installation
 antenna and feedline selection 6
 planning 5
 requirements 5
 site guidelines 5

P

Power
 replacing power supply modules 26
Procedures
 installation planning 5
Protected Network Station
 product features 2

R

Radio
 description 1
Redundancy 5
Replacing
 indicator board 26
 other assemblies 26
 power supply modules 26
 switchover logic board 26
Requirements for installation 5

S

Specifications 33
Switchover Logic Board
 replacing 26

T

Troubleshooting 25

V

Voltage
 power supply ratings 33

W

Weight
 of unit 33

IN CASE OF DIFFICULTY...

GE MDS products are designed for long life and trouble-free operation. However, this equipment, as with all electronic equipment, may have an occasional component failure. The following information will assist you in the event that servicing becomes necessary.

TECHNICAL ASSISTANCE

Technical assistance for GE MDS products is available from our Technical Support Department during business hours (8:00 A.M.–5:30 P.M. Eastern Time). When calling, please give the complete model number of the product, along with a description of the trouble/symptom(s) that you are experiencing. In many cases, problems can be resolved over the telephone, without the need for returning the unit to the factory. Please use one of the following means for product assistance:

Phone: 585 241-5510

E-Mail: gemds.techsupport@ge.com

FAX: 585 242-8369

Web: www.gemds.com

FACTORY SERVICE

Component level repair of this equipment is not recommended in the field. Many components are installed using surface mount technology, which requires specialized training and equipment for proper servicing. For this reason, the equipment should be returned to the factory for any PC board repairs. The factory is best equipped to diagnose, repair and align your unit to its proper operating specifications.

If return of the equipment is necessary, you must obtain a Service Request Order (SRO) number. This number helps expedite the repair so that the equipment can be repaired and returned to you as quickly as possible. Please be sure to include the SRO number on the outside of the shipping box, and on any correspondence relating to the repair. No equipment will be accepted for repair without an SRO number.

SRO numbers are issued online at www.gemds.com/support/product/sro/. Your number will be issued immediately after the required information is entered. Please be sure to have the model number(s), serial number(s), detailed reason for return, “ship to” address, “bill to” address, and contact name, phone number, and fax number available when requesting an SRO number. A purchase order number or pre-payment will be required for any units that are out of warranty, or for product conversion.

If you prefer, you may contact our Product Services department to obtain an SRO number:

Phone Number: 585-241-5540

Fax Number: 585-242-8400

E-mail Address: productservices@gemds.com

The equipment must be properly packed for return to the factory. The original shipping container and packaging materials should be used whenever possible. All factory returns should be addressed to:

GE MDS, LLC
Product Services Department
(SRO No. XXXX)
175 Science Parkway
Rochester, NY 14620 USA

When repairs have been completed, the equipment will be returned to you by the same shipping method used to send it to the factory. Please specify if you wish to make different shipping arrangements. To inquire about an in-process repair, you may contact our Product Services Group using the telephone, Fax, or e-mail information given above.



Digital Energy
MDS

GE MDS, LLC
175 Science Parkway
Rochester, NY 14620
General Business: +1 585 242-9600
FAX: +1 585 242-9620
Web: www.gemds.com

