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## **Installation and Operation Manual**

**Publication Number 050-00004-01 F**

**23 February, 1998**

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### **DIVA-2000<sup>®</sup> Wireless Local Loop**

**Model MBS-150  
Quad -48 VDC Power Supply**

**Model MBS-151  
MBS -48 VDC Power Supply Chassis**

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This documentation applies to DIVA-2000 equipment employing Release 1.1 or later of the DIVA-2000 Wireless Local Loop software. Later releases are intended to be backward compatible but may introduce new functionality not treated in this documentation. Please consult with Diva Communications or its authorized representatives to ensure compatibility.

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# Section 1 – Overview

The Model MBS-150 Quad -48 VDC Power Supply and Model MBS-151 MBS -48 VDC Power Supply Chassis are components of the Modular Base Station of the DIVA-2000 Wireless Local Loop. This document provides the necessary information for their installation and operation.

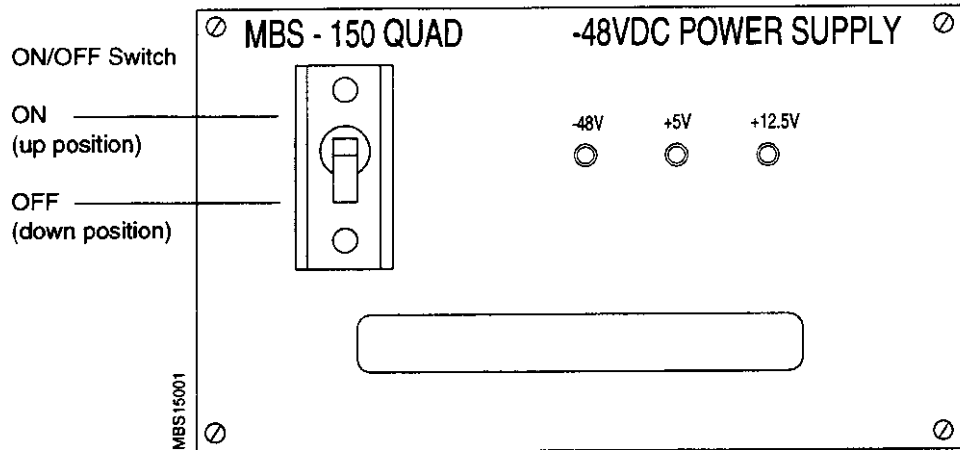
## 1.1 Description

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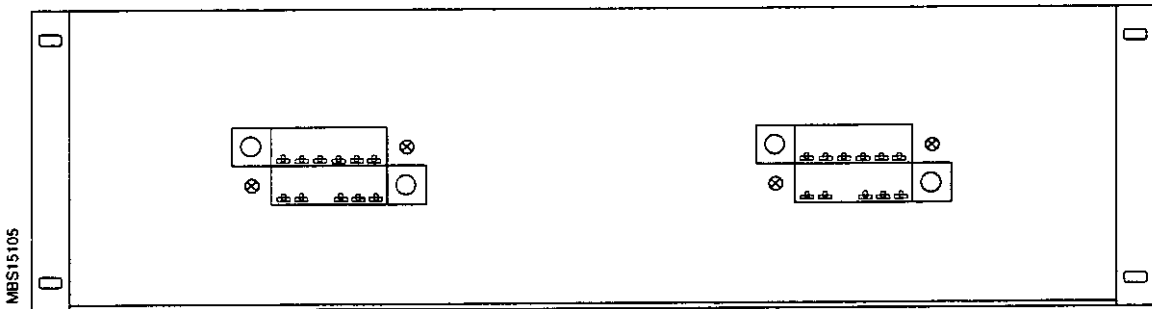
The Model MBS-150 Quad -48 VDC Power Supply is a plug-in module of the Model MBS-151 MBS -48 VDC Power Supply Chassis. Each Quad Power Supply converts -48 VDC input power to regulated +5 VDC and +12.5 VDC outputs as needed for modules of a fully provisioned single Quad of the Modular Base Station (MBS). The Quad Power Supply and MBS Power Supply Chassis supports both the Model MBS-100 MBS Chassis and the Model MBS-110 MBS Chassis.

The MBS Power Supply Chassis accommodates two Quad Power Supplies, where their operation is completely independent. No wiring is required to install or remove an individual Quad Power Supply -- the modules are designed to simply slide into the MBS Power Supply Chassis and make electrical contact through multi-pin connectors. All wiring to and from the power supplies is via terminal strips at the rear of the MBS Power Supply Chassis.

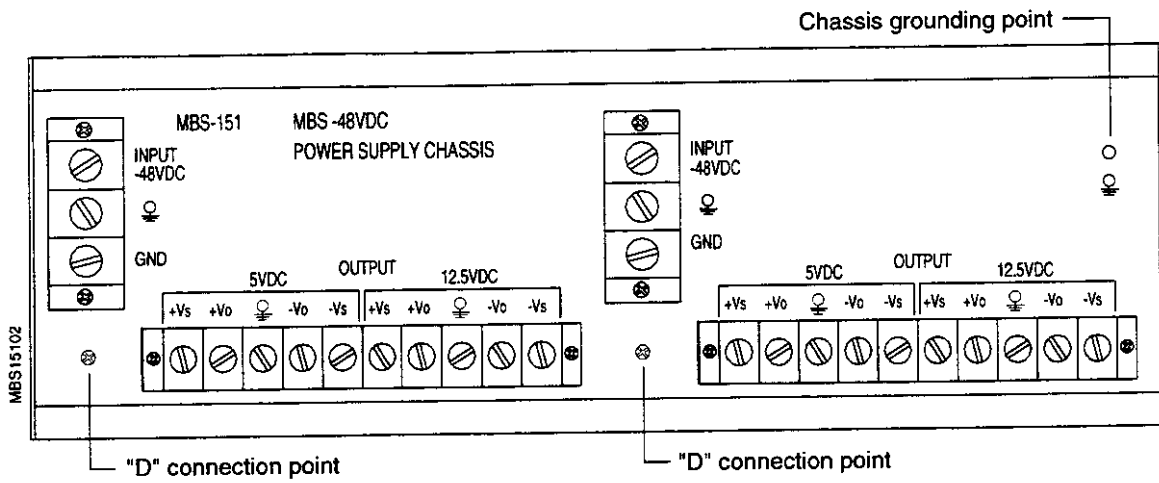
Figure 1-1 shows the front view of a single Quad Power Supply; Figures 1-2 and 1-3 show front and rear views of the MBS Power Supply Chassis, respectively.



**Figure 1-1** Model MBS-150 Quad -48 VDC Power Supply (front view)



**Figure 1-2** Model MBS-151 MBS -48 VDC Power Supply Chassis (front view)



**Figure 1-3 Model MBS-151 MBS -48 VDC Power Supply Chassis (rear view)**

## 1.2 Features

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The Model MBS-150 Quad -48 VDC Power Supply offers the following features:

- ◆ power output for a fully provisioned MBS Quad
- ◆ nominal -48 VDC input
- ◆ regulated +5 VDC and +12.5 VDC outputs
- ◆ power on/off switch
- ◆ three LEDs show status of -48 VDC input and +5 VDC and +12.5 VDC outputs

The Model MBS-151 MBS -48 VDC Power Supply Chassis offers the following features:

- ◆ support of two fully independent Quad Power Supplies
- ◆ easy plug-in installation of Quad Power Supplies
- ◆ flush rack-mountable in standard 19-inch rack
- ◆ convenient terminal strips for input and output connections

# Section 2 – Function

This section describes capabilities of the MBS-150 Quad -48 VDC Power Supply and Model MBS-151 MBS -48 VDC Power Supply Chassis, including its interfaces and its application and use within the DIVA-2000 Wireless Local Loop.

## 2.1 Capabilities

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The Model MBS-150 Quad -48 VDC Power Supply offers the following capabilities:

- ◆ designed for operation with Model MBS-151 MBS -48 VDC Power Supply Chassis
- ◆ operates from nominal -48 VDC input
  - ❖ supports input voltage variation from -40 to -60 VDC
  - ❖ line filter eliminates or reduces input noise
- ◆ two sets of +5 VDC and +12.5 VDC outputs, where each set supports a fully provisioned MBS Quad (four RF Modems; one Quad Interface)
- ◆ +5 VDC output
  - ❖  $\pm 5\%$  total line and load regulation
  - ❖ ripple < 100 mV peak-to-peak
  - ❖ output provides up to 6 Amps
- ◆ +12.5 VDC output
  - ❖  $\pm 4\%$  total line and load regulation
  - ❖ ripple < 5 mV peak-to-peak
  - ❖ output provides up to 12 Amps
- ◆ front panel on/off switch to control power output
- ◆ LEDs provide input and output status indications

The Model MBS-151 MBS -48 VDC Power Supply Chassis offers the following capabilities:

- ◆ designed to support two Model MBS-150 Quad -48 VDC Power Supplies
- ◆ designed for flush 19-inch rack mounting
- ◆ allows easy plug-in installation of Quad Power Supplies
- ◆ provides convenient terminal strips for input and output connections

### 2.1.1 Summary of Capabilities

Capabilities of the Model MBS-150 Quad -48 VDC Power Supply and Model MBS-151 MBS -48 VDC Power Supply Chassis are summarized in Table 2-1.

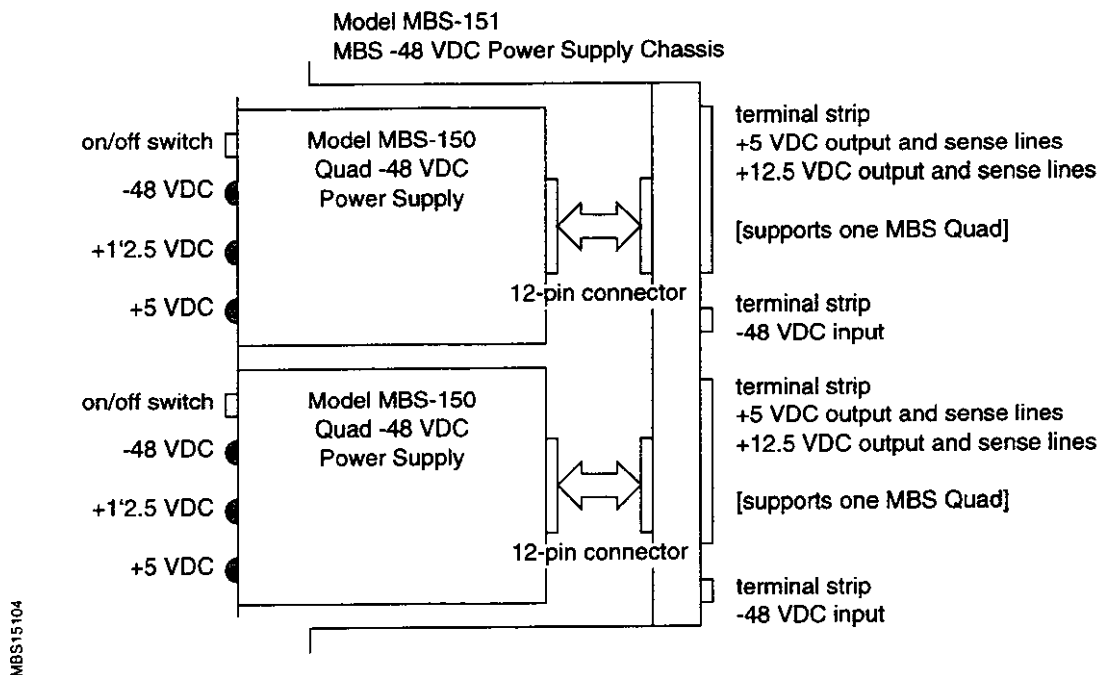
<p>functions</p>	<ul style="list-style-type: none"> <li>◆ Model MBS-150 Quad -48 VDC Power Supply                     <ul style="list-style-type: none"> <li>❖ designed for operation with Model MBS-151 MBS -48 VDC Power Supply Chassis</li> <li>❖ operates from nominal -48 VDC input (-40 to -60 VDC)</li> <li>❖ provides +5 VDC and +12.5 VDC outputs to support a fully provisioned MBS Quad (four RF Modems; one Quad Interface)                             <ul style="list-style-type: none"> <li>— +5 VDC (<math>\pm 5\%</math>) output provides up to 6 Amps</li> <li>— +12.5 VDC (<math>\pm 4\%</math>) output provides up to 12 Amps</li> </ul> </li> <li>❖ LEDs provide input and output status indications</li> </ul> </li> <li>◆ Model MBS-151 MBS -48 VDC Power Supply Chassis                     <ul style="list-style-type: none"> <li>❖ designed for 19-inch rack mounting</li> <li>❖ allows easy plug-in installation of two Quad Power Supplies</li> <li>❖ supports two -48 VDC inputs, one for each Quad Power Supply</li> <li>❖ provides two sets of +5 VDC and +12.5 VDC outputs, where each set supports a fully provisioned MBS Quad (four RF Modems; one Quad Interface)</li> <li>❖ provides convenient terminal strips for wiring connections</li> </ul> </li> </ul>
<p>interfaces (MBS Power Supply Chassis)</p>	<ul style="list-style-type: none"> <li>◆ internal 12-pin connector mates with slide-in Quad Power Supply</li> <li>◆ two 3-post terminal strips for -48 VDC inputs</li> <li>◆ two 10-post terminal strips for +5 and +12.5 VDC outputs to two MBS Quads</li> </ul>

**Table 2-1** Summary of Quad P/S and MBS P/S Chassis Capabilities



## 2.2 Functional Block Diagram

The Model MBS-150 Quad -48 VDC Power Supply and MBS-151 MBS -48 VDC Power Supply Chassis are shown in Figure 2-1.



**Figure 2-1** Quad Power Supply and MBS Power Supply Chassis Block Diagram

### 2.2.1 Model MBS-150 Quad -48 VDC Power Supply

A Model MBS-150 Quad -48 VDC Power Supply is designed to plug into a Model MBS-151 MBS -48 VDC Power Supply Chassis. The Quad Power Supply can then provide +5 and +12.5 VDC outputs capable of supporting an MBS Quad fully provisioned with one Quad Interface and four RF Modems. Front-panel LEDs indicate the status of the -48 VDC input and the +5 and +12 VDC outputs. A front-panel on/off switch controls the output of the Quad Power Supply.

### 2.2.2 Model MBS-151 MBS -48 VDC Power Supply Chassis

A Model MBS-151 MBS -48 VDC Power Supply Chassis supports up to two independent Model MBS-150 Quad -48 VDC Power Supplies. The MBS Power Supply Chassis thus can provide power for the two Quads of a fully provisioned MBS Chassis. All input and output connections to the Quad Power Supplies are supported by the MBS Power Supply Chassis. The MBS Power Supply Chassis is designed to be rack mounted and offers a 12-pin connector for easy insertion of each Quad Power Supply.

## 2.3 External Interfaces

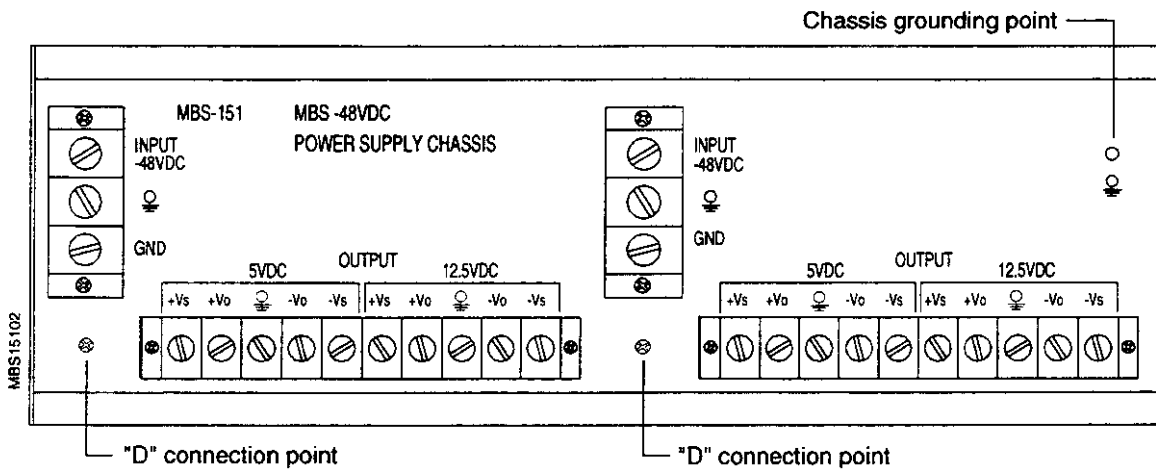
This section describes the external interfaces of the Model MBS-150 Quad -48 VDC Power Supply and Model MBS-151 MBS -48 VDC Power Supply Chassis.

### 2.3.1 Plug-in Interface

Each Quad Power Supply is designed to insert and mate to 12-pin connectors provided by the MBS Power Supply Chassis.

### 2.3.2 Rear Panel Interface

The MBS Power Supply Chassis provides two sets of terminal strips, where each set supports the input of -48 VDC power and the output of +5 and +12.5 VDC power to an MBS Quad. The back panel and terminal strips of the MBS Power Supply Chassis are shown in Figure 2-2.



**Figure 2-2** Model MBS-151 MBS -48 VDC Power Supply Chassis (rear view)

Each of the two -48 VDC inputs are supported according to the terminal strip connections indicated in Table 2-2.

MBS Power Supply Chassis Input Terminal	Wire Color (typical)
INPUT -48 VDC	Black
♀	Green
GND	Red

**Table 2-2** MBS Power Supply Chassis -48 VDC Input Power Connections

For each MBS Quad, the +5 and +12.5 VDC power outputs and sense lines for voltage regulation must be connected to the Quad power connector block terminals. Table 2-3 summarizes the connections required using one of the two Quad power harnesses provided with each MBS Chassis.

MBS Power Supply Chassis Output Terminal		Quad Power Harness		MBS Chassis Quad Power Block Terminal
		Wire Label	Wire Color	
	+Vs	1	Clear	1
	+Vo	2	Red	2
5 VDC	$\text{Q}$	3	Green/Yellow	3
	-Vo	4	Black	4
	-Vs	5	Black	5
	+Vs	6	Clear	6
	+Vo	8	Yellow	8
12.5 VDC	$\text{Q}$	9	Green/Yellow	9
	-Vo	10	Black	10
	-Vs	12	Black	12
"D" connection point (see Figure 2-2)		D		

**Table 2-3** MBS Chassis/MBS Power Supply Chassis Wiring Connections

### 2.3.3 Control

Each Quad Power Supply has an ON/OFF switch on its front panel to control the +5 VDC and +12.5 VDC outputs, as summarized in Table 2-4.

function	enables/disables +5 VDC and +12.5 VDC output
type	single-pole single-throw switch
physical location	front panel
label	<ul style="list-style-type: none"> <li>◆ ON (up position)</li> <li>◆ OFF (down position)</li> </ul>

**Table 2-4** ON/OFF

### 2.3.4 Display

Each Quad Power Supply has three front-panel LED indicators that show the status of the unit. Table 2-5 summarizes the LED status indications.

LED	Color	LED On	LED Off
-48 V	Green	-48 VDC input is present	-48 VDC input not present
+5 V	Green	+5 VDC output is present	+5 VDC output not present
+12.5 V	Green	+12.5 VDC output is present	+12.5 VDC output not present

**Table 2-5** Quad Power Supply LED Indicators

## 2.4 Application

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A Model MBS-150 Quad -48 VDC Power Supply installed in a Model MBS-151 MBS -48 VDC Power Supply Chassis provides operating power for one fully provisioned MBS Quad composed of one Quad Interface and four RF Modems. The MBS Power Supply Chassis can support two Quad Power Supplies and can thus power a complete MBS Chassis and its two Quads.

An MBS Power Supply Chassis must be installed for each MBS Chassis, and a Quad Power Supply must be installed in the MBS Power Supply Chassis for each operational Quad.

# Section 3 – Installation

This section provides detailed instructions for installation of the Model MBS-150 Quad -48 VDC Power Supply and the Model MBS-151 MBS -48 VDC Power Supply Chassis. The components are assumed to have been unpacked and inspected according to the instructions accompanying shipment. These installation instructions concern:

- ◆ tools and test equipment
- ◆ site preparation
- ◆ power supply chassis installation
- ◆ external connections
- ◆ chassis removal

## 3.1 Tools and Test Equipment

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The following tools may be required for installation of the Quad Power Supply and MBS Power Supply Chassis:

- ◆ Phillips #1 screwdriver to install chassis in 19-inch rack and to make chassis ground connections
- ◆ slotted screwdriver (6 mm blade) to make terminal strip connections
- ◆ slotted screwdriver (3 mm blade) to tighten/loosen Quad Power Supply captive screws
- ◆ voltmeter

## 3.2 Site Preparation

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Installation of the chassis involves consideration of rack space, power provision, and safety grounding.

### 3.2.1 Site Environment

Aspects of the site environment can contribute to initial and long-term system performance and reliability. The following environmental conditions are important for installation and operation of DIVA-2000 Wireless Local Loop equipment:

- ◆ adequate front clearance for racks to allow chassis installation and removal
- ◆ adequate rear clearance for racks to allow cable service and troubleshooting
- ◆ availability of adequate power for installed equipment
- ◆ adequate accessibility to AC power for test equipment
- ◆ adequate lighting
- ◆ an anti-static (electrostatic discharge) work area, complete with wrist straps, static dissipative work surfaces, and, in low humidity environments, ionizers and/or humidifiers
- ◆ adequate air treatment to remove dust and other airborne contaminants
- ◆ adequate ventilation or air conditioning to dissipate heat build-up
- ◆ a maximum ambient temperature range of 0 to +50° Celsius (+32 to +122° Fahrenheit) and an optimum temperature range of 10 to +30° Celsius (+50 to +85° Fahrenheit)
- ◆ humidity from 5% to 95%, non-condensing
- ◆ no possible exposure to water, aerosols, or steam (avoidance of overhead plumbing, sprinkler systems, steam pipes or vents, basement floors with poor drainage), subject to local fire code requirements
- ◆ minimal exposure to electrical interference and vibration, especially from transformers, motors, radio frequency generating devices, high-voltage transmission lines, or other electrical equipment
- ◆ no exposure to corrosive fumes or machine exhaust
- ◆ a minimum clearance of 3 m (10 ft.) from any reproducing or copying machine not equipped with an air filtering system

Typically, the DIVA-2000 complement of equipment will be rack-mounted, where the various chassis have been designed for installation in standard 19-inch rack assemblies. Rack assemblies should meet the following requirements:

- ◆ accessibly located to minimize cable runs and, as necessary and possible, to allow use of existing ducts or conduits
- ◆ constructed using modular parts of 16 gauge steel, aluminum, or similar materials

- ◆ rack holes to accommodate standard mounting hardware, such as “cagenuts” or be tapped to accommodate 10-32 screws
- ◆ an assembled rack must be able to stand on its own when loaded to a maximum of 100 kg
- ◆ rack frame mounting bases must allow bolting to the floor surface, as required

### 3.2.2 Rack Space

The MBS Power Supply Chassis is designed for flush mounting in a standard 19-inch rack, occupying 13.4 cm (3U) of vertical rack space. The MBS Power Supply Chassis is intended to be mounted directly below an MBS Chassis, using the integral fans of the MBS Chassis to create air flow through both chassis. At least 4.45 cm (1U) of rack space below the MBS Power Supply Chassis must be left empty to provide ventilation, where empty rack space may be covered with blank panels. The rack assembly must thus provide at least 4U of free rack space below the MBS Chassis for installation of the MBS Power Supply Chassis.

The MBS Power Supply Chassis is 30 cm deep. In general, access to the rear of the rack assembly is required during the installation and for any post-installation test and troubleshooting. Allow at least 10 cm (4”) of clearance from the rear of the chassis for the connectors and cables.

### 3.2.3 Power

The installation site must provide -48 VDC input power to the MBS Power Supply Chassis. It is recommended that each of the two DC input power connections to the MBS Power Supply Chassis use 10 to 14 AWG wire and that each be on its own fast-blow fused 10 Amp circuit.

### 3.2.4 Safety Grounding

The installation site must offer a common earth ground to provide proper electro-static discharge suppression, electrical noise suppression, and lightning suppression. This ground should be part of an overall grounding system encompassing all DIVA-2000 and associated base station site equipment, including the rack assemblies, antennas, tower, and primary power electrical system. Equipment within the same rack assembly should be connected to the same grounding point to ensure that all electronics are at the same earth ground potential. If equipment is separated by greater than 30 meters (100 feet), however, separate grounding points should be used.

A proper ground is characterized as follows:

- ◆ the connection to the common earth ground uses a conductor of suitable material (such as 12 AWG or heavier copper cabling)
- ◆ the grounding wire conductor must be able to conduct power surges to earth without breaking down or short-circuiting to earth through other equipment or conduits

- ◆ total resistance of the grounding wire conduction path should be less than 1 Ohm
- ◆ grounding wire lengths should be kept as short as possible; if conductor lengths exceed 30 meters (100 feet), additional grounding points should be installed
- ◆ each chassis must have its own grounding wire connecting it to the common grounding point — daisy chain grounding is not recommended
- ◆ the grounding point should be part of the installation site's overall grounding system. For example, the grounding point can be an earth-rod electrode of suitable material at least 15 mm (1/2") thick that has been driven at least 1 meter into the ground or a copper cold water pipe connected to an all metal water supply system

Follow these general rules when installing a grounding wire:

- ◆ use stranded or braided copper wire as a grounding wire whenever possible
- ◆ use 12 AWG copper wire for runs of up to 15 meters (50 feet); use 10 AWG copper wire for runs of up to 30 meters (100 feet); if necessary, use 6 or 8 AWG copper wire for runs greater than 30 meters (100 feet)
- ◆ avoid sharp bends and coiling of excess grounding wire which can increase the impedance of the grounding path

**CAUTION** Failure to provide an adequate ground connection can lead to intermittent system or component failure, complete system or component failure, and potentially severe system or component damage.

### 3.3 Chassis Installation

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The chassis should be installed in a 19-inch rack with all Quad Power Supplies removed. If the chassis contains Quad Power Supplies, they should be removed.

Place mounting hardware in the rack assembly corresponding to the spacing of the chassis support slots. Proper vertical orientation of the chassis can be determined by observation of the backplanes from the front of the chassis as illustrated in Figure 1-2 or by observation of the rear terminal strip connectors and labels as illustrated in Figure 1-3. Securely fasten the chassis to the rack with the open side of the chassis (the front of the chassis) facing forward. Be sure to observe the rack space requirements and constraints described in Section 3.2.2.

Figure 3-1 illustrates installation of the MBS Power Supply Chassis directly below the MBS Chassis.

**CAUTION** Do not place or install items (fuse panels, test equipment, or other assemblies) which may block the air flow through the upper or lower surface of the MBS Power Supply Chassis. Obstructed air flow may cause the Quad Power Supplies to overheat and may result in damage to the equipment.



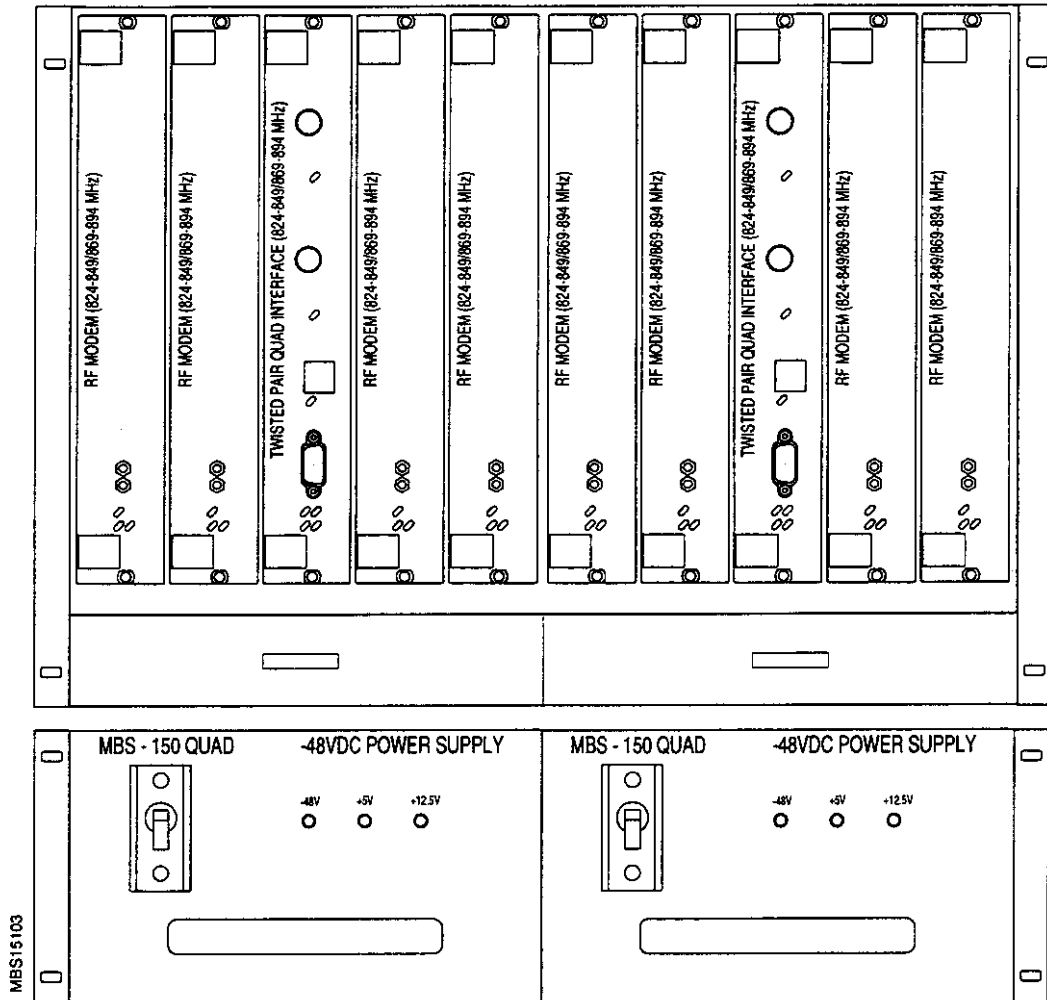


Figure 3-1 Rack Installation of MBS Power Supply Chassis and MBS Chassis

### 3.4 External Connections

All connections to/from the MBS Power Supply Chassis are through terminal strips on the chassis rear panel, as shown in Figure 3-2. There are two sets of output terminal strips and two sets of input terminal strips, corresponding to each of the two MBS Quads that can be supported by the MBS Power Supply Chassis. For safety, connections should first be made to each MBS Quad that is to be powered and then to the -48 VDC input.

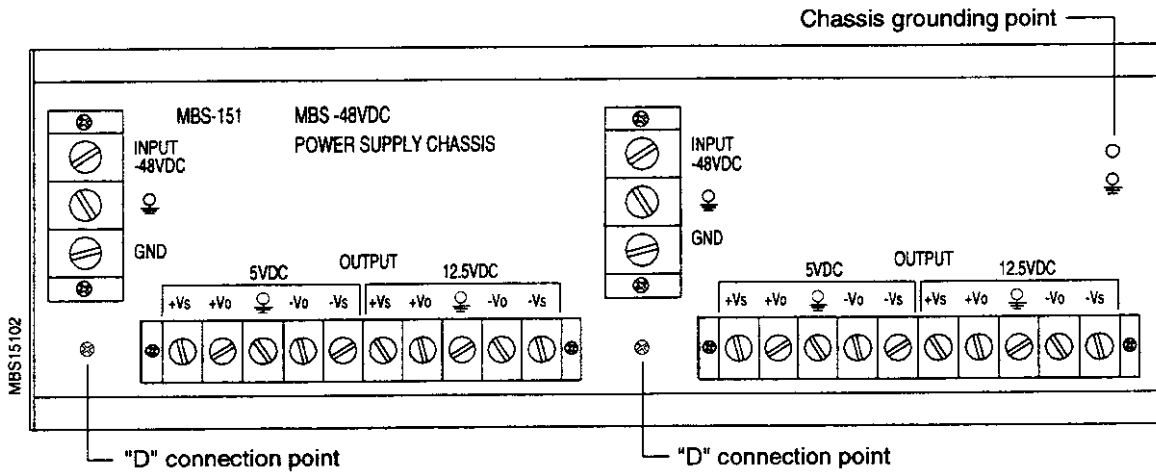


Figure 3-2 MBS Power Supply Chassis (rear view)

### 3.4.1 Output Power Connections

Each MBS Chassis is shipped with two Quad power harnesses to support connection of the chassis' two Quads to the MBS Power Supply Chassis. The connections between each Quad and the MBS Power Supply Chassis are listed in Table 3-2. In the table and on the rear panel of the MBS Power Supply Chassis, “Vo” denotes output line; “Vs” denotes sense line; “+V” denotes positive polarity line; “-V” denotes negative polarity line; and  $\text{⏏}$  denotes the power ground line as established by chassis and installation site grounding.

MBS Power Supply Chassis Output Terminal		Quad Power Harness		MBS Chassis Quad Power Block Terminal
		Wire Label	Wire Color	
	+Vs	1	Clear	1
	+Vo	2	Red	2
5 VDC	$\text{⏏}$	3	Green/Yellow	3
	-Vo	4	Black	4
	-Vs	5	Black	5
	+Vs	6	Clear	6
	+Vo	8	Yellow	8
12.5 VDC	$\text{⏏}$	9	Green/Yellow	9
	-Vo	10	Black	10
	-Vs	12	Black	12
"D" connection point (see Figure 3-2)		D		

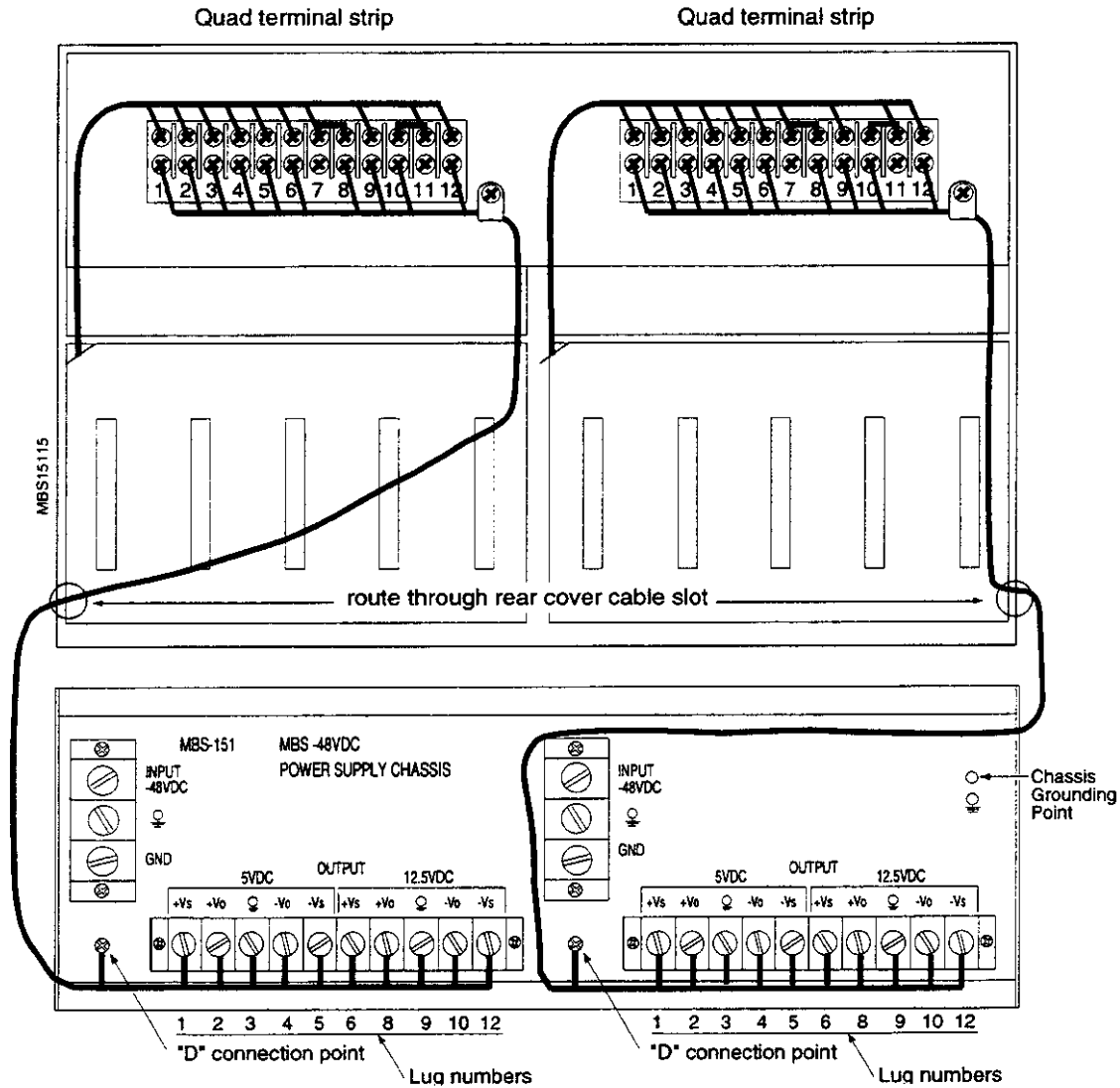
**Table 3-1** MBS Chassis/MBS Power Supply Chassis Wiring Connections

To connect the MBS Power Supply Chassis to the two Quads of an MBS Chassis, perform the following steps for each of the two output terminal strips:

1. If the MBS Power Supply Chassis has already been installed, be sure that the -48 VDC input power to the MBS Power Supply Chassis is turned off at the applicable switch or circuit breaker and that no Quad Power Supplies have been inserted into the chassis.
2. Connect the Quad power harness lead labeled “D” to the MBS Power Supply Chassis ground terminal identified in Figure 3-2.
3. Connect the #10 spade lugs of the Quad power harness to the MBS Power Supply Chassis output terminals according to the connections indicated in Table 3-1.
4. Connect the #6 spade lugs of the Quad power harness to the MBS Chassis terminals according to the connections indicated in Table 3-1.
5. Securely tighten all connections.

**CAUTION** To avoid risk of shock, ensure that -48 VDC input power to the MBS Power Supply Chassis is turned off at the applicable switch or circuit breaker before installing the unit.

Figure 3-3 illustrates the correct connections between the MBS Chassis and the MBS Power Supply Chassis.



**Figure 3-3** Quad Power Harness Connections

### 3.4.2 Input Power Connections

The two -48 VDC input power terminal strip connections are listed in Table 3-2. In the table and on the rear panel of the MBS Power Supply Chassis, “-48 VDC” denotes the negative polarity input voltage line; “GND” denotes the return voltage line; and  $\text{⏏}$  denotes the safety ground as established by chassis and site grounding.

Connection to the  $\text{⏏}$  terminal may not be required; to avoid possible grounding problems, do not bridge the “GND” and  $\text{⏏}$  terminals

MBS Power Supply Chassis Input Terminal	Wire Color (typical)
INPUT -48 VDC	Black
$\text{⏏}$	Green (or no connection)
GND	Red

**Table 3-2** MBS Power Supply Chassis -48 VDC Input Power Connections

To connect the MBS Power Supply Chassis to -48 VDC input power, perform the following steps for each of the two input terminal strips:

1. Be sure that the -48 VDC input power to the MBS Power Supply Chassis is turned off at the applicable switch or circuit breaker and that no Quad Power Supplies have been inserted into the chassis.
2. Connect a grounding wire from the chassis ground terminal at the upper right of the rear panel to the installation site grounding point and, if appropriate, from the  $\text{⏏}$  terminal of the -48 VDC input power terminal strip.
3. Connect the -48 VDC input power according to the connections indicated in Table 3-2. Ensure that the correct polarity is observed.
4. Securely tighten all connections.

**CAUTION** To avoid risk of shock, ensure that -48 VDC input power to the MBS Power Supply Chassis is turned off at the applicable switch or circuit breaker before attempting to install it.

### 3.5 Chassis Removal

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If the chassis must be removed for service or replacement, perform the following steps:

1. Remove all Quad Power Supply modules from the MBS Power Supply Chassis.
2. Turn off -48 VDC input power to the MBS Power Supply Chassis at the applicable switch or circuit breaker.
3. Disconnect all wiring from the rear panel of the MBS Power Supply Chassis: Quad power harnesses, -48 VDC input power connections, and grounding wire.
4. Remove the mounting screws from the rack and carefully remove the MBS Power Supply Chassis from the rack assembly.
5. If the MBS Power Supply Chassis is to be shipped, pack it according to instructions supplied with the original shipping materials.

**CAUTION** To avoid risk of shock, ensure that -48 VDC input power to the MBS Power Supply Chassis is turned off at the applicable switch or circuit breaker before attempting to remove it.

# Section 4 – Operation

This section describes use of the Model MBS-150 Quad -48 VDC Power Supply and Model MBS-151 MBS -48 VDC Power Supply Chassis. The DIVA-2000 System Management Software (SMS) does not directly control, configure, or monitor the Quad Power Supply or MBS Power Supply Chassis. Operation of the Quad Power Supply, however, consists of:

- ◆ insertion of the Quad Power Supply into the MBS Power Supply Chassis
- ◆ operation and verification of the Quad Power Supply
- ◆ removal of the Quad Power Supply as may be required for service or replacement

## 4.1 Quad Power Supply Insertion

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The Quad Power Supplies may be inserted or removed independently of each other as needed for troubleshooting or replacement. To insert the Quad Power Supply in an installed MBS Power Supply Chassis, perform the following steps:

1. Verify that the Quad Power Supply ON/OFF switch is OFF (down position).
2. Gently slide the Quad Power Supply into an open slot of the MBS Power Supply Chassis until the module connector seats with the chassis connector.
3. Verify that the -48 VDC indicator is on.
4. Tighten the four captive screws that hold the Quad Power Supply in the MBS Power Supply Chassis.

## 4.2 Operation and Verification

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The -48 VDC indicator on each inserted Quad Power Supply will illuminate if the -48 VDC input power is wired correctly to the input terminal strip and the Quad Power Supply is firmly seated in the MBS Power Supply Chassis.

To enable the +5 VDC and +12.5 VDC outputs and verify proper operation of the Quad Power Supply, perform the following steps:

1. Turn the ON/OFF switch of the Quad Power Supply to ON (up position).
2. Verify that the +5 and +12.5 VDC indicators are on.

The +5 VDC and +12.5 VDC indicators on each inserted Quad Power Supply will remain illuminated as long as the Quad Power Supply is switched ON and properly functioning. To at any time cut off power to the Quad, turn the ON/OFF switch of the Quad Power Supply to OFF (down position). The +5 VDC and +12.5 VDC indicators will also turn off.

### **4.3 Quad Power Supply Removal**

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If a Quad Power Supply must be removed for service or replacement, perform the following steps:

1. Turn the ON/OFF switch of the Quad Power Supply to OFF (down position).
2. Loosen the four captive screws that secure the Quad Power Supply to the MBS Power Supply Chassis.
3. Grasp the handle and gently pull the Quad Power Supply straight out of the MBS Power Supply Chassis.



# Section 5 – Troubleshooting

The intent of troubleshooting a Model MBS-150 Quad -48 VDC Power Supply and Model MBS-151 MBS -48 VDC Power Supply Chassis is to locate the source of any difficulty and, as needed, replace the faulty component. This section addresses symptoms and recommended actions to be taken in the event of a fault.

**CAUTION** No internal (component-level) testing or repairs should be attempted. Unauthorized testing or repairs may void the equipment warranty; in addition, unauthorized repairs may void the regulatory approvals.

Table 5-1 outlines the faults that may accompany insertion of the Quad Power Supply into the MBS Power Supply Chassis.

Symptom	Action
-48 VDC indicator is not on	<ul style="list-style-type: none"> <li>◆ remove Quad Power Supply and re-insert in MBS Power Supply Chassis to verify that Quad Power Supply is firmly seated</li> <li>◆ check -48 VDC input connections at MBS Power Supply Chassis rear panel</li> <li>◆ replace Quad Power Supply</li> </ul>
<ul style="list-style-type: none"> <li>◆ -48 VDC indicator is on</li> <li>◆ +5 VDC indicator and +12.5 VDC indicator are both off</li> </ul>	<ul style="list-style-type: none"> <li>◆ verify that ON/OFF switch is ON (up)</li> <li>◆ turn switch OFF (down) and ON (up)</li> <li>◆ remove Quad Power Supply and re-insert in MBS Power Supply Chassis to verify that Quad Power Supply is firmly seated</li> <li>◆ replace Quad Power Supply</li> </ul>
<ul style="list-style-type: none"> <li>◆ -48 VDC indicator is on</li> <li>◆ one output indicator (+5 or +12.5 VDC) is off; other indicator is on</li> </ul>	<ul style="list-style-type: none"> <li>◆ verify that ON/OFF switch is ON (up)</li> <li>◆ turn switch OFF (down) and ON (up)</li> <li>◆ remove Quad Power Supply and re-insert in MBS Power Supply Chassis to verify that Quad Power Supply is firmly seated</li> <li>◆ replace Quad Power Supply</li> </ul>
<ul style="list-style-type: none"> <li>◆ -48 VDC indicator is on</li> <li>◆ +5 VDC indicator and +12.5 VDC indicator are both on</li> <li>◆ MBS Quad does not have power</li> </ul>	<ul style="list-style-type: none"> <li>◆ verify that Quad Power Supply has been inserted in MBS Power Supply Chassis slot associated with the MBS Quad</li> <li>◆ check Quad power harness connections at MBS Chassis</li> <li>◆ check Quad power harness connections at MBS Power Supply Chassis</li> <li>◆ replace Quad Power Supply</li> <li>◆ replace MBS Chassis</li> <li>◆ replace MBS Power Supply Chassis</li> </ul>

**Table 5-1** Faults Upon Quad Power Supply Insertion

