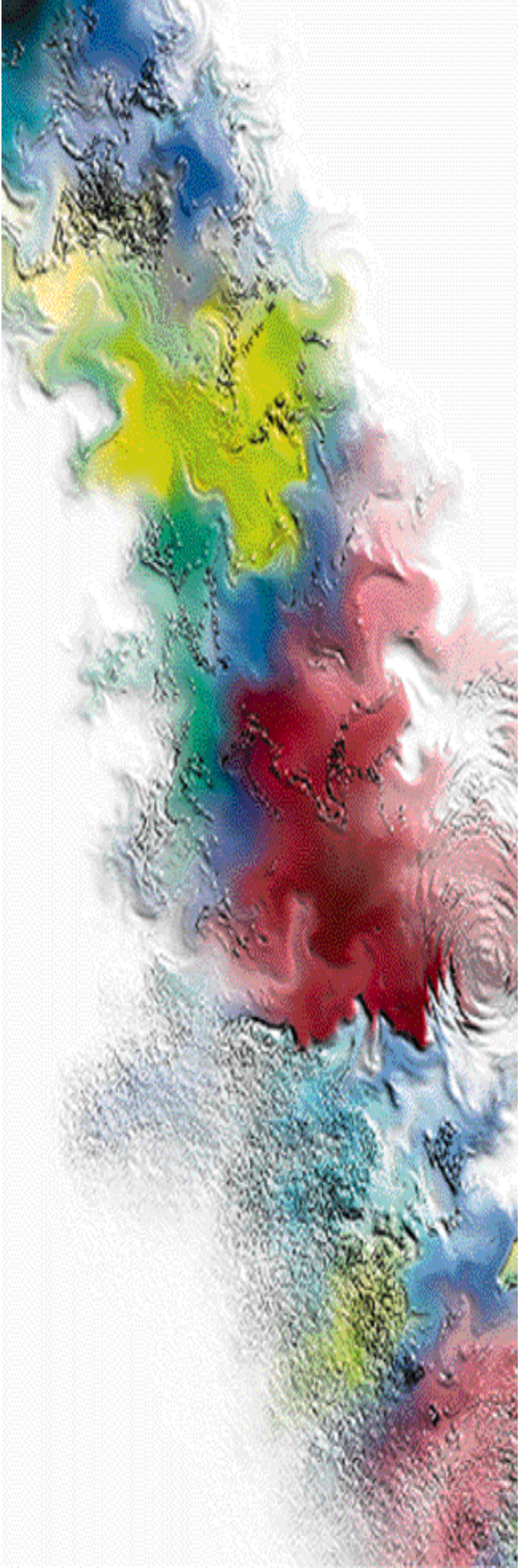

# RF-Conductor!™ Controller

## Models 3200 and 3210

Installation

Series: Wireless Messaging System

System Version: WMS 3.0
Software Version: 1.5

Issue Date: January 1999

6880494G53-B

MOTOROLA

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MOTOROLA

# Foreword

## General Information

The information in this manual has been reviewed for accuracy. However, no responsibility is assumed for inaccuracies. Motorola® reserves the right to make changes to any products discussed herein. The information in this document is subject to change without notice. Motorola assumes no liability for hardware or software damage or loss of data because of errors or omissions in this manual. Motorola does not assume any liability arising from the application or use of any products or circuits described herein. Neither does Motorola convey any license under its patents or right of others.

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**Paging Systems Group**
**Multimedia Publications Department**
**5401 North Beach St., MS E230-A**
**Fort Worth, TX 76137-2794**

or telephone: **(817) 245-4260**

To access on-line electronic information (BBS) for service notices and the latest software releases, call the Paging One-Call-Support™ Center. To request additional manuals or parts, please contact the Motorola Americas Parts Division:

telephone: **(800) 422-4210**
facsimile: **(847) 538-8198**

To request a part number, contact the Parts Identification Group:

telephone: **(847) 538-0021**

For Motorola Infrastructure and communicator test equipment, contact the Motorola Test Equipment Center:

telephone: **(800) 505-8378**

## Global Service Organization

Motorola provides Infrastructure and communicator technical support through authorized or company-owned Service Centers. Motorola also provides service for communicators on a contract basis. For contract service information, please contact your local Motorola representative or the Paging One-Call-Support Center:

**Motorola, Inc.**
**Paging One-Call-Support Center**
**5401 North Beach St., MS E112**
**Fort Worth, TX 76137-2794**

telephone: **(800) 520-7243** or
**(817) 245-4663**
facsimile: **(817) 245-2141**

## Service Training

Motorola, through its Advanced Messaging Technical Training Group in Fort Worth, Texas, offers courses on communicators, messaging switches, transmitters, and receivers. These courses are taught on the site or at a customer's location.

Students learn to install, configure, and maintain Motorola messaging systems. The classrooms at Motorola are equipped to ensure hands-on experience in practical lab exercises.

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To obtain a course catalog or scheduling information, please call (817) 245-2184 or (800) 724-3588 and ask for the training coordinator.

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# Important Safety Information

The installation, maintenance, and / or operation of this equipment may present potentially unsafe conditions, including, but not limited to, electrical shock, improper voltage to components, and improper operation that can cause personal injury, death or damage to property.

**Read Instructions:** Read all the safety instructions before operating the equipment. Retain these safety instructions for future reference. Specialized procedures and instructions are required and must be followed. Also, all applicable safety procedures, such as Occupational, Safety, and Health Administration (OSHA) requirements, National Electric Code Requirements, local code requirements, safe working practices, and good judgement must be used by personnel.

**Heed Admonitions**: Adhere to all warnings on the equipment and in the operating instructions. Follow all operating and use instructions. Two safety admonitions are used in this instruction manual to indicate:

- Equipment damage–


***This safety admonition applies to an operating or maintenance procedure, practice or condition which, if not strictly observed, could result in damage to the equipment or database.***

- Personal injury or injury that may result in death–


***This safety admonition applies to an operating or maintenance procedure, practice or condition which, if not strictly observed, could result in serious personal injury or death.***

**Mounting**: Mount the equipment only as recommended by the manufacturer. Situate the equipment away from heat sources such as radiators, heat registers, stoves, or other equipment (including amplifiers) that produces heat.

**Power Sources and Grounding:** Connect the equipment to the type of power source described in the installation instructions or as marked on the equipment. Take precautions to avoid defeating the grounding or polarization provisions of the equipment. Disconnect the power to the equipment by a circuit breaker when left unused for long periods of time.

**Cleaning:** Clean the outside of the equipment by using only a damp cloth. Do not immerse the equipment in any type of liquid, including water. Do not use liquid cleaners or aerosol cleaners. Dirt or other foreign matter should not be allowed to accumulate in the interior of the enclosure.

**Damage Requiring Service:** Do not attempt to perform service functions that are not described in the operating instructions. All other servicing should be referred to qualified service personnel.

**Telephone Line Installation:** All telephone line connections to the equipment should be accomplished with the telephone lines disconnected from the network interface.

Motorola is not responsible for static damage to equipment not sold under the Motorola logo.

# PSG Limited Equipment Warranty for Non-U.S. and Non-Canadian Markets

## General Terms

1. Motorola Paging Systems Group (PSG) manufactured infrastructure equipment is warranted to be free from defects in material and workmanship to the original purchaser only as set forth herein.

2. This Warranty covers only that equipment identified in paragraph 1 that is used in the manner and for the purpose intended.

3. This Warranty specifically excludes any and all software products from any source. PSG software products are the subject of the PSG Software Maintenance Program, addressed separately.

4. This Warranty shall commence 30 days after the date of shipment of the PSG infrastructure equipment.

5. The term of Warranty for all PSG infrastructure equipment is one (1) year parts and labor.

## Limitations And Qualifications of Warranty

6. LIMITATION—THE REMEDY UNDER THIS WARRANTY IS LIMITED TO MOTOROLA'S REPAIR OR REPLACEMENT OF DEFECTIVE EQUIPMENT. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

7. This Warranty does not cover, nor include a remedy for, damages, defects or failure caused by:
   a. The equipment or any part of it NOT having been installed, modified, adapted, repaired, maintained, transported or relocated in accordance with Motorola technical specifications and instructions;

b. Storage not conforming to the Shipping, Receiving, and Installation section of the applicable Motorola Equipment Manual;

c. Environmental characteristics not conforming to the applicable Motorola Equipment Manual;

d. Nonconformance with the Equipment Operating Instructions in the applicable Motorola Equipment Manual;

e. External causes including, without limitation, use in conjunction with incompatible equipment, unless such use was with or under Motorola's prior written consent;

f. Cosmetic damages;

g. Damages caused by external electrical stress;

h. Lightning;

i. Accidental damage;

j. Negligence, neglect, mishandling, abuse, or misuse;

k. Force Majeure; and

l. Damage caused by Shipper(s).

## Return of Equipment

8. If an item of PSG infrastructure equipment malfunctions or fails in normal use within the Warranty Period:

   a. The Customer shall promptly notify the nearest Motorola Area Customer Care Center (CCC) of the problem and provide the serial number of the defective item. Motorola shall then, at its option, either resolve the problem over the telephone or issue a Return Authorization Number to the Customer. The Customer shall, at its cost, ship the item to the Motorola Area CCC location designated at the time the Return Authorization Number is issued;

   b. The Return Authorization Number must be shown on the label attached to each returned item. A description of the fault must accompany each returned item. The returned item must be properly packed, and the insurance and shipping charges prepaid;

   c. Motorola shall either repair or replace the returned item. The replacement item may be new or refurbished. When refurbished, it shall be equivalent to new in operation. When a returned item is replaced by Motorola, the returned item shall become the property of Motorola;

d. Subject to all the terms of this Warranty, part availability and the clearance of Customs, Motorola shall complete the repair or exchange of Motorola-manufactured equipment returned under Warranty within fifteen (15) working days of receipt of the equipment;

e. Motorola shall, at its cost, ship the repaired or replaced item to the Customer. If the Customer has requested Express Shipping, the Customer shall pay Motorola an expedite fee; and

f. Equipment which is repaired or replaced by Motorola shall be free of defects in material and workmanship for the remainder of the original Warranty, or for 90 days from the date of repair or replacement, whichever is longer. All other terms of this Warranty shall apply to such repairs or replacements.

## Advance Replacements

9. During the Warranty Period:

   a. At the Customer's request and for the Customer's convenience, Motorola may supply the Customer with Advance Replacement Parts (parts furnished in advance of Motorola's receipt of defective items). Motorola's provision of such parts will be contingent on part availability and on the Customer's maintaining a satisfactory credit standing with Motorola.

   b. Motorola shall ship the Advance Replacement Parts requested by the Customer within 48 hours of Motorola determining that such service is appropriate, if stock is available at the Motorola service location. If stock is not available, Motorola will make reasonable efforts to locate and provide it to the Customer within ten (10) working days.

   c. The Customer shall return defective items to the Motorola Area Customer Care Center within thirty (30) days from the date of shipment of the Advance Replacement Parts; failing which, Motorola shall bill and the Customer shall pay the full current list price of the Advance Replacement Parts.

10. To secure payment of the list price of Advance Replacement Parts if the defective items are not returned to Motorola, the Customer hereby grants to Motorola a purchase money security interest in any Advance Replacement Parts.

## Excluded Equipment

11. The following equipment is excluded from this Warranty and is covered instead by the Original Equipment Manufacturer's Warranty:
    a. Equipment which is not an integral part of a basic system configuration and which is not manufactured by Motorola, such as batteries and satellite dish LNBs;
    b. Peripheral equipment such as printers, modems, data loggers, video display terminals, and lightning and surge protectors; and
    c. Equipment which is not listed in Motorola's Price Book.

## Force Majeure

12. Motorola shall not be responsible for failure to discharge its obligations under this Warranty due to delays by suppliers, material shortages; strikes, lockouts or other labor disputes; disturbances, government regulations, floods, lightning, fires, wars, accidents, acts of God, and any other causes beyond Motorola's reasonable control.

## Default and Termination

13. Motorola shall have the right to immediately terminate this Warranty, and to suspend its performance under this Warranty, upon notification to the Customer if the Customer:
    a. Assigns or transfers the Customer's rights or obligations under this Warranty without the prior written consent of Motorola; or
    b. Within thirty (30) days of written demand by Motorola, fails to pay (1) any charge for Advance Replacement Parts supplied under this Warranty, if the Customer has not timely returned the defective items, or (2) any other amount that may be due.

14. Notwithstanding any such termination of the Warranty to the Customer, the Customer shall remain responsible for all amounts then due.

## Limitation of Liability

15. IN NO EVENT SHALL MOTOROLA BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THIS WARRANTY, EVEN IF MOTOROLA HAS BEEN ADVISED OF THE POSSIBILITY THEREOF, INCLUDING, WITHOUT LIMITATION, LOST PROFITS AND REVENUES, FAILURE TO REALIZE EXPECTED SAVINGS, LOST DATA OR ANY CLAIMS AGAINST THE CUSTOMER BY A THIRD PARTY.

# PSG Limited Equipment Warranty for U.S. And Canadian Markets

## General Terms

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2. This Warranty covers only that equipment identified in paragraph 1 that is used in the manner and for the purpose intended.

3. This Warranty specifically excludes any and all software products from any source. PSG software products are the subject of the PSG Software Maintenance Program, addressed separately.

4. This Warranty shall commence 30 days after the date of shipment of the PSG infrastructure equipment.

5. The term of Warranty for all PSG infrastructure equipment, except for AlphaMate® 250 paging entry terminal products, is one (1) year parts and labor. The term of Warranty for AlphaMate 250 paging entry terminals is one (1) year parts and 120 days labor in Motorola PSG-authorized service centers. In-field labor for warranty claims (excluding AlphaMate 250 products) will be provided by Motorola PSG-authorized service centers during normal business hours.

## Limitations and Qualifications of Warranty

6. LIMITATION—THE REMEDY UNDER THIS WARRANTY IS LIMITED TO MOTOROLA'S REPAIR OR REPLACEMENT OF DEFECTIVE EQUIPMENT. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

7. This Warranty does not cover, nor include a remedy for, damages, defects or failure caused by:
   a. The equipment or any part of it NOT having been installed, modified, adapted, repaired, maintained, transported or relocated in accordance with Motorola technical specifications and instructions;
   b. Storage not conforming to the Shipping, Receiving, and Installation section of the applicable Motorola Equipment Manual;
   c. Environmental characteristics not conforming to the applicable Motorola Equipment Manual;
   d. Nonconformance with the Equipment Operating Instructions in the applicable Motorola Equipment Manual;
   e. External causes including, without limitation, use in conjunction with incompatible equipment, unless such use was with or under Motorola's prior written consent;
   f. Cosmetic damages;
   g. Damages caused by external electrical stress;
   h. Lightning;
   i. Accidental damage;
   j. Negligence, neglect, mishandling, abuse or misuse;
   k. Force Majeure; and
   l. Damage caused by Shipper(s).

## Return of Equipment

8. If an item of PSG infrastructure equipment malfunctions or fails in normal use within the Warranty Period:
   a. The Customer shall promptly notify the Motorola Paging One-Call-Support™ Center at 1-800-520-PAGE (7243) as to the problem and provide the serial number of the defective item. Motorola shall, at its option, either resolve the problem over the telephone or issue a Return Authorization Number to the Customer. The Customer shall, at its cost, ship the item to the Motorola Paging One-Call-Support Center location designated at the time the Return Authorization Number is issued;

b. The Return Authorization Number must be shown on the label attached to each returned item. A description of the fault must accompany each returned item. The returned item must be properly packed, and the insurance and shipping charges prepaid;

c. Motorola shall either repair or replace the returned item. The replacement item may be new or refurbished. When refurbished, it shall be equivalent to new in operation. When a returned item is replaced by Motorola, the returned item shall become the property of Motorola;

d. Subject to all the terms of this Warranty and to part availability, Motorola shall complete the repair or exchange of Motorola-manufactured equipment returned under Warranty within ten (10) working days of receipt of the equipment;

e. Motorola shall, at its cost, ship the repaired or replaced item to the Customer. If the Customer has requested Express Shipping, the Customer shall pay Motorola an expedite fee; and

f. Equipment which is repaired or replaced by Motorola shall be free of defects in material and workmanship for the remainder of the original Warranty, or for 90 days from the date of repair or replacement, whichever is longer. All other terms of this Warranty shall apply to such repairs or replacements.

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c. The Customer shall return defective items to Motorola within thirty (30) days from the date of shipment of the Advance Replacement Parts; failing which, Motorola shall bill and the Customer shall pay the full current list price of the Advance Replacement Parts.

10. To secure payment of the list price of Advance Replacement Parts if the defective items are not returned to Motorola, the Customer hereby grants to Motorola a purchase money security interest in any Advance Replacement Parts.

## Telephone Technical Assistance

11. During the Warranty Period, Motorola will provide the Customer with over-the-telephone technical fault analysis free of labor charges. The Customer may call the Paging One-Call-Support Center at 1-800-520-PAGE (7243) for assistance. For warranty calls in excess of 15 per location per month or for non-warranty calls, Motorola shall charge the Customer per Motorola's then-current labor rates.

## Excluded Equipment

12. The following equipment is excluded from this Warranty and is covered instead by the Original Equipment Manufacturer's Warranty:
    a. Equipment which is not an integral part of a basic system configuration and which is not manufactured by Motorola, such as batteries and satellite dish LNBs;
    b. Peripheral equipment such as printers, modems, data loggers, video display terminals, and lightning and surge protectors; and
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## Default and Termination

14. Motorola shall have the right to immediately terminate this Warranty, and to suspend its performance under this Warranty, upon notification to the Customer if the Customer:
    a. Assigns or transfers the Customer's rights or obligations under this Warranty without the prior written consent of Motorola; or
    b. Within thirty (30) days of written demand by Motorola, fails to pay (1) any charge for Advance Replacement Parts supplied under this Warranty, if the Customer has not timely returned the defective items, or (2) any other amount that may be due.

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## Limitation of Liability

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# Contents

# Figures

# Tables

# Introduction

This manual describes how to install the RF-Conductor! (RF-C!) controller. It is intended to assist persons with a technical background in digital and analog circuits and a general knowledge of paging system operations.

This manual contains the following sections:

- Chapter 1, "Introduction" — This section provides a brief description of the purpose of this manual, a list of the manual's sections and their functions, and a list of related publications.
- Chapter 2, "System Description" — This section provides an overview of the RF-C! controller, diagrams, specifications, a basic operational description, a list of RF-C! controller components along with a faceplate view of each component, and LED and connector information.
- Chapter 3, "Module Installation or Replacement" — This section discusses how to remove and install the RF-C! controller components and other components located in the RF-C! controller cabinet.
- Chapter 4, "Troubleshooting" — This section describes some problems that might arise, and how to solve them.
- Appendix A, "Abbreviations and Acronyms" — This section provides a list of definitions for acronyms and terms used in this manual.
- Appendix B, "Terminal Server Configuration" —This section contains information on configuring the terminal server.
- Appendix C, "Software Installation"— This section provides instructions for installing the RF-C software.
- Appendix D, "SuperStream Connection Pinouts"— This section contains pinout information for SuperStream connections.

# Related Publications

Related publications include:

- *RF-Conductor!™ Controller Administration*, Motorola part number 6880494G54
- *RF-Conductor! NIU Remote Configuration*, Motorola part number 6880494G55

# System Description

## System Overview

The RF-C! controller is a high-speed, high-capacity paging system controller. It includes a SPARC® 10 or SPARC® 20 microcomputer for local control across a standard VME bus. The RF-C! controller operates using the UNIX® (Solaris™) operating system.

The RF-C! controller component mounts in an industry-standard, 19-inch chassis with two VME-compatible backplanes and eight additional slots above for vertical-mounted peripheral devices (see Figure 2-1 and Figure 2-2).

Each side of the redundant RF-C! controller contains:

- A lightweight, aluminum chassis comprised of one internal VME backplanes that provide a 10-slot, slide-mount enclosure
- SPARC 10 or SPARC 20 microprocessor
- Four synchronous outputs, each capable of 76.8 kbps, that use the SuperStream™ protocol
- Support for 1600, 3200, and 6400 bps Flex paging protocols
- Support for POCSAG 512, 1200, and 2400 paging protocols
- Support for the Telocator Network Paging Protocol (TNPP) from the terminal server
- 64 MB of RAM for each processor board
- RS-232C serial ports for the Global Positioning System (GPS) receiver and the RF-C! controller console
- A 2.1-GB internal SCSI hard disk drive
- A 4-GB digital audio tape (DAT) drive
- A quad-spin CD-ROM drive
- An Ethernet® transceiver (AUI) port
- One general-purpose Input / Output (I / O) port (2 relays)
- A GPS reference

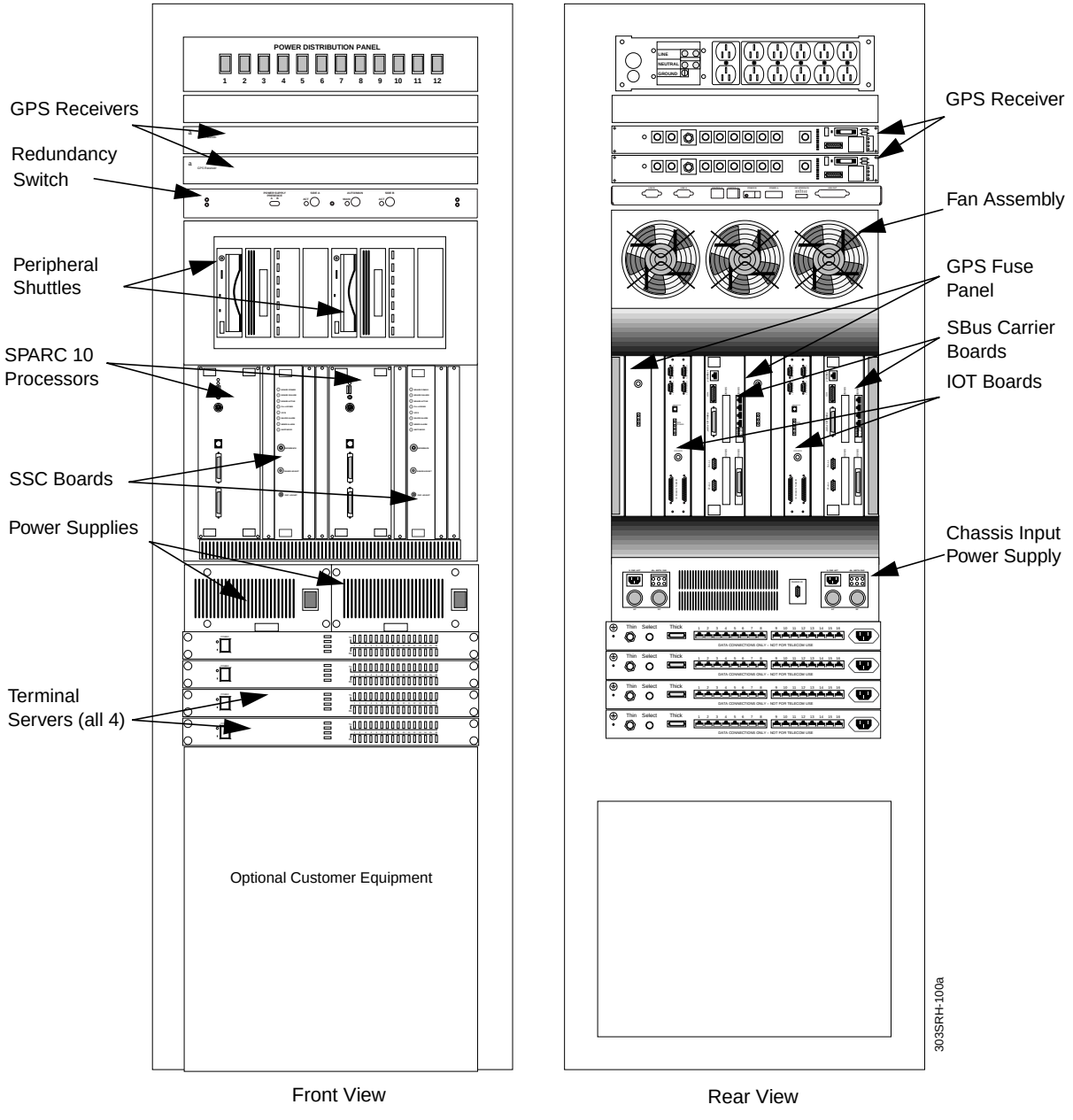



*Figure 2-1: Redundant RF-C! Controller—Typical Configuration with SPARC 10 Processor*

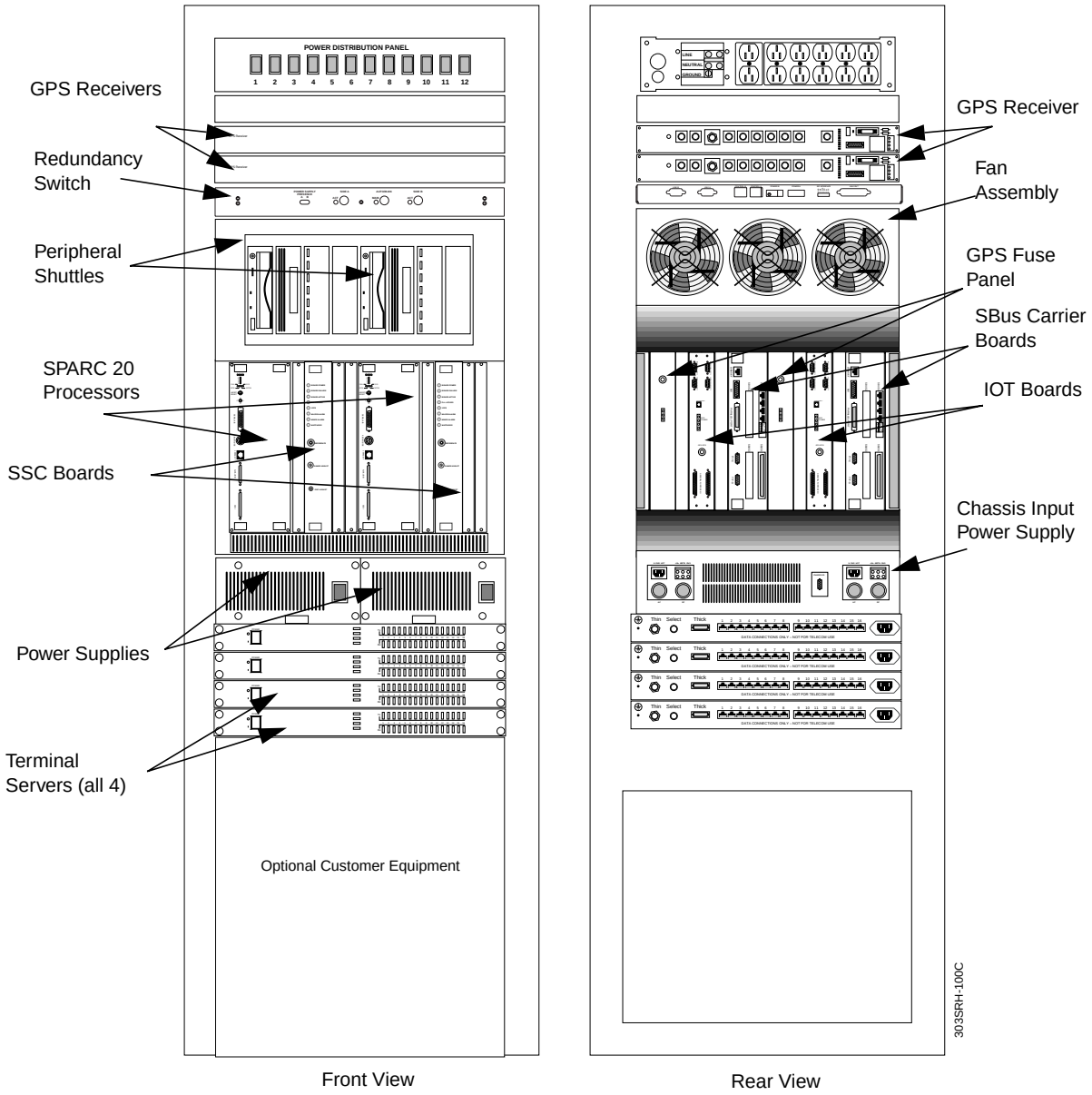



*Figure 2-2: Redundant RF-C! Controller—Typical Configuration with SPARC 20 Processor*

# Specifications

This section describes the mechanical (see Table 2-1 and Table 2-2), electrical (see Table 2-3), and environmental (see Table 2-4) specifications for the RF-C! controller.

*Table 2-1: Internal Mechanical Specifications*

| Item | Description |
|---|---|
| **Physical dimensions** | Height: 26.25 in. (66.68 cm)<br>Width: 19 in. (48.26 cm)<br>Depth: 20.5 in. (52.07 cm) |
| **Total weight (fully loaded)** | 105 lb (47.63 kg) |
| **Mounting** | Standard 19-in. chassis with flanges |
| **Power supply** | A plug-in, front-accessible power supply shuttle |
| **Board slots** | Twenty slots capable of accepting twenty 160-mm vertical plug-in boards (ten slots for the primary side, ten slots for the backup side) |
| **Peripheral slots** | Two shuttles for eight 5 1/4-in. shuttle drives vertically mounted over the subchassis |
| **Fans** | Three; 130 cfm (0 in. H2O static pressure) |

*Table 2-2: Peripheral Device Mechanical Specifications*

| Item | Description |
|---|---|
| **Universal redundancy control** | Height: 1.75 in (4.45 cm) |
| **GPS receivers (2)** | Height: 1.75 in (4.42 cm) each |
| **16-port terminal servers (1-4)** | Height: 1.75 in (4.42 cm) each |

*Table 2-3: Electrical Specifications*

| Item | Description |
|---|---|
| **Input voltage** | -48 Vdc +/-10 percent<br>110/240 Vac |
| **Total power consumption** | 700W maximum |
| **Power protection** | Over-current and over-voltage protection |
| **Line regulation** | All output voltages regulated to +/- 5 percent |
| **Surge protection** | Circuitry provided to limit initial peak inrush current |
| **Ripple and noise** | One percent peak-to-peak or 100MV, whichever is greater (50 Mhz bandwidth) |
| **Remote sensing** | Circuitry compensates for 500MV of total line drop; open-sense lead protection (on 5V only) |
| **Overload protection** | Outputs protected against overload and shorts |

*Table 2-4: Environmental Specifications*

| Item | Description |
|---|---|
| **Cooling** | Provided by three fans in an evacuation cooling scheme |
| **Air flow** | Top rear air exhaust from bottom front |
| **Operating temperature** | $40^{o}$ to $95^{o}$ F ($15^{o}$ to $35^{o}$ C) |
| **Transport and storage temperature** | $-4^{o}$ to $185^{o}$ F ($-20^{o}$ to $85^{o}$ C) |
| **Relative humidity** | 20 to 80 percent (no condensation) |

# System Operation

The following subsections describe the basic signal flow and the redundancy performance of the RF-C! controller.

## Basic Signal Flow

Incoming page requests are processed and validated by the paging terminal. Valid requests are then sent to a terminal server in the form of RS-232 TNPP packets (see Figure 2-3).

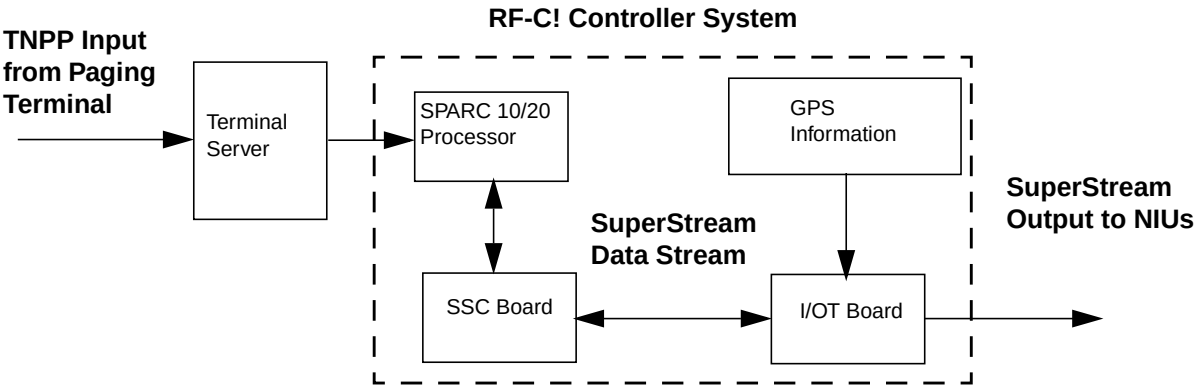



*Figure 2-3: Basic Signal Flow*

The terminal server then translates the RS-232 inputs into outputs compatible with the RF-C! controller and forwards them over the ThinNet (10b2 Ethernet) to the RF-C! controller.

The RF-C! controller accepts the TNPP packets from the terminal server at an Ethernet connection on the SPARC 10/20 paddle board located on the back of the RF-C! controller chassis (see paragraph, "SBus Carrier Board"). The paddle board then passes the information across the backplane to the SPARC 10/20 processor board.

The SPARC 10/20 processor board, in conjunction with the Synchronous Serial Communications Board (SSCB), queues, batches, schedules, and encodes the TNPP information into a SuperStream data stream for movement on the link distribution channel. The SuperStream data stream also contains embedded transmitter control commands and error corrections.

The SuperStream protocol causes:

- Efficient multiplexing of multiple paging channels onto a single distribution link
- Forward Error Correction (FEC)
- Interleaving for distribution link protection from bit errors

In the final phase, the Input/Output Transition Board (I/OTB) updates the SuperStream data stream with GPS information from the GPS receiver and sends the data stream to the Network Interface Units (NIUs) over the link distribution channel.

## Redundancy

The RF-C! controller provides redundant operation through the use of two identical RF-C! controller component groups housed in the same chassis.

One of the RF-C! controllers is the operating controller (called the primary controller); the other controller is the standby (called the backup controller). The primary RF-C! controller manages all normal TNPP traffic processing, page queuing, batching, scheduling, distribution link control, and console interaction. The redundant RF-C! controller operates in a hot standby mode, ready to become primary if needed. Both the primary and redundant RF-C! controller systems are connected to the Universal Redundancy Switch (URS), which provides manual and automatic switchover capabilities.

Both RF-C! controller systems share database information through a common ethernet connection. Operator configurations and system management information are not lost during a redundancy switchover. Also, each side of a redundant RF-C! controller system has its own GPS receiver. This eliminates clock synchronization delays during a switchover.

Several events can trigger a switchover (see Table 2-5).

*Table 2-5: Switchover Events*

| Switchover Event | Description |
|---|---|
| **A hardware or software failure on the primary RF-C! controller** | If the primary RF-C! controller detects an internal critical hardware or software failure, it automatically passes control to the backup RF-C! controller. |
| **Operator switchover request through a console interface** | Operators can send a switchover request instructing the primary RF-C! controller to relinquish control to the redundant RF-C! controller, or they can send a switchover request to the backup RF-C! controller instructing it to take control from the primary RF-C! controller. These actions can be overridden only through a console command or by manually initiating a switchover using the URS (see next event description). |
| **Switch action at the URS** | The three switches located on the URS front panel are for manually triggering switchover events. Whenever the AUTO/MAN switch is set to the manual mode (MAN LED on), the other two switches on the front panel, labeled SIDE A and SIDE B, become active. Pressing the SIDE A switch (its ACT LED on) forces the RF-C! controller connected to the A side to take control. Pressing the SIDE B switch (its ACT LED on) forces the RF-C! controller connected to the B side to take control. |

# System Components

Each side of the redundant RF-C! controller contains:

- A SPARC 10 or SPARC 20 processor board
- An Synchronous Serial Communications (SSC) board
- An Input/Output Transition (I/OT) board
- SBUS Carrier Card and Transition Module
- A 2.1 GB hard disk drive
- A 4 GB digital audio tape (DAT) drive
- A CD-ROM drive

Peripheral devices also located in the RF-C! controller cabinet are:

- A URS
- Two GPS receivers, each with its own antenna
- Two to four terminal servers

Peripheral devices outside of the cabinet are:

- Video display terminals (VDTs)
- Screen-recording printers
- Logging printers

## SPARC 10/20 Processor Board

The primary component of the RF-C! controller is the 90-MHz or 125-MHz dual SPARC 10 processor board (see Figure 2-4). The SPARC 20 is an option. Features of the SPARC 10/20 processor board include:

- 64 MB of RAM
- 512 Kbyte of EPROM
- Eight Kbytes of NVRAM (stores boot configurations for VME bus devices)
- A rear-accessible AUI Ethernet port

- Support for SCSI II devices
- Two RS-232/422 rear-panel serial ports
- A high-performance master/slave VME controller

The SPARC 10 processor board front panel contains LEDs for status indications and connectors (see Table 2-6).

*Table 2-6: SPARC 10 Front Panel Features*

| Item | Description |
|---|---|
| **RUN LED** | Lights whenever the board is operating normally |
| **FAIL LED** | Lights whenever a board failure is detected |
| **User LEDs** | 0,1,2,3—not used |
| **ABORT/RESET switch** | Push-button switch—for factory use only |
| **KBD/MOUSE connector** | Accepts standard Sun™ keyboard and mouse DIN connector inputs—not used |
| **10BASE-T connector** | Accepts 8-pin, RJ-45 type twisted pair Ethernet connections—not used |
| **TTY A/B and AUI connector** | Provides two serial ports and an AUI Ethernet interface through a 40-pin connection; accommodates configuration then is disconnected—not used |
| **SCSI connector** | 50-pin SCSI connection—not used |

The SPARC 20 processor board front panel contains LEDs for status indications and connectors (see Table 2-7).

*Table 2-7: SPARC 20 Front Panel Features (Sheet 1 of 2)*

| Item | Description |
|---|---|
| **CPU Status LEDs** | Four green status LEDs indicate the number of installed processors. These LEDs flicker to indicate activity. |
| **User Status LEDs** | 0, 1, 2, 3—not used |
| **Fail LED** | Indicates a VMEbus system failure. Turns on (red) during the power on self test. |

*Table 2-7: SPARC 20 Front Panel Features (Sheet 2 of 2)*

| Item | Description |
|---|---|
| **SCSI LED** | Indicates (orange) the SCSI termination is enabled on the SPARC 20 through the serial ports and the SCSI termination switch. |
| **SYS LED** | Indicates (green) at the end of a successful power on self test. During normal operation this LED is on. |
| **SCON LED** | Indicates (yellow) the SPARC 20 is set to system controller through the system controller and VMEbus reset receive switch. |
| **ABORT/RESET switch** | Pushbutton switch—for factory use only |
| **C048** | Rotary switch—not used |
| **Serial A/B connector** | Accepts serial port connections |
| **KBD/MOUSE connector** | Accepts standard Sun™ keyboard and mouse DIN connector inputs—not used |
| **10BASE-T connector** | Accepts 8-pin, RJ-45 type twisted pair Ethernet connections—not used |
| **AUI/Audio connector** | Provides two serial ports and an AUI Ethernet interface through a 40-pin connection; accommodates configuration then is disconnected—not used |
| **SCSI connector** | 50-pin SCSI connection—not used |

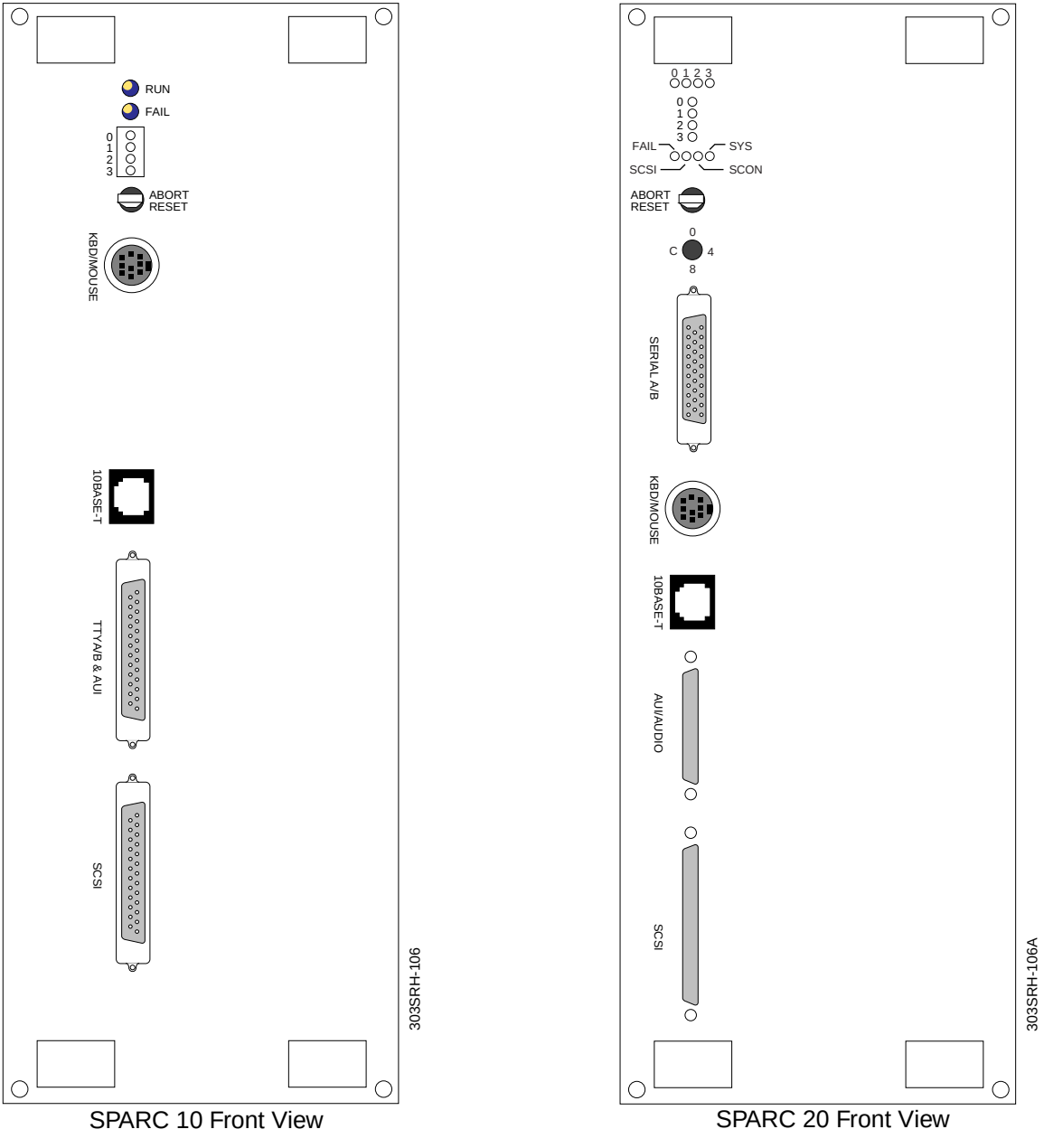



*Figure 2-4: SPARC 10 and SPARC 20 Processor Board*

## SSC Board and I/OT Board

The SSC board provides control and output synchronization for the RF-C! controller system's distribution links and the I/O connections (see Figure 2-5).

The I/OTB, located on the back of the cabinet, provides transition for the SSC board. It also provides a direct external interface to the distribution link(s) and the General Purpose Input/Output (GPI/O) cables (see Figure 2-5).

The SSC board has eight LEDs (see Table 2-8).

*Table 2-8: SSCB Front Panel Components (Sheet 1 of 2)*

| LEDs | | |
|---|---|---|
| **Component** | **Reading** | **Description** |
| **BOARD POWER** | Steady green | Both +5 V and 12 V power are available |
| | Off | Either the +5 V or 12 V power, or both, are not present |
| **BOARD FAILURE** | Steady red | SSCB failure |
| | Off | No board failures detected |
| **BOARD ACTIVE** | Steady or flashing green | Paging traffic is transferring |
| **PLL LOCKED** | Steady green | PLL locked |
| | Flashing green | PLL is locking |
| | Off | PLL not in use |
| **1PPS** | Flashing green | Incoming 1pps GPS signals |
| | Off | GPS failure |
| **MAJOR ALARM** | Steady red | Major alarm exists |
| | Off | No major alarms |
| **MINOR ALARM** | Steady red | Minor alarm exists |
| | Off | No minor alarms |

*Table 2-8: SSCB Front Panel Components (Sheet 2 of 2)*

| Component | LEDs | |
|---|---|---|
| | Reading | Description |
| **WATCHDOG** | Red | In the absence of normal system communication, flashes just before system is reset |
| | Off | Normal system communication is present |

The I/OT board has ten connectors (see Table 2-9).

*Table 2-9: I/OTB Back Panel Connector Functions*

| Connector Name | Type | Purpose |
|---|---|---|
| **SuperStream Port 1** | DB-9 connectors | Connects I/O channel 1 |
| **SuperStream Port 2** | DB-9 connectors | Connects I/O channel 2 |
| **SuperStream Port 3** | DB-9 connectors | Connects I/O channel 3 |
| **SuperStream Port 4** | DB-9 connectors | Connects I/O channel 4 |
| **Redundancy** | RJ-45 connector | Provides control over the redundancy switch |
| **GPS Power** | Power connector | Supplies power to the redundancy switch |
| **GPS 1PPS** | Coaxial connector | Used for the 1pps timing input |
| **U18 (internal; not shown)** | 96-pin ribbon connector | Interfaces the I/OTB with the SSCB |
| **General Purpose I/Os** | DB-25 connectors | General purpose |
| **General Purpose I/Os** | DB-25 connectors | General purpose |

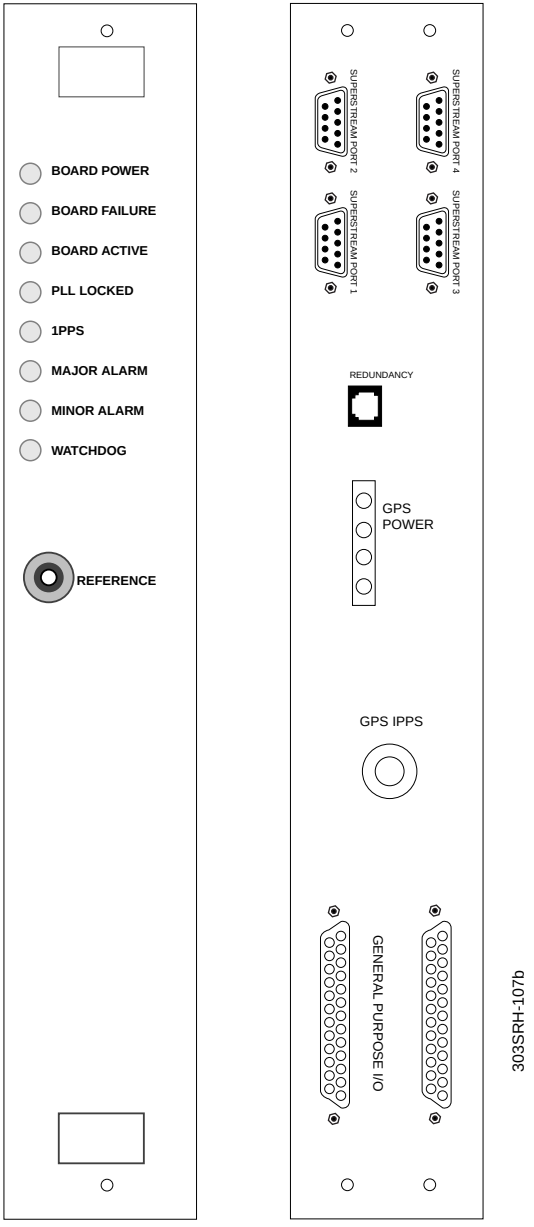



*Figure 2-5: SSC Board and I/OT Board*

## SBus Carrier Board

The SBus carrier board is an extension of the SPARC 10 and SPARC 20 processor board. The SBus carrier board provides the communication between the CPU and SBus boards. The SBus carrier board provides rear access serial, parallel, and Ethernet connections. The SBus carrier board connects to the VME chassis backplane through the paddle board. The SBus carrier board is located behind the SPARC 10 and SPARC 20 processor board. A typical primary (side A) version and a typical redundant (side B) version are provided (see Figure 2-6).

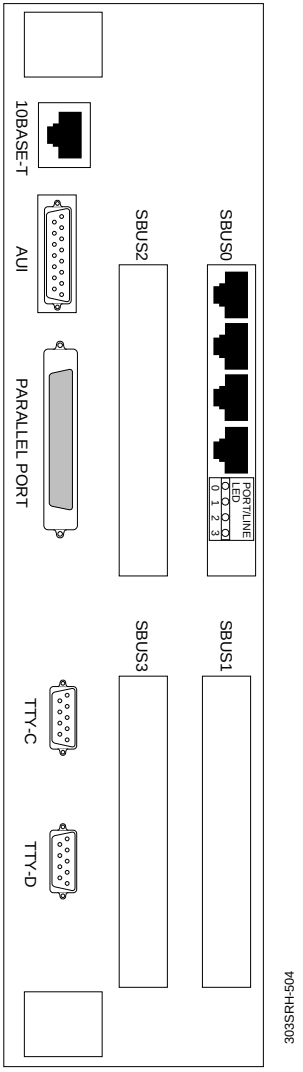



*Figure 2-6: SBus Carrier Board, Typical Configuration*

## Peripheral Shuttle Components

### Hard Disk Drive

The RF-C! controller uses a 2.1-GB internal SCSI hard disk drive for storing files, databases, and configuration information. It is installed in the peripheral shuttle in the top of the cabinet (see Figure 2-7).

### Digital Audio Tape Drive

The RF-C! controller uses a 4mm digital audio tape (DAT) drive for the backup storage of databases, statistics files, and software updates. It is installed in the peripheral shuttle in the top of the cabinet (see Figure 2-7).

### CD ROM Drive

The RF-C! controller uses a quad-spin CD ROM drive for entering operating system updates and for rebooting the operating system when necessary. It is installed in the peripheral shuttle in the top of the cabinet (see Figure 2-7).

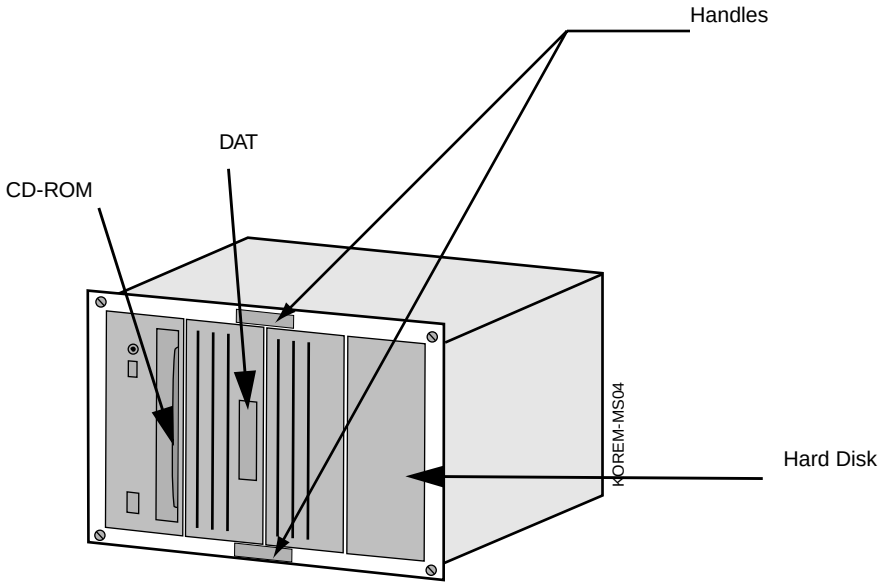



*Figure 2-7: Peripheral Shuttle and Components*

## Internal Peripheral Devices

The RF-C! controller system internal peripheral devices include:

- Two GPS receivers, each with its own antenna
- One to four terminal servers
- The URS

### Global Positioning System Receivers

The RF-C! controller redundant configuration contains two GPS receivers, each with its own antenna (see Figure 2-8).


*Figure 2-8: The Global Positioning System Receiver*

The GPS receivers provide the 1PPS and Time Of Day (TOD) information necessary for paging synchronization. Power for the GPS receiver is provided by the VME chassis (See Figure 2-1). Both receivers are located in the RF-C! controller cabinet.

### Terminal Servers

The RF-C! controller redundant configuration contains one to four terminal servers (See Figure 2-9).

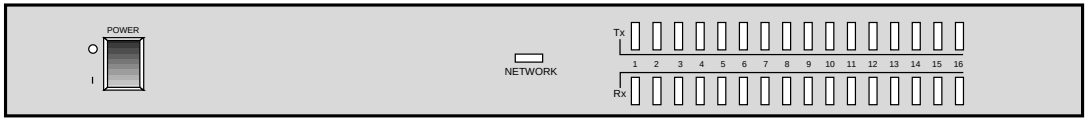



*Figure 2-9: The Terminal Server*

Through RS-232 inputs (RJ-45 connections) located in the rear of the cabinet, the terminal server accepts asynchronous TNPP serial inputs from the paging terminal. When the terminal server detects the end of the TNPP message, it sends the TNPP message, via the ethernet, to the primary RF-C! controller system.

Status indicators on the front of the unit display power, network, and the port connections that are active.

### Universal Redundancy Switch (URS)

The URS provides automatic and manual redundancy control and status indications (see Figure 2-10).

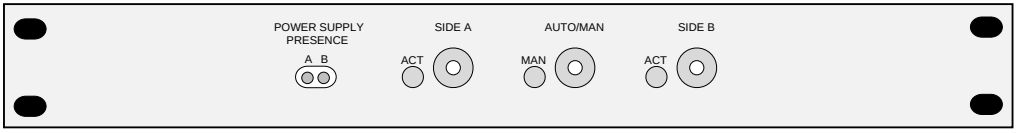



*Figure 2-10: The Universal Redundancy Switch*

The URS is connected to the redundancy control port on the I/OTB. Light-emitting diodes (LEDs) located on the front of the unit show the current power supply source, which side of the redundant RF-C! controller is active (the SIDE A or SIDE B ACT LED is on), and if the URS is set to automatic (the MAN LED is off) or manual (the MAN LED is on).

To switch from automatic to manual or back, press the push-button above the MAN LED.

In the automatic mode (the MAN LED is off), push-buttons located on the front of the URS have no effect on system operation. In the manual mode (MAN LED is on), the URS disregards all inputs except those from the push-buttons.

In the manual mode (MAN LED is on), pressing the SIDE A push-button switches system operations to that side (the Side A ACT LED is on and the Side B ACT LED is off). Pressing the SIDE B push-button switches system operation to the B side (the Side B ACT LED is on and the Side A ACT LED is off).

## External Peripheral Devices

### VDT and Keyboard

The VDT and keyboard provide the active interface for the system operator. In the RF-C! controller redundant configuration, two VDTs and two keyboards are provided.

### Screen-Recording Printers

The VDT screen-recording printers provide a hard copy of the screens that the system operator is accessing. In the RF-C! controller redundant configuration, two screen-recording printers are provided.

### Logging Printer

In the RF-C! controller redundant configuration, a logging printer is shared by both RF-C! controllers. Because the RF-C! controller can recover from errors without operator awareness or input, the logging printer provides a printout (hard copy) of errors and other events that have occurred.

# Module Installation or Replacement

The RF-C! controller cabinet, and its components and boards, are installed in the factory (see Figure 3-1). Thus, no installation at the site is required. This section describes how to replace boards and components in the RF-C! controller Model 3200 or 3210 system.


***Before you power up the controller, verify that the following actions are completed: (1) grounds are properly installed, (2) cables are secured tightly, (3) all components are fully seated, and (4) mounting screws are tight. These items may loosen during shipment.***

# Powering up the RF-C! Controller

Use the following procedure to power up the RF-C! controller for the first time:

1. Make sure all power cables for the RF-C! controller system components are plugged into the power distribution panel (see Figure 3-1 and Figure 3-2).

2. Make sure power is applied to the power distribution panel.

3. Turn on power to both sides of the RF-C! controller system.

4. Wait for the RF-C! controller to finish the boot sequence.

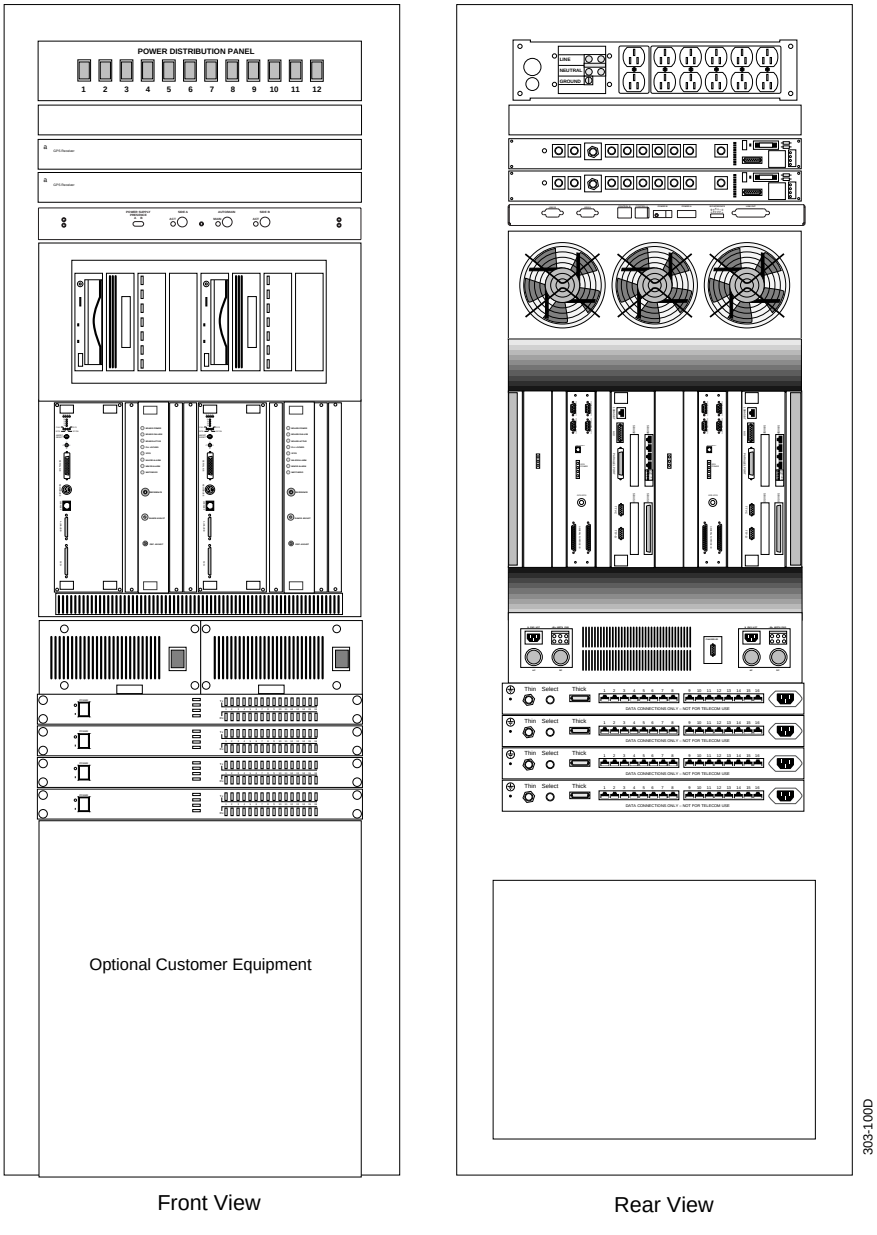
   The logon prompt displays when the RF-C! controller is ready.

5. If components were replaced and software needs re-installation, follow the appropriate procedures in Appendix C, "Software Installation".

6. Make sure all terminal server power cables are connected to the power distribution panel.

7. Turn on all terminal servers.

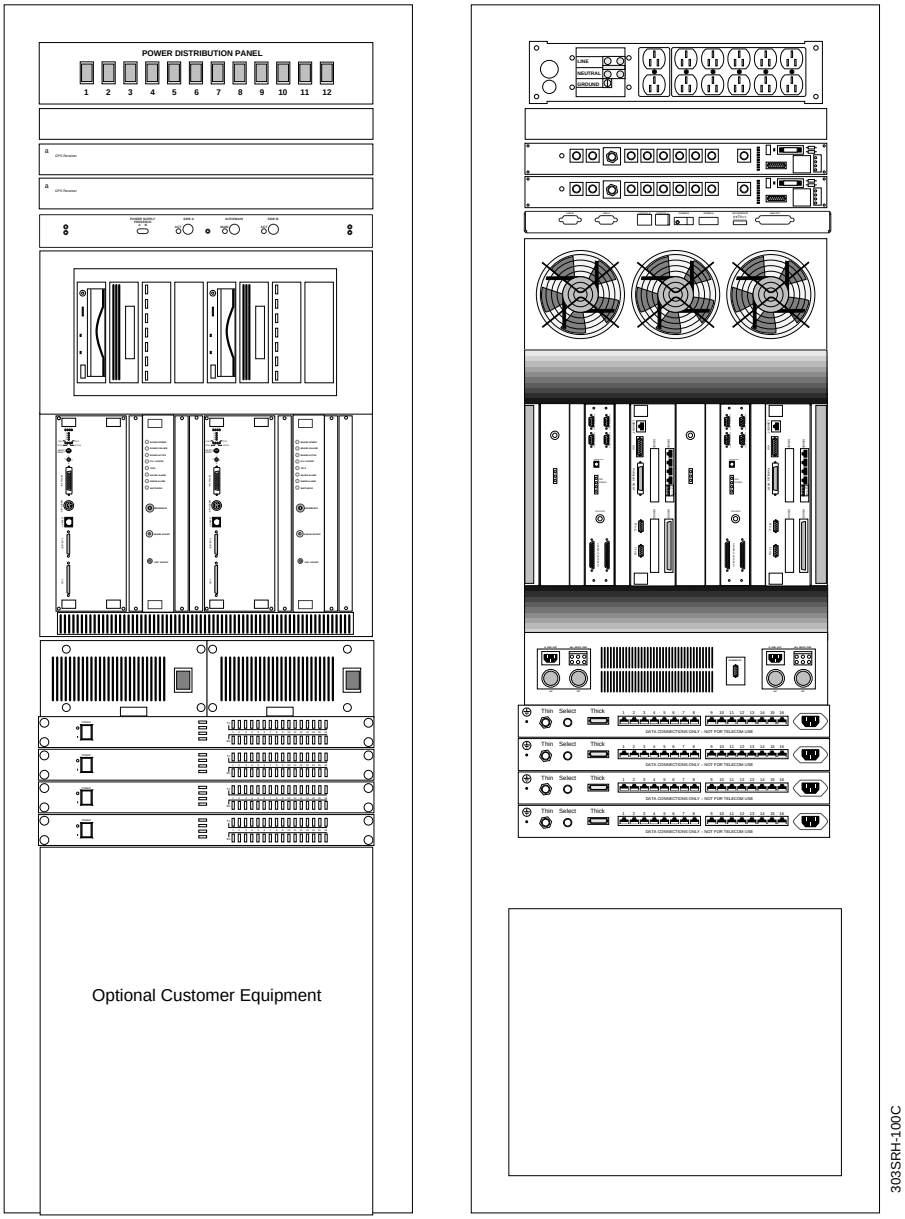
The RF-C! controller is ready to use.




Front View

Rear View

*Figure 3-1: RF-C! Controller Cabinet—Typical Redundant Configuration with SPARC 10 Processor*




Front View Rear View

*Figure 3-2: RF-C! Controller Cabinet—Typical Redundant Configuration with SPARC 20 Processor*

# Board Replacement

The RF-C! controller chassis arrives with the necessary boards and components already installed in their proper locations. However, if a board needs to be replaced, the RF-C! controller is designed for easy board removal. The RF-C! controller chassis contains guides for each slot for the proper placement and seating of the boards.

CAUTION

***The RF-C! controller boards contain electronic devices that are susceptible to damage from electrostatic discharge. Motorola recommends the use of approved electrostatic discharge devices, such as wrist and heel straps.***

## SPARC 10 and SPARC 20 Processor Board Replacement

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0 <Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

*Note: Unless otherwise noted, all cabling occurs at the backplane of the component.*

To remove the SPARC 10 or SPARC 20 processor board, use the following steps (see Figure 3-3):

1. If applicable, label the location of any cables connected to the front of the board, and then disconnect them.

2. Using a screwdriver, unscrew the two retaining screws located at the top and two retaining screws located at the bottom of the board faceplate.

3. Grasp the faceplate handles and push toward the outside while firmly pulling the board out from the chassis until the board unseats from the RF-C! controller chassis backplane.

4. Slide the board out of the slot.

To install the SPARC 10 or SPARC 20 processor board (see Figure 3-3):

1. Slide the board into the appropriate slot in the RF-C! controller chassis using the slot guides.

2. When the board backplane connector reaches the chassis backplane, firmly push the board all the way in until the board faceplate is flush with the front of the RF-C! controller chassis.

3. Secure the board to the RF-C! controller chassis using two screws in the screw slots at the top and two screws at the bottom of the board faceplate.

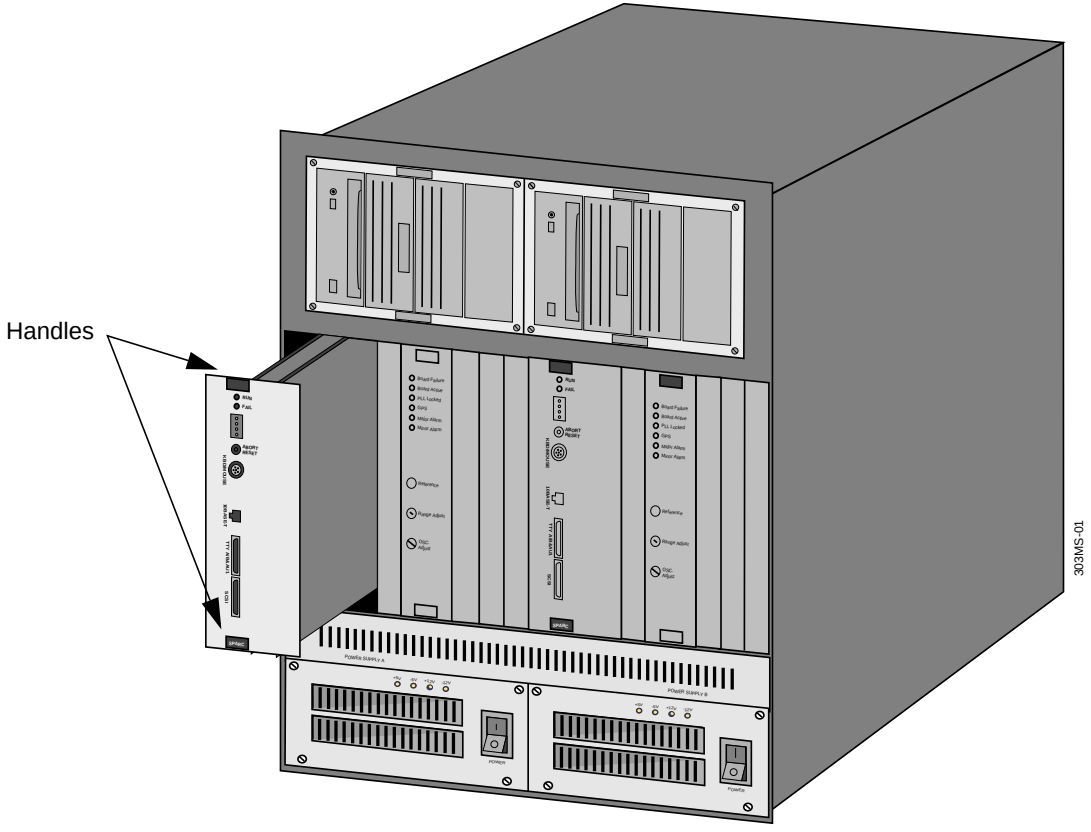



*Figure 3-3: Processor Board Replacement—SPARC 10 Shown*

## Serial Synchronous Control (SSC) Board Replacement

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0<Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

*Note: Unless otherwise noted, all cabling occurs at the backplane of the component.*

To remove the SSC board (see Figure 3-4):

1. Using a screwdriver, unscrew the two retaining screws located at the top and two retaining screws located at the bottom of the board faceplate.

2. Grasp the faceplate handles and firmly pull the board out from the chassis until the board backplane connector unseats from the RF-C! controller chassis backplane.

3. Slide the board out of the slot.

To install the SSC board (see Figure 3-4):

1. Slide the board into the appropriate slot in the RF-C! controller chassis using the slot guides.

2. When the board backplane connector reaches the chassis backplane, firmly push the board all the way in until the board faceplate is flush with the front of the RF-C! controller chassis.

3. Secure the board to the RF-C! controller chassis using two screws in the screw slots at the top and two retaining screws located at the bottom of the board faceplate.

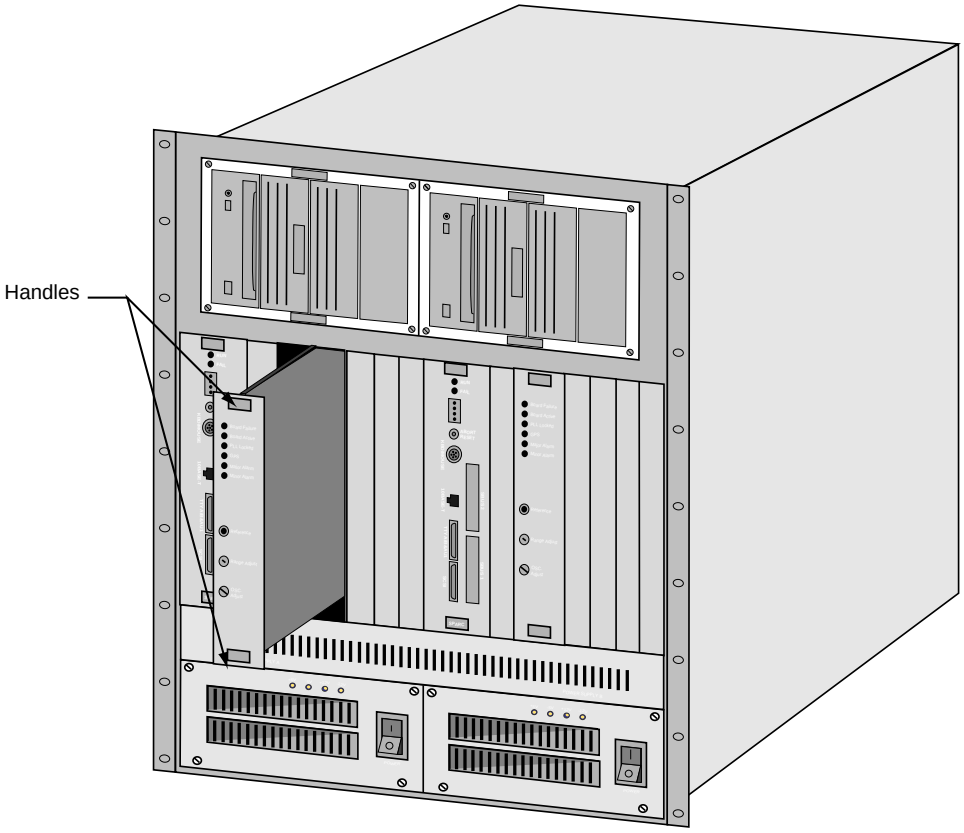



*Figure 3-4: SSC Board Replacement*

## Input/Output Transition (I/OT) Board Replacement

The I/OT board is in the rear of the RF-C! controller chassis on the left side of the plate mount.

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0 <Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

*Note: Unless otherwise noted, all cabling occurs at the backplane of the component.*

To remove the I/OT board:

1. Mark and disconnect the four channel data cables from their DB-9 connectors.
   a. Disconnect the RJ-45 control cable.
   b. Disconnect the redundancy power cable and one 1PPS cable.
   c. If used, mark and disconnect the GPI/O DB-25 cables.
   d. Disconnect the serial port cables.
   e. Disconnect the four screws that secure the I/OT board to the chassis.
   f. Pull the I/OT board out far enough to access the 96-pin ribbon cable at the back of the board.
   g. After noting which side of the ribbon cable has the red stripe on the edge, separate the ribbon cable from the connector.
   h. Remove the I/OT board.

To install the I/OT board:

1. Insert the new I/OT board far enough to reconnect the 96-pin ribbon cable.
2. After matching the red stripe location with the original installation, reattach the 96-pin ribbon cable.
3. Push the board all the way in and secure it with the four screws.
4. Reconnect the four channel data cables to their DB-9 connectors.
5. Reconnect the RJ-45 redundancy control cable.
6. Reconnect the redundancy power cable and 1PPS cable.
7. Reconnect any GPI/O DB-25 cables removed in Step c.

Refer to Chapter 2, "System Description", Figure 2-1 and Figure 2-2, to assist you in these procedures.

## Peripheral Shuttle Removal

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0 <Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

To remove the peripheral shuttle (see Figure 3-5)

1. Using a screwdriver, unscrew the four retaining screws located at the top and two retaining screws located at the bottom of the shuttle faceplate.

2. Grasp the faceplate handles and firmly pull the shuttle out from the chassis until the shuttle backplane connector unseats from the RF-C! controller chassis backplane.

3. Slide the shuttle the rest of the way out of the slot.

To install the peripheral shuttle (see Figure 3-5):

1. Slide the shuttle into the appropriate location in the RF-C! controller chassis.

2. When the shuttle backplane connector reaches the chassis backplane, firmly push the shuttle all the way in until the shuttle faceplate is flush with the front of the RF-C! controller chassis.

3. Secure the shuttle to the RF-C! controller chassis using four screws in the screw slots at the top and two retaining screws located at the bottom of the shuttle faceplate.

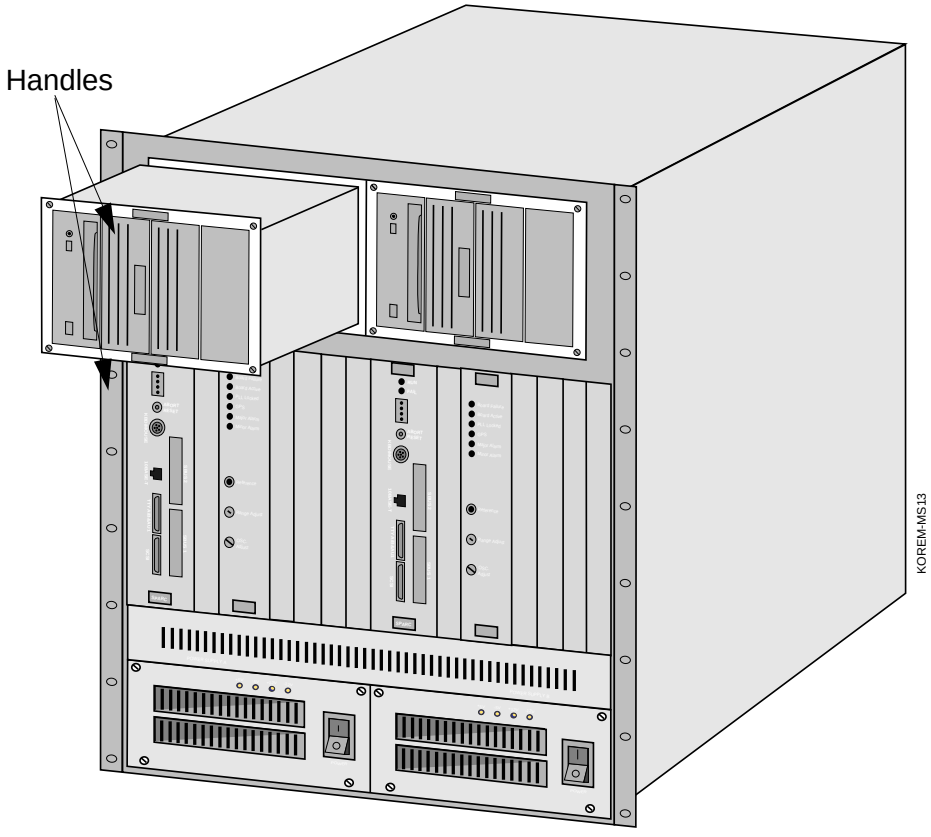



*Figure 3-5: Removing the Peripheral Shuttle*

## Hard Drive Replacement

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0 <Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

To remove the hard drive (see Figure 3-6):

1. Using a screwdriver, remove the four retaining screws holding the hard drive on the top and bottom of the peripheral shuttle.

2. Slide the hard drive out until the ribbon cable and power cable are exposed.

3. Disconnect the ribbon and power cables from the hard drive.

To install the hard drive (see Figure 3-6):

1. Connect the ribbon and power cables to the back of the hard drive.

2. Slide the hard drive into the slot until it is flush with the front of the peripheral shuttle.

3. Secure the hard drive using four screws on the top and bottom of the peripheral shuttle.

*Note: SCSI device ID # 3 is used for disk drive.*

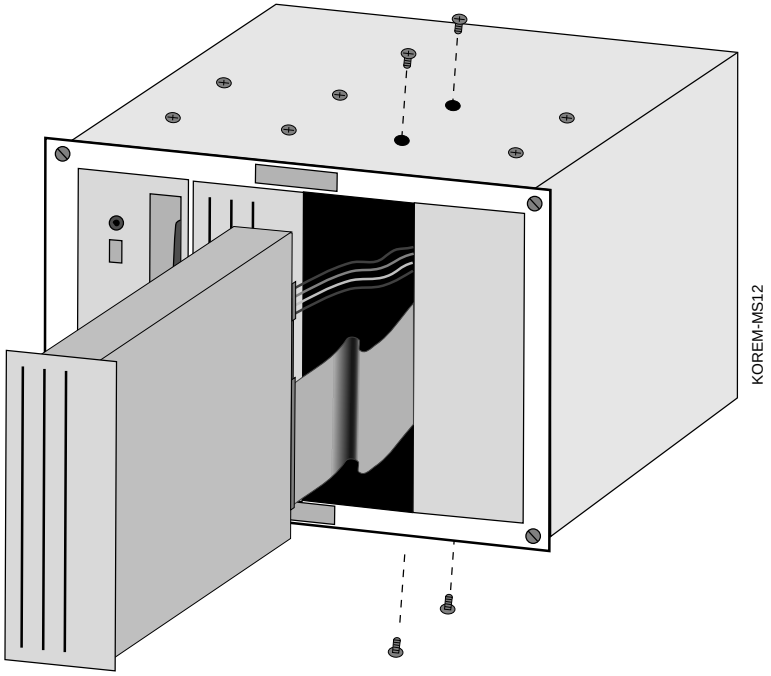



*Figure 3-6: Hard Drive Replacement*

### Digital Audio Tape (DAT) Drive Replacement

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0 <Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

To remove the DAT drive (see Figure 3-7):

1. Using a screwdriver, remove the four retaining screws holding the DAT on the top and bottom of the peripheral shuttle.

2. Slide the DAT out until the ribbon cable and power cable are exposed.

3. Disconnect the ribbon and power cables from the DAT.

To install the DAT (see Figure 3-7):

1. Connect the ribbon and power cables to the back of the DAT.
2. Slide the DAT into the slot until it is flush with the front of the peripheral shuttle.
3. Secure the DAT using four screws on the top and bottom of the peripheral shuttle.

*Note: SCSI device ID# 4 is used for DAT.*

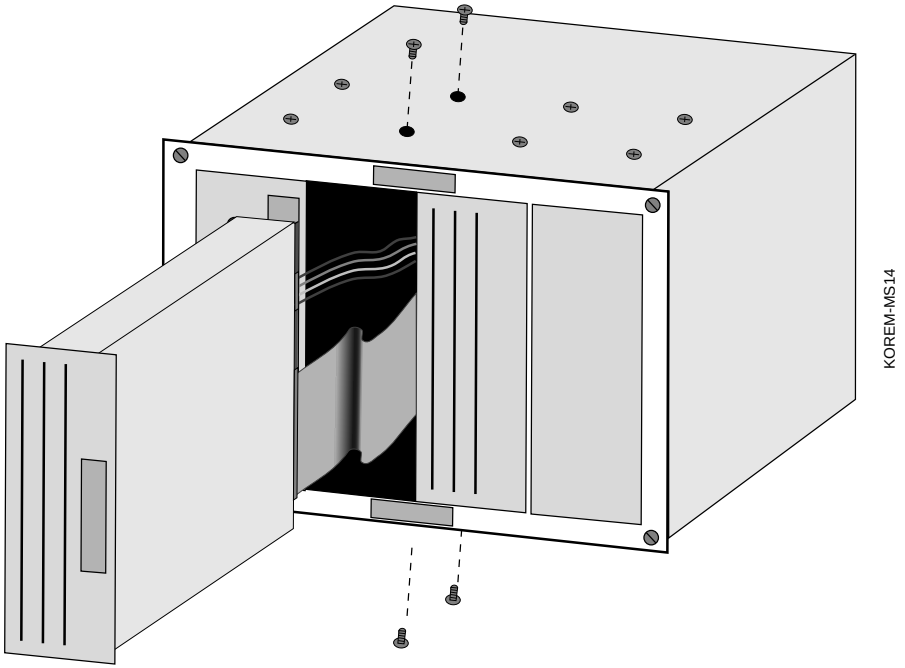



*Figure 3-7: DAT Replacement*

### CD-ROM Replacement

CAUTION

***Before replacing an RF-C! controller component, perform a UNIX system shutdown by typing:*** **sync <Return>** ***and*** **shutdown -g0 -y i0 <Return>** ***and then, turn the power off to the appropriate RF-C! controller side.***

To remove the CD-ROM (see Figure 3-8):

1. Using a screwdriver, remove the four retaining screws holding the CD-ROM on the top and bottom of the peripheral shuttle.

2. Slide the CD-ROM out until the ribbon cable and power cable are exposed.

3. Disconnect the ribbon and power cables from the CD-ROM.

To install the CD-ROM (see Figure 3-8):

1. Connect the ribbon and power cables to the back of the CD-ROM.

2. Slide the CD-ROM into the slot until it is flush with the front of the peripheral shuttle.

3. Secure the CD-ROM using four screws on the top and bottom of the peripheral shuttle.

*Note: SCSI device ID # 6 is used for the CD-ROM.*

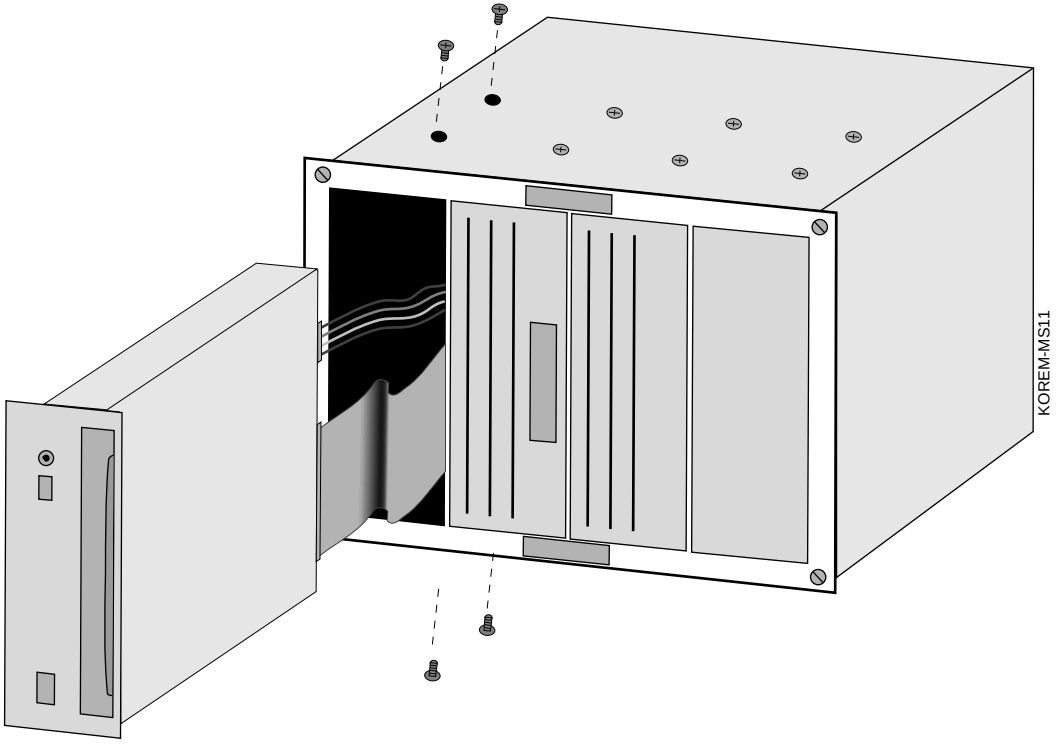



*Figure 3-8: CD-ROM Replacement*

# Internal Peripheral Device Replacement

The internal peripheral devices are located in the bottom of the RF-C! controller cabinet below the chassis vent (see Figure 3-9).

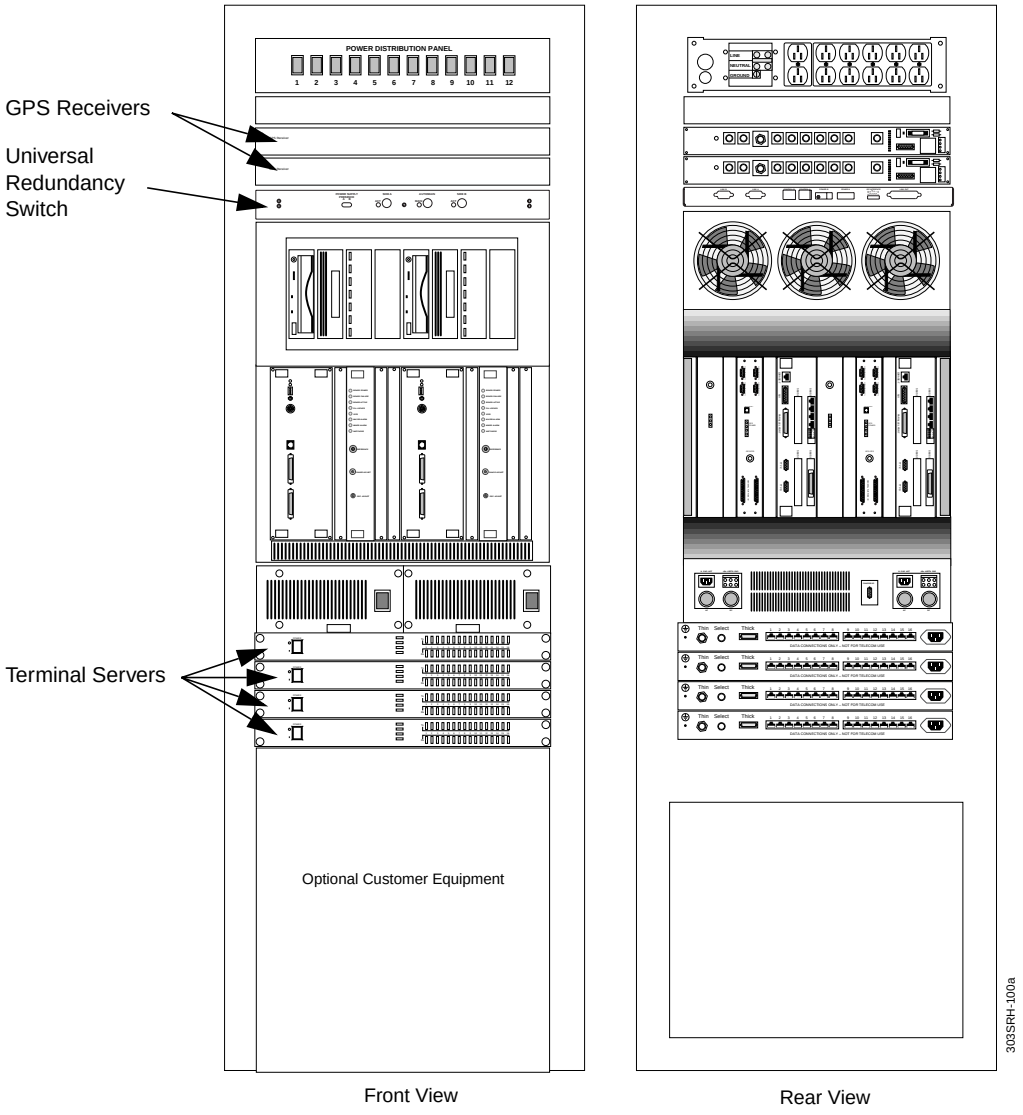



*Figure 3-9: Peripheral Devices Location Example—SPARC 10 Processor Shown*

## Global Positioning System (GPS) Receiver Replacement

*Note: Unless otherwise noted, all cabling occurs at the backplane of the component.*

To remove the GPS receiver:

1. Disconnect the GPS power cable.
2. Disconnect the serial DB-9 data cable.
3. Disconnect the coaxial antenna cable.
4. Disconnect the 1PPS BNC cable.
5. Disconnect the ground cable.
6. At the front of the unit, remove the four screws that secure the GPS chassis to the cabinet.
7. Remove the GPS chassis.

To install the GPS receiver:

1. Insert the replacement unit and secure it with the four screws.
2. Reconnect the serial DB-9 data cable.
3. Reconnect the coaxial antenna cable.
4. Reconnect the 1PPS BNC cable.
5. Reconnect the ground cable.
6. Reconnect the GPS power cable.

## Terminal Server Replacement

*Note: Unless otherwise noted, all cabling occurs at the backplane of the component.*

To remove the terminal server:

1. At the front panel, turn the power switch to Off.
2. Disconnect the 48VDC power cable or AC power cable.
3. Mark the data connector number above the connector, and disconnect all the RJ-45 data connection cables.
4. Disconnect the Ethernet “T” connector.
5. Disconnect the ground cable.
6. At the front of the unit, remove the four TORX screws that secure the terminal server chassis to the cabinet.
7. Remove the terminal server chassis.

To install the terminal server:

1. Insert the replacement unit and secure it with the four TORX screws.
2. Reconnect all the RJ-45 data connection cables to the appropriate connectors.
3. Reconnect the Ethernet “T” connector.
4. Reconnect the power cable (either 48VDC or AC).
5. Reconnect the ground cable.
6. At the front panel, turn the power switch to ON.

## Universal Redundancy Switch Replacement

*Note: Unless otherwise noted, all cabling occurs at the backplane of the component.*

To remove the URS:

1. Mark and disconnect the 12V power cables labeled POWER A and POWER B.
2. Mark with the letter A or B located above the connector, and disconnect the two DB-15 data connection cables (if used).
3. Disconnect the DB-25 cable (if used).
4. Disconnect the ground cable.
5. Mark with the letter A or B located above the connector, and disconnect the two RJ-45 control cables.
6. At the front of the unit, remove the four TORX screws that secure the URS chassis to the cabinet.
7. Remove the URS chassis.

To install the URS:

1. Insert the replacement unit and secure it with the four TORX screws.
2. Reconnect all the DB-9 data connection cables to the appropriate connectors.
3. Reconnect the DB-25 cable (if used).
4. Reconnect the appropriately marked RJ-45 control cables.
5. Reconnect the ground cable.
6. Reconnect the 12V power cables.

# Cable Connections

This section contains the RF-C! controller Model 3200 and 3210 cabling information.

## AC/DC Power Cable

The following are the AC / DC power cable connections (see Table 3-1).

*Table 3-1: AC/DC Power Cabling*

| Cable Label | Cable Type | Part Number | Connect From | Connect To |
|---|---|---|---|---|
| 1 | CBL 7.5 Ft. IEC320 Power ST | 3080654R03 | Prime Side of VME | Port 1 on PDU |
| 1 DC | CBL RFC CHASIS DC Power | 3080560F01 | Prime side of VME 48V<br>RTN: white (-48V Return)<br>Black (-48V)<br>GND: Green (ground) | Port 1 on PDU |
| 2 | CBL 7.5FT IEC320 Power ST | 3080654R03 | Redundant Side of VME | Port 2 on PDU |
| 2 DC | CBL RFC CHASIS DC Power | 3080560F01 | Redundant side of VME 48V<br>RTN: white (-48V Return)<br>Black (-48V)<br>GND: Green (ground) | Port 2 on PDU |
| 3 | CBL Power GPS | 3080572P02 | Prime Panel, VME to GPS port | Port 16 on Prime GPS |
| 4 | CBL Power GPS | 3080572P02 | Redundant Panel, VME to GPS port | Port 16 on Redundant GPS |
| 5 | Redundant Switch | | Prime IOTB<br>(DC Power) | Right (from back) Port on Redundancy Switch |
| 6 | Redundant Switch | | Redundant IOTB<br>(DC Power) | Left (from back) Port on Redundancy Switch |
| 7 | TSERV1 | | Terminal Server 1 | Port 3 on PDU |
| 7 DC | TSERV1 | | Terminal Server 1 | Port 3 on PDU |
| 8 | TSERV2 | | Terminal Server 2 | Port 4 on PDU |
| 8 DC | TSERV2 | | Terminal Server 2 | Port 4 on PDU |

*Table 3-1: AC/DC Power Cabling (Continued)*

| Cable Label | Cable Type | Part Number | Connect From | Connect To |
|---|---|---|---|---|
| 9 | TSERV3 | | Terminal Server 3 | Port 5 on PDU |
| 9 DC | TSERV3 | | Terminal Server 3 | Port 5 on PDU |
| 10 | TSERV4 | | Terminal Server 4 | Port 6 on PDU |
| 10 DC | TSERV4 | | Terminal Server 4 | Port 6 on PDU |

## RS-232 Cabling

The following are the RS-232 connections standard for AC and DC (see Table 3-2).

*Table 3-2: RS-232 Connections (Standard for AC/DC)*

| Cable Label | Cable Type | Part Number | Connect From | Connect To |
|---|---|---|---|---|
| 11 | RJ-45 | 0180301F97 | Redundancy Switch Prime side (Right Port) | Prime CP-1 RJ-45 port |
| 12 | RJ-45 | 0180301F97 | Redundancy Switch Redundant Sides (Left Port) | Redundant CP-2 RJ-45 port |
| 13 | RS-232 Serial | 3080503G01 | Comport on Prime GPS | TTY-D port on SBus Carrier Board Prime |
| 14 | RS-232 Serial | 3080503G01 | Comport on Redundant GPS | TTY-D port on SBus Carrier Board Prime |
| 15 | RS-232 Serial (4 DB-9 to 1 DB-15 cable) | 3080528R02 | IOTB on CP-1 (4 DB-9 connectors) | DB-15 port on universal redundancy switch for CP-1 |
| 16 | RS-232 Serial (4 DB-9 to 1 DB-15 cable) | 3080528R02 | IOTB on CP-2 (4 DB-9 connectors) | DB-15 port on universal redundancy switch for CP-2 |
| 17 | RS-232 Serial (1 DB-25 to 4 DB-9 cable) | 3080527R02 | DB-25 connector on universal redundancy switch | Interface (satellite uplink, transmitter, distribution network) |

## 10/Base 2 Co-Axial Cabling

The following are the 10/Base 2 co-axial connection (see Table 3-3).

*Table 3-3: 10/Base 2 Co-Axial Cabling (Standard for AC and DC)*

| Cable Label | Cable Type | Part Number | Connect From | Connect To |
|---|---|---|---|---|
| 15 | CBL 10/2Base2 Co-axial | 3080533F08 | GPS Prime J6 | Prime IOTB Bd. 1PPS |
| 16 | CBL 10/2Base2 Co-axial | 3080533F08 | GPS Redundant J6 | Redundant IOTB Bd. 1PPS |
| 17 | CBL 10/2Base2 Co-axial | 3080533F08 | TSERV1 0980669R01 (L-style+Term) | Prime AUI port AUI ~ 10B2 conv 0180677R01 |
| 18 | CBL 10/2Base2 Co-axial | 3080533F08 | Terminal Server 1 | Terminal Server 2 0980669R01 (L-style+Term) |
| 19 | CBL 10/2Base2 Co-axial | 3080533F08 | Terminal Server 2 | Terminal Server 3 0980669R01 (L-style+Term) |
| 20 | CBL 10/2Base2 Co-axial | 3080533F08 | Terminal Server 3 | TSERV4 0980669R01 (L-style+Term) |
| 21 | CBL 10/2Base2 Co-axial | 3080533F08 | Terminal Server 4 | Terminate 0980669R01 |
| 22 | CBL 10/2Base2 Co-axial | 3062666D03 | Prime CP AUI Port 0980669R01 (L-style + Term) | Redundant CP AUI Port 0980669R01 (L-style + Term) AUI 0180677R01 |

## 10Base-T Twisted Pair Cabling

The following are the 10Base-T twisted pair connection (see Table 3-4).

*Table 3-4: 10/Base-T Twisted Pair Cabling (Standard for AC and DC)*

| Cable Label | Cable Type | Part Number | Connect From | Connect To |
|---|---|---|---|---|
| 23 | CBL 10Base-T 14’ | 3080533F15 | Prime Port 0 S-BUS | Port 1 on second 12 Port Ethernet Hub |
| 24 | CBL 10Base-T 14’ | 3080533F15 | RDNDT Port 0 S-BUS | Port 2 on second 12 Port Ethernet Hub |
| 25 | CBL 10Base-T 14’ | 3080533F15 | Prime Port 1 S-BUS | Port 12 on second 12 Port Ethernet Hub |
| 26 | CBL 10Base-T 14’ | 3080533F15 | RDNDT Port 1 S-BUS | Port 11 on second 12 Port Ethernet Hub |

## RS-422 Data Connections

The following are the RS-422 data connections (see Table 3-5).

*Table 3-5: RS-422 Data Connections*

| Cable Label | Cable Type | Part Number | Connect From | Connect To |
|---|---|---|---|---|
| 1 | RS-422 Data Cable | 3086197G01 | Prime Superstream port 1 | Redundant Superstream port 1 |
| 2 | RS-422 Data Cable | 3086197G01 | Prime Superstream port 2 | Redundant Superstream port 2 |
| 3 | RS-422 Data Cable | 3086197G01 | Prime Superstream port 3 | Redundant Superstream port 3 |
| 4 | RS-422 Data Cable | 3086197G01 | Prime Superstream port 4 | Redundant Superstream port 4 |

Each chassis, or component, should have a ground cable. The ground cable goes to the left rear vertical rail.

# Troubleshooting

## Basic Troubleshooting

This section describes conditions associated with system issues, what to look for to identify those conditions, and possible solutions. For additional information, refer to *RF-Conductor!™ Controller Administration*, Motorola part number 6880494G54.

Also, this section references the components and user interfaces that are used to identify and solve potential issues (see Figure 4-1).

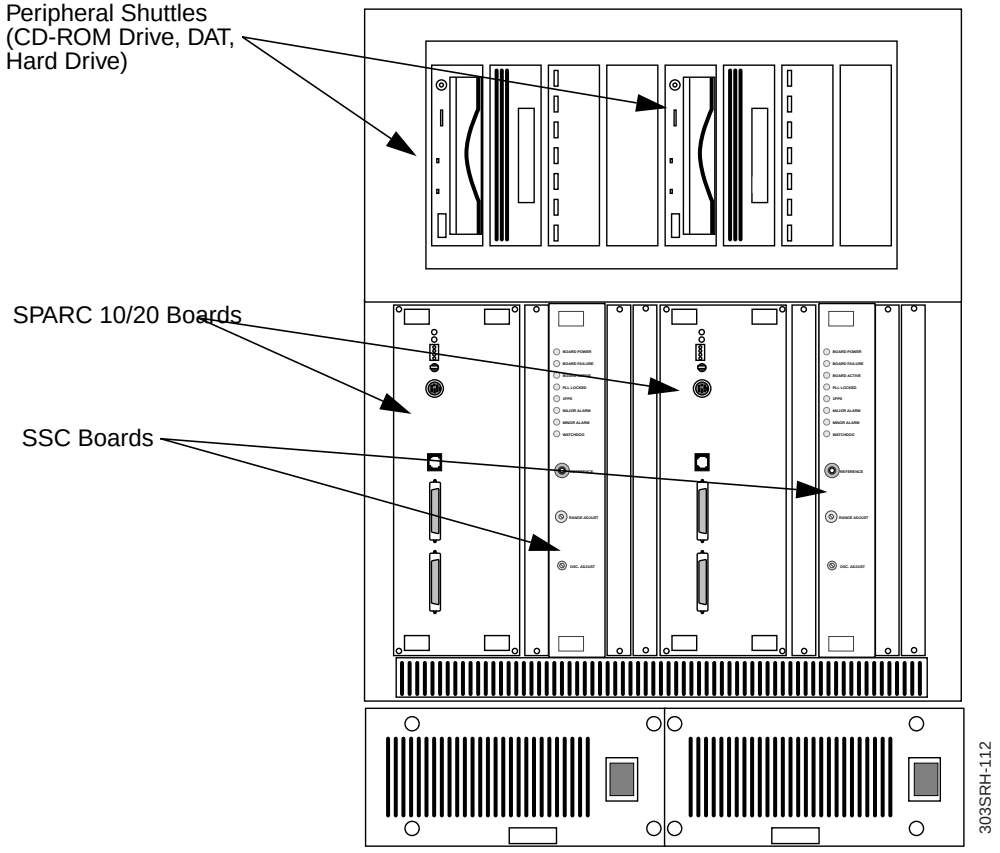



*Figure 4-1: The Redundant RF-C! Controller—SPARC 10 Processor Shown (Front View)*

# Hardware Troubleshooting

The following section contains information that can be helpful in solving hardware related issues.

## GPS Receiver

The following are troubleshooting procedures for the GPS:

### No Power for the GPS Receiver

- **Related Events:** EGPSSIGNALFAIL, EGPSSEQERROR, EGPSSIGNALLOST, ENOSATSTRACKED

The power for the GPS receiver comes from the VME chassis.

The best indicator that the GPS has power is when the 1PPS LED on the front panel of the SSC board is flashing.

1. If the 1PPS LED is not flashing, verify that the 4-pin power cable is properly installed between the VME chassis and the GPS receiver.

2. Verify that all connections are tight.

3. If it is properly installed and there is still no power, remove the cable from the VME chassis and GPS receiver and verify the voltages (+12VDC and Ground) are correct.

4. If the voltages are correct, replace the fuse on the GPS receiver (see Figure 4-2).

5. Verify the voltage ($\pm$5v) at the antenna connector

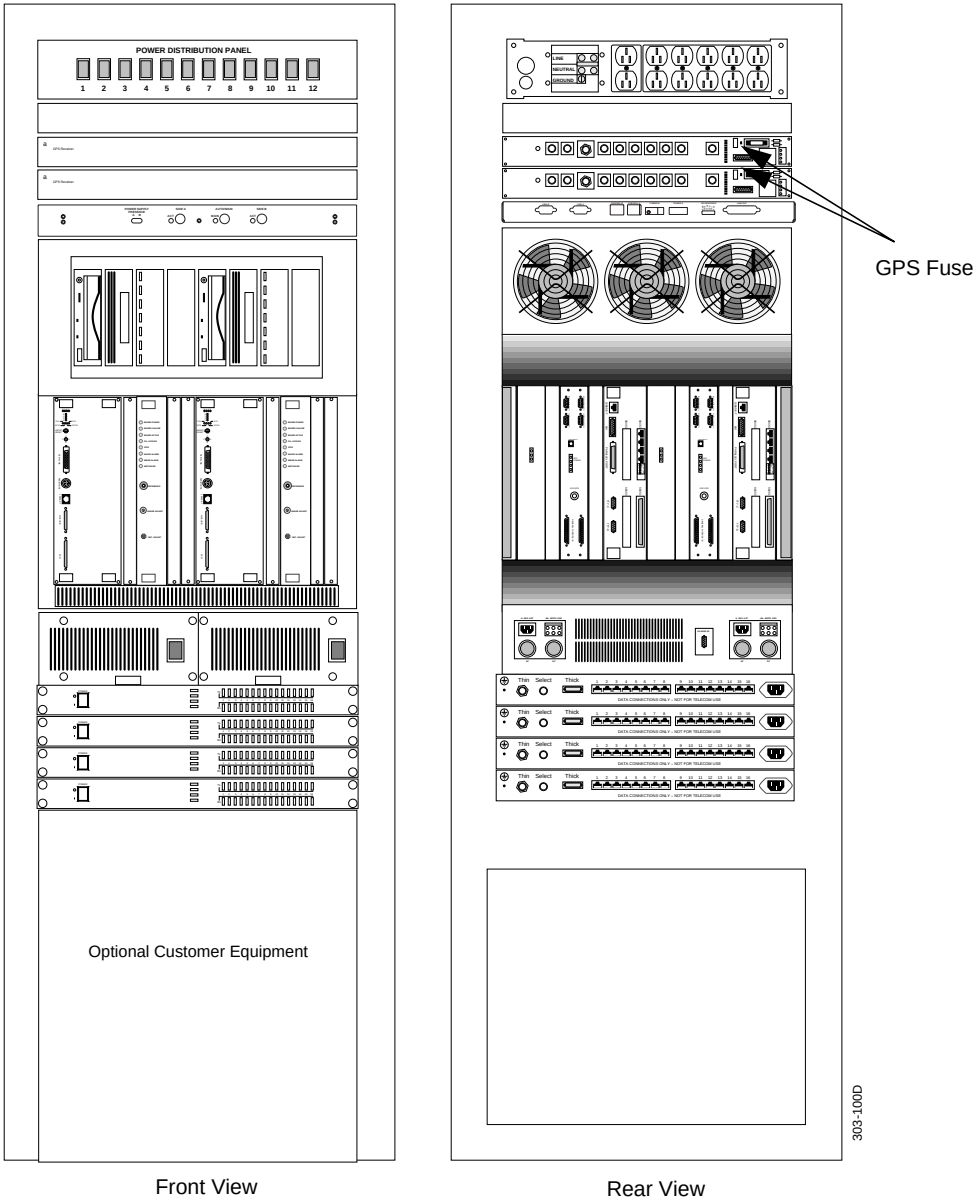



*Figure 4-2: GPS Fuse Locations*

### Loss of the 1PPS Signal

- **Related Events:** EGPSSIGNALFAIL, EGPSSIGNALLOST

The 1PPS LED on the front panel of the Serial Synchronous Control (SSC) board should be flashing when the RF-C! controller is receiving the 1PPS signal from the receiver.

1. If there is no 1PPS signal, first verify that power is present.

2. If power is present and there is still no 1PPS signal, verify that the 1PPS signal cable is properly connected to the connector on the front of the I/OT board and the GPS receiver.

3. If this cable is connected properly and there is still no 1PPS signal, verify that the BOARD FAILURE LED on the SSC board is not on.

4. If the LED is lit, then the SSC board needs testing.

### No Serial Data

- **Related Events:** EGPSSIGNALLOST, EGPSSIGNALFAIL, EGPSSEQERROR, ENOSATSTRACKED

If the 1PPS signal is flashing and the RF-C! controller is reporting any of the above events, then it could be because of a loss of serial data. There are several items to investigate, as follows:

1. Verify that the serial cable between the SBUS carrier board and the GPS receiver is properly connected. A NULL modem cable should be used between the board and the GPS receiver.

2. Verify that the RF cable from the GPS antennas is properly connected to the GPS receiver.

3. If the GPS still does not respond, it could be due to an internal cable or serial port configuration error.

4. If an error is still being reported, try replacing the GPS receiver and/or the GPS antenna.

## Universal Redundancy Switch

The following are troubleshooting procedures for the URS:

### No Power

- **Related Events:** ENOSWITCHOVER

The LEDs on the front panel of the URS indicate whether or not power is present. Only one of the two power LEDs needs to be on in order for the switch to perform properly.

1. Verify that the power connector is properly installed between the IOT board and the cabinet-mounted redundancy control board.

2. Check the IOTB board fuse (see Figure 4-3).

3. If there is still no power, the switch might have a bad voltage regulator, and the board might need to be replaced.

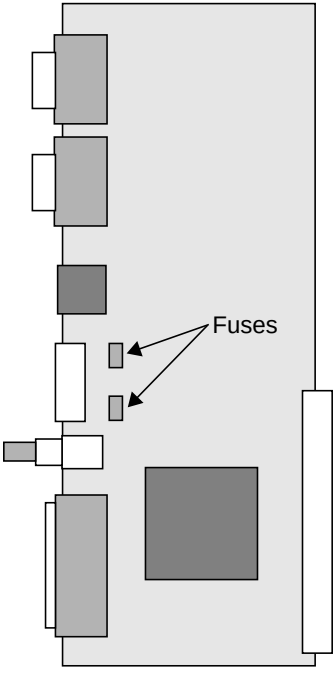



*Figure 4-3: IOTB Fuse Locations*

### No Switchovers

- **Related Events:** ENOSWITCHOVER

1. If switchovers attempted from the console interface are unsuccessful, verify that the redundancy cable is properly installed between the I/OT board and the proper side of the switch for both RF-C! controller systems in a redundant configuration.

2. If switchovers attempted from the maintenance tool are unsuccessful, verify that the switch is not in manual mode (MAN LED is on).

3. If switch is in manual mode, change it to automatic mode by using the push-button located on the URS front panel under the AUTO/MAN label (MAN LED is not on).

4. If switchovers still are unsuccessful, verify that switchovers are enabled within the software and that the RF-C! controller is in redundant mode. This can be done through the console interface (see *RF-Conductor!™ Controller Administration*, Motorola part number 6880494G54).

5. If none of the above solutions work, replace the SSC board, I/OT board, and/or URS and their interconnecting cables.

### Side A and B Indicator LEDS Are Not On

- **Related Events:** ENOSWITCHOVER

If the redundancy switch has power, but the Side A and B LED indicators are not on, then it is likely the switch is bad and needs to be replaced.

## Logging Printer

The logging printer is not working.

1. Verify that the printer is turned on, has paper in it, and the cabling is correct between the terminal server and the printer. The cable must be connected to the printer serial port.

2. If the cabling is correct and the printer is operational, verify that the proper port for the logging printer is configured on the terminal server. Port 16 of TERMSERV1 is used for the logging printer (see Appendix B, "Terminal Server Configuration", paragraph, "Logging Printer Port Setup" for configuration information).

## VDT

The VDT is not working.

1. Verify that the cabling between the VDT and the serial port on the PBBP is correct.

2. If the cabling is correct, verify that the VDT terminal type is set to VT100 (see *RF-Conductor!™ Controller Administration*, Motorola part number 6880494G54, for more information).Terminal Server

## Terminal Server

The terminal server cannot be accessed through port number1.

1. Cycle the terminal server power off, then on.

2. Refer to the *Chase Iolan+ Administration Manual.* This is the trouble shooting and maintenance documentation supplied by the terminal server manufacturer.

# Software Troubleshooting

The following section contains information that can be helpful in solving software related issues.

## SuperStream

### No SuperStream Output Data

- **Related Events:** ESuperStream DOWN, ESCHEDULER_FELL_BEHIND

There are several reasons why there might not be any SuperStream output data.

1. The URS is not working or present. A working URS is necessary to receive the SuperStream output in RS232 configurations. Verify that the URS is working properly.

2. The SuperStream output cable is not connected properly. Verify RS-485 configurations do not use the redundancy switch.

3. The clock source is configured incorrectly in the database. Using the console interface, verify that the database is configured for the proper clock source. If the database selection is for an external clock, verify the external clock interface is providing the proper clock signal on the proper pin of each SuperStream port configured to use the external clock.

4. The external clock source is not present.

5. The distribution links are not properly defined in the database. From the console interface, verify that the correct SuperStream ports are enabled in the database (see *RF-Conductor!™ Controller Administration*, Motorola part number 6880494G54).

6. If everything above is correct, it might be necessary to replace the SSC board and / or the I / OT board.

*Note: SSC board pinouts are in Appendix D, "SuperStream Connection Pinouts"*

### SSCBoard BOARD ACTIVE LED is not set

- **Related Events:** ESuperStream DOWN

1. If the SSC board BOARD ACTIVE LED is not on, the RF-C! controller is not sending out any FLEX and / or POCSAG pages. This could be due to any of the reasons listed in previous subsection, No SuperStream Output Data.

2. The queuing, batching, and scheduling parameters might be improperly set (see *RF-Conductor!™ Controller Administration*, Motorola part number 6880494G54).

## TNPP

### TNPP Port Is Out of Service

- **Related Events:** ETNPPDOWN

1. The terminal server is not responding. Verify that the cables are connected to the proper ports on the terminal server. Use the console interface to see what terminal server ports are being used by the RF-C! controller, and verify that the parameter settings are correct.

2. The database is not configured properly. Verify that the terminal server is configured properly by logging onto the terminal server and verifying the server configuration with the suggested configuration (see Appendix B, "Terminal Server Configuration").

3. The cable between the RF-C! controller and the terminal server is not working. verify that all cables between the RF-C! controller and the terminal servers are installed properly.

4. The cable between the terminal server and the paging terminal is not working. verify that all cables between the RF-C! controller and the paging terminal are installed properly.

5. After verifying that the cables and database are correct, reset the terminal servers. To reset a terminal server, cycle the power by turning the power off and on from the power switch on the front panel.

6. If the issue persists, replace the terminal server.

### Cannot Connect to a Terminal Server Port

- **Related Events:** ETNPPDOWN

The RF-C! controller might not be able to connect to the terminal server because the database is not configured properly, the terminal server is not on the network, or the terminal server is not defined in the database.

## Database

### Cannot Update Parameters

- **Related Events:** EDBUSER

Only an administrator on the prime (active) RF-C! controller side can update parameters.

Use the console interface to verify that the machine used for the updates is the prime RF-C! controller and that the user is logged in as an administrator.

### Cannot Reconcile Databases

- **Related Events:** EDBUSER, ENOSPACE

Only an administrator on the prime (active) RF-C! controller side can reconcile databases.

1. Use the console interface to verify the machine used for the reconciliation is the prime RF-C! controller and that the user is logged in as an administrator.

2. Use the console interface to verify reconciles are enabled.

3. If the issue persists, it is possible that there is no more disk space. If this is the case, then delete any backup copies of the database or previous software releases that are not needed. Then, retry the command.

4. If the issue still persists, try resetting the RF-C! controller by initiating a COLD RESET through the console interface.

### Page Redundancy

- **Related Events:** EPAGE_RED_LINK_BAD, ECONGST

An inoperable page-redundant link can be caused by cable failures, a backup RF-C! controller reset, or congestion control in the backup RF-C! controller.

1. Verify that the ethernet link between the two RF-C! controller systems is properly connected and terminated.

2. If the backup RF-C! controller is experiencing congestion control, page redundancy goes out of service until the backup RF-C! controller has developed enough shared memory. Once this is accomplished, it will automatically start receiving pages again.

3. If the issue persists, try resetting the RF-C! controller by issuing a COLD RESET command from the console interface.

# Abbreviations and Acronyms

*Table 1-1: Abbreviations and Acronyms*

| Acronym | Definition |
|---|---|
| AUI | Auxiliary Unit Interface |
| BNC | Bayonet-Neill-Concelman (A type of connector named after its inventor) |
| CD-ROM | Compact Disk-Read Only Memory |
| CPU | Central Processor Unit |
| DAT | Digital Audio Tape |
| DIP | Dual In-line Package |
| EPROM | Erasable/Programmable Read-Only Memory |
| FEC | Forward Error Correction |
| FLEX™ | A Motorola proprietary protocol, using a one-way signal broadcasting with a predetermined repeat broadcast added |
| GPI/O | General Purpose Input/Output |
| GPS | Global Positioning System |
| I/O | Input/Output |
| I/OTB | Input/Output Transition Board |
| KG | Kilogram |
| LBS | Pounds |
| LED | Light-Emitting Diode |
| MB | MegaByte |
| MHz | MegaHertz |
| NIU | Network Interface Unit |
| NVRAM | Non-Volatile Random Access Memory |

*Table 1-1: Abbreviations and Acronyms*

| Acronym | Definition |
|---|---|
| PBBP | Paddle Board Breakout Panel |
| PPS | Pulse Per Second |
| PROM | Programmable Read-Only Memory |
| RAM | Random Access Memory |
| SSCB | Synchronous Serial Communications Board |
| SuperStream | A proprietary data protocol using FEC |
| TNPP | Telocator Network Paging Protocol |
| TOD | Time Of Day |
| TTL | Transistor-Transistor Logic |
| URS | Universal Redundancy Switch |
| VDT | Video Display Terminal |
| VME | Versa-Module Eurocard |

# Terminal Server Configuration

## Quick Configuration of the Terminal Server

This appendix contains brief instructions on terminal server configuration for RF-Conductor!™ controller system administrators and testers. Please refer to *CHASE Terminal Server User and System Administration Guides* for more detailed information.

### Connections

Before the configuring, successful installation of the terminal server includes:

- Powering on the terminal server
- Attaching the terminal server to the Ethernet network
- Configuring the /etc/hosts file on each host machine file so that it contains a unique IP address for each terminal server
- Loading TFTP boot file from the host machine

Once these steps have been completed, continue with the configuration of the terminal server. Configuration may take two paths: through a TELNET connection or through a direct connection into the terminal server through a video display terminal (VDT).

#### Procedure Using TELNET

Use the following procedure to configure the terminal server:

1. Create an Xterm window from your host machine (Sun or other) and TELNET to the terminal server. CtrlsvrXX is the name of the terminal server in the following example:

   sun> **telnet ctrlsvrXX <Return>**

2. At the prompt, type the terminal emulation command (see Figure B-1):

   ctrlsvrXX> **set term vt100<Return>**

*Note: All windows display the firmware version at the bottom of the screen.*


*Figure B-1: Terminal Type Command—Example*

3. The Connections Menu displays. If the Connections Menu is not displayed, type in the following command at the prompt:

   **set menu <Return>**

4. Select the first connection, and press **<Return>**. The Connections Menu, Commands pop-up window displays.

*Note: To find where you are in the menu system, press* **<Esc>** *until you reach the Connections Menu.*

5. Select the Admin mode field and press **<Return>**.

6. Select the password field and press **<Return>**. The Administration Menu displays.

7. Type **iolan** and press <Return>. iolan is the factory default password.

   The Administration menu refreshes with additional fields (see Figure B-2).

*Note: Do not change the password from the factory default. Changing this password will have a negative impact on Motorola support.*

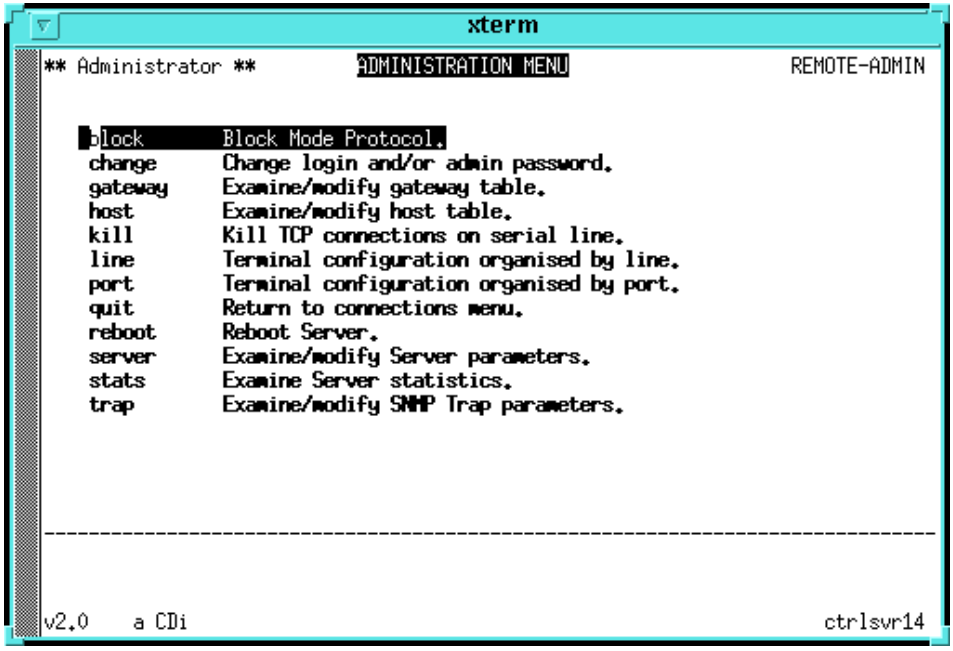



*Figure B-2: Administration Menu—Expanded*

8. Select **server** and press **<Return>**. The Server Configuration Menu displays (see Figure B-3).

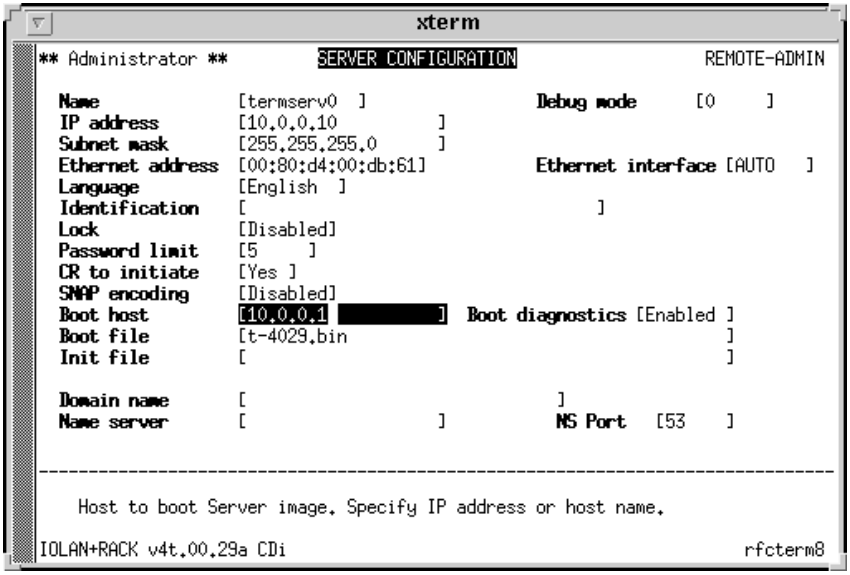



*Figure B-3: Server Configuration Menu*

9. Enter values into the following fields: **Name**, **IP address**, and **Subnet Mask** (see Table B-1). The **boot host** and **boot file** fields are needed only if the firmware on the EPROM is old. The boot host contains the host name or IP address of the host machine that contains the server download image. The boot file contains the file name of the server download image. Refer to the Release Notes for specific information about terminal server software version for each release.

*Table B-1: Terminal Server Gate Configuration (Sheet 1 of 2)*

| Terminal Server | Terminal Server IP | Subnet Mask |
|---|---|---|
| termserv1 | 10.0.0.11 | 255.255.255.0 |
| termserv2 | 10.0.0.12 | 255.255.255.0 |
| termserv3 | 10.0.0.13 | 255.255.255.0 |
| termserv4 | 10.0.0.14 | 255.255.255.0 |
| termserv5 | 10.0.0.15 | 255.255.255.0 |
| termserv6 | 10.0.0.16 | 255.255.255.0 |

*Table B-1: Terminal Server Gate Configuration (Sheet 2 of 2)*

| Terminal Server | Terminal Server IP | Subnet Mask |
|---|---|---|
| termserv7 | 10.0.0.17 | 255.255.255.0 |
| termserv8 | 10.0.0.18 | 255.255.255.0 |
| termserv9 | 10.0.0.19 | 255.255.255.0 |

10. Once entries are complete, press **<Return>** to activate the Commands pop-up window. Select **Save & Exit**, then press **<Return>**. This returns you to the Administration Menu.

11. If an IP address is changed, select the **Reboot** option before continuing.

## Port Setup

For each terminal server, the necessary ports for TNPP connection must be set up. Ports 2 – 14 are available for TNPP, port 1 is reserved for the terminal server console, and ports 15 and 16 are reserved for Motorola use.

The following areas must have field entries:

- Hardware
- Flow control
- Keys
- Access

Use the following steps:

1. Select **port** from the Administration Menu. It is recommended that you begin with Port 1, the diagnostics port.

2. Enter the port number to set up, and press **<Return>**.

3. The Port Setup Menu displays (see Figure B-4). Enter the required information in the fields for each area (bulleted items above). For more information on required entries, please refer to the *CHASE User and Administration Guide.*

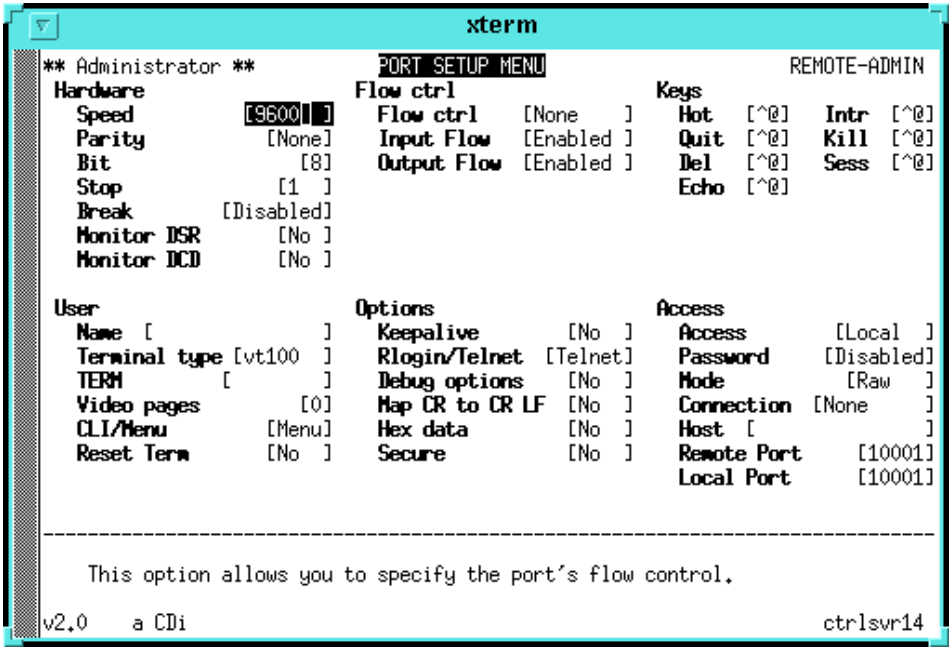



*Figure B-4: Port Setup Menu for Port 1*

4. When finished, press **<Return>**. The Port Setup Menu Command pop-up window displays. Select **Save and Exit** from the Commands pop-up window, then press **<Return>**.

   The Administration Menu displays (see Figure B-2).

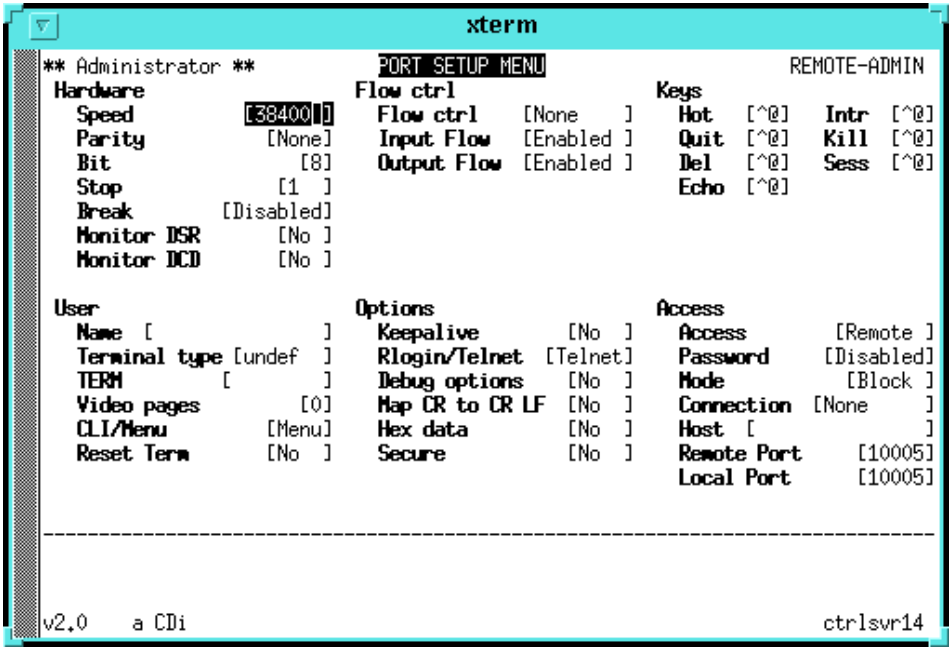



*Figure B-5: Port Setup Menu—Commands (for Ports 2-14)*

5. For each subsequent TNPP port, repeat steps 1 – 4 (see Figure B-5). Note that only the Keys area fields need to be set by the user. The rest of the parameters associated with non-diagnostic ports are set by the RF-C! controller.

## Logging Printer Port Setup

The most important section of setup for printers is the **access** fields. There are a number of fields which will need specific values:

- Keys
- Access
- Mode
- Remote port number
- Local port number
- User name
- Flow control

Use the following steps:

1. From the Administration Menu, select and enter the port number for the log printer.
2. Select the **Port** option, and press **<Return>**. The Port Setup Menu appears.
3. Disable all special keys by entering the **^@** symbol in all fields.
4. Set Access to **remote**.
5. Set the Mode to **Raw**.
6. Set the Flow Control to **Hardware**.
7. Set the Local Port to **515** for the LPD printer.
8. Set the User Name to **lpd_printer**.

   The window should appear as shown in Figure B-6 when completed.

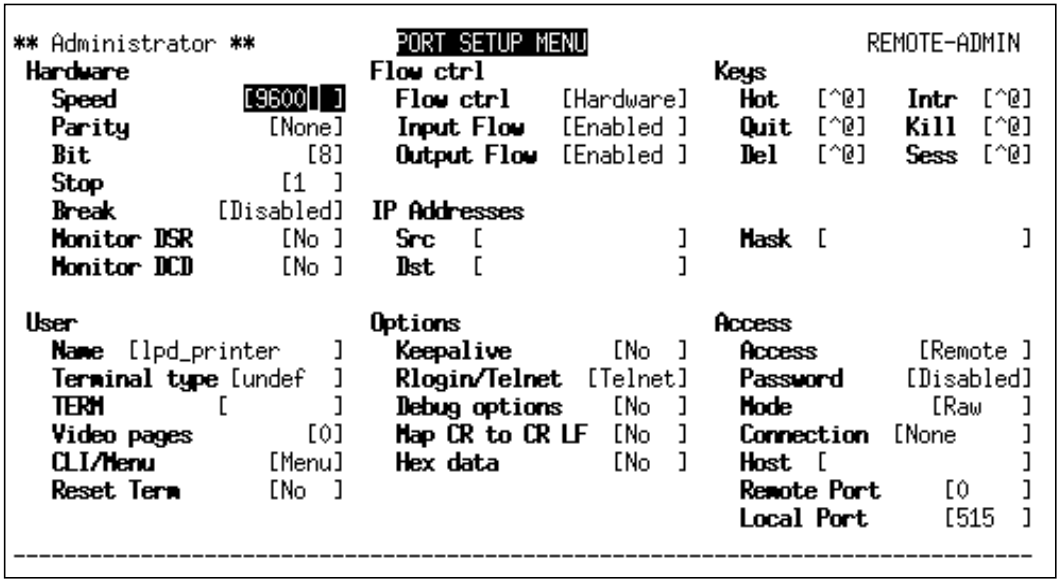



*Figure B-6: Port Setup Menu—Logging Printer Option*

9. Once printer port setup is complete, press **<Esc>** until you return to the Administration Menu. You must use the **Kill** option to restart the port before the setup will take effect.

10. Printer setup on the RF-C! controller is done during the installation. Refer to the installation procedures for operating system configuration.

## Modem Port Setup

The terminal server can be configured for dial-in, providing access to the server for the remote system (Console) or qualified users. The following required parameters must be at these values:

- Name: **modem**
- Terminal type: **dumb**
- CLI / Menu: **CLI**
- Reset Term: **Yes**

- Monitor DSR: **Yes**
- Monitor DCD: **Yes**
- Access: **Local**
- Password: **Disabled**
- Mode: **Raw**

Many fields may already be set to these values, but the completed input must match the screen shown in Figure B-7.

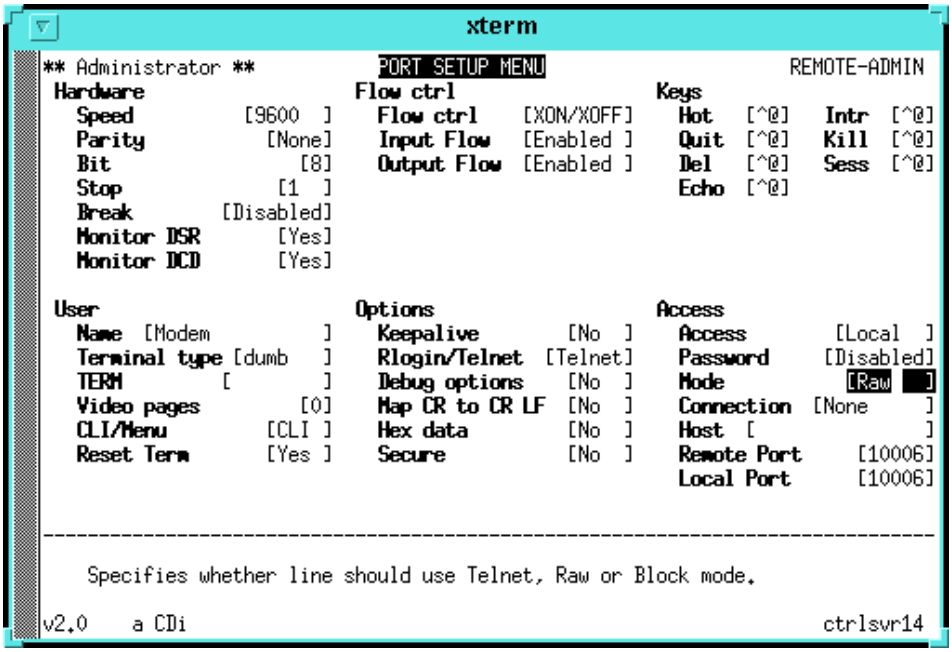



*Figure B-7: Modem Port Setup*

11. Configure the modem port using steps 1–3 of “Port Setup”. The setup shown in Figure B-8 will result in a normal terminal server interface for a dial-in user, enabling them to connect manually to any host on the network.

12. If the modem is to connect directly to the RF-C! controller, modify the Access fields as follows:
    - Connection: **Dedicated**
    - Host: name of the host machine being connected to
    - Remote port: **Port 23** for telnet, and **Port 513** for login.

The terminal server can be configured for remote access using a direct connection for a dumb terminal to a specific terminal server port.

The following fields must be set as indicated:

- Keys: all set to **^@**
- Name: **Vt100**
- CLI / Menu: **Menu**
- Password: **disabled**
- Access: **Local**
- Mode: **Raw**
- Flow Control: **XON/XOFF**

### Procedure–Remote Port Setup

Use the following steps:

1. Select Port from the Administration Menu and press <Return>. The Port Setup Menu displays (see Figure B-8).

2. Configure the remote port following procedures in “Port Setup” and “Modem Port Setup”. The setup illustrated below will result in a normal terminal server interface for a remote user, enabling them to connect manually to any host on the network.

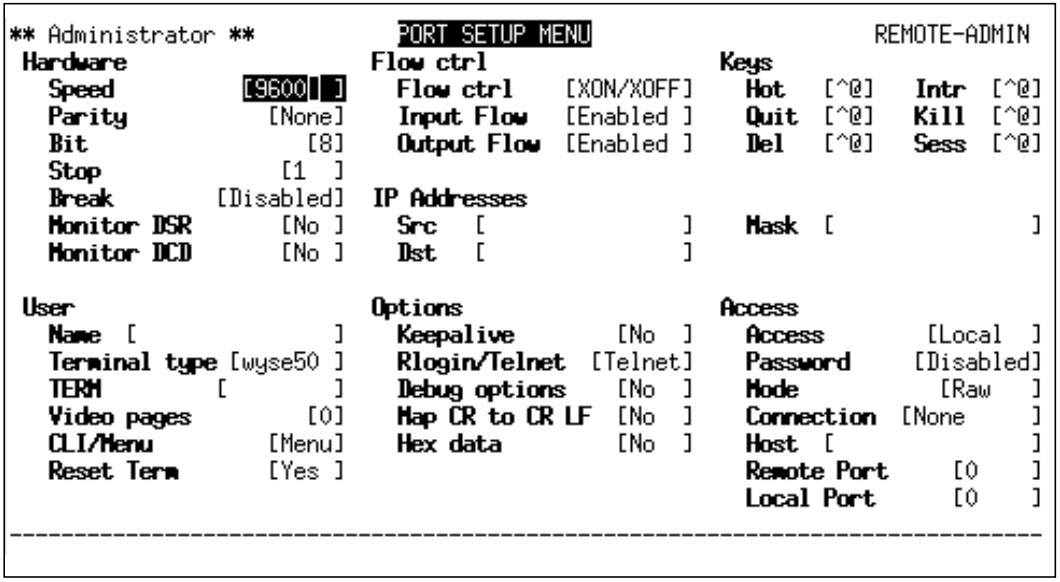



*Figure B-8: Port Setup Menu—Remote Port Option*

3. Press **<Return>** then select **save and exit** from the Commands pop-up window.

4. Once the remote port setup is complete, press **<Esc>** until you return to the Administration Menu. You must then use the **Kill** option to restart the port before the setup will take effect.

### Procedure–Remote Port Login

Once the port has been restarted, perform the following steps:

1. Connect the video display terminal to the proper port. The video display terminal will display:

   termserv1 login:

2. At the prompt type:

   termserv1 login:**iolan**

   The Connection Menu displays (see Figure B-9).

3. Select **telnet**, and press **<Return>**. The Open Connections pop-up window displays.

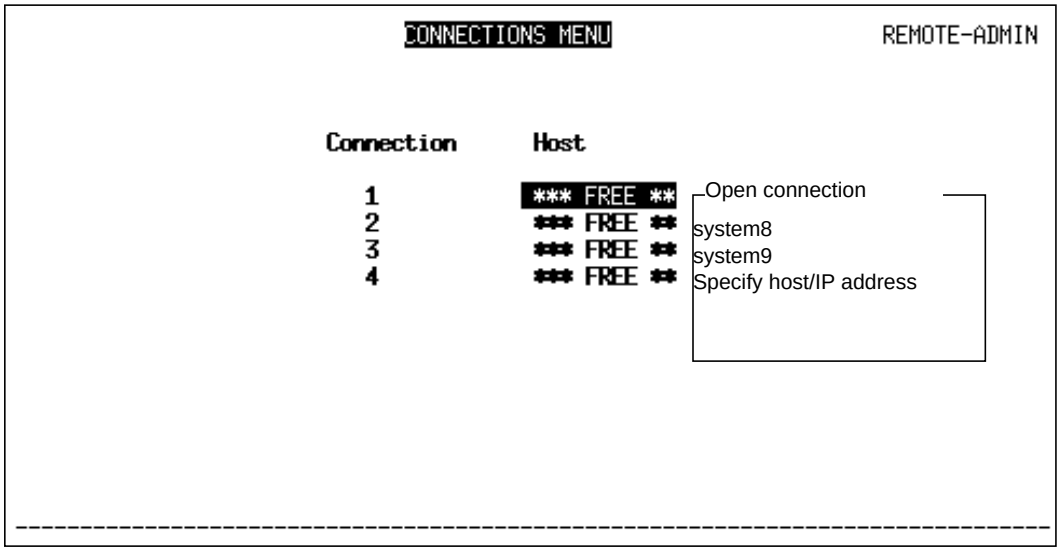



*Figure B-9: Connections Menu—Open Connection Pop-Up Window*

4. Select the desired entry, then press **<Return>**.

5. Get login prompt for the host machine selected, as shown (see Figure B-10).

```
Connection to host system8
Type ^] to return to connections menu.
Connection established

UNIX(r) System V Release 4.0 (system8)
login:
```

*Figure B-10: Login Prompt*

## Host Setup

There can be multiple hosts connected to a terminal server, using either a remote port or a modem port login. Each host port must be configured. Use the following procedure to setup the host:

1. Select **Host** from the Administration Menu. The Host Setup Menu displays.

2. Enter the **Host name** and **IP address** for each device.

3. Press **<Return>** and select **save and exit** from Commands pop-up window.

## Terminal Server Statistics Setup

The terminal server collects and maintains the following system statistics:

- Ethernet / TTY / Gateway
- IP / ICMP / UDP
- TCP
- Users
- Netstat
- Gateway
- Slip
- Clear counters
- Restore counters
- Port status
- Line status
- LPD status

The two most useful statistics to the system administrator are: Users and Port Status. The procedures for setting up these two statistics follow.

### Procedure—User Statistics

1. From the Administration Menu, select the **Stats** option. The Server Statistics window displays (see Figure B-11).

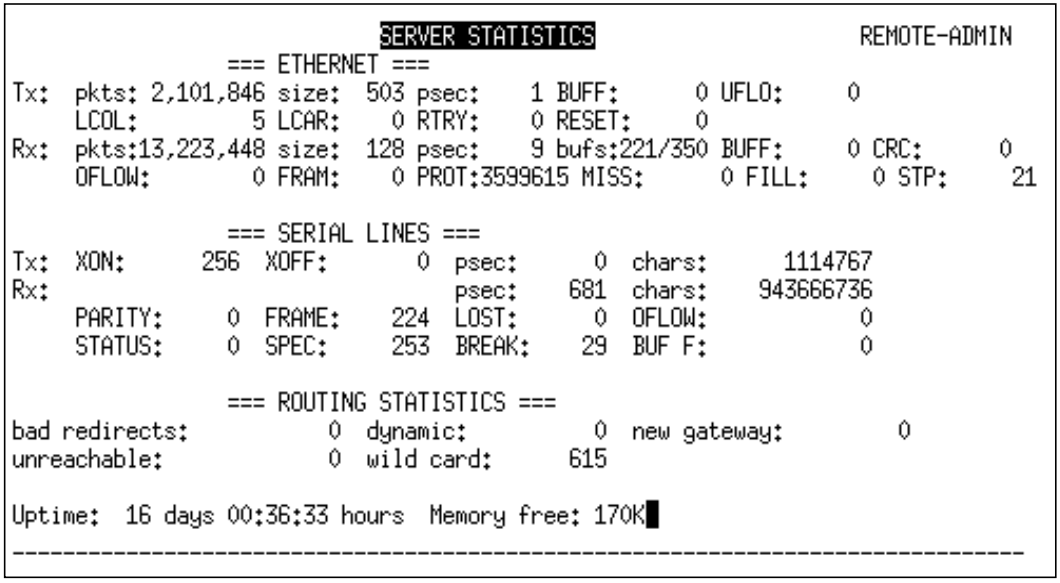



*Figure B-11: Server Statistics Menu*

2. Press **<Return>** to display the pop-up window with the Statistics options.

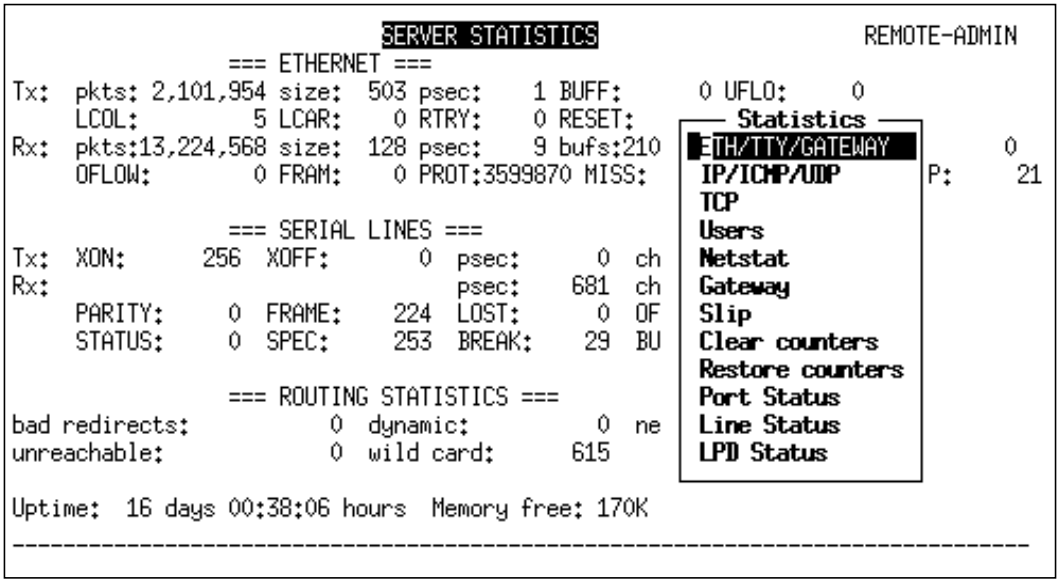



*Figure B-12: Server Statistics Menu–Statistics Options Pop-Up Window*

3. Select **Users**, then press **<Return>**.

4. The Server Statistics–Users Statistics screen displays (see Figure B-13). The first column identifies the physical port. The second column describes the current state of the port. Two options are possible:
   - Waiting for incoming connection—indicates the port is waiting for a TCP connection; or
   - Talking to host—indicates the terminal server is connected to the host with that IP address

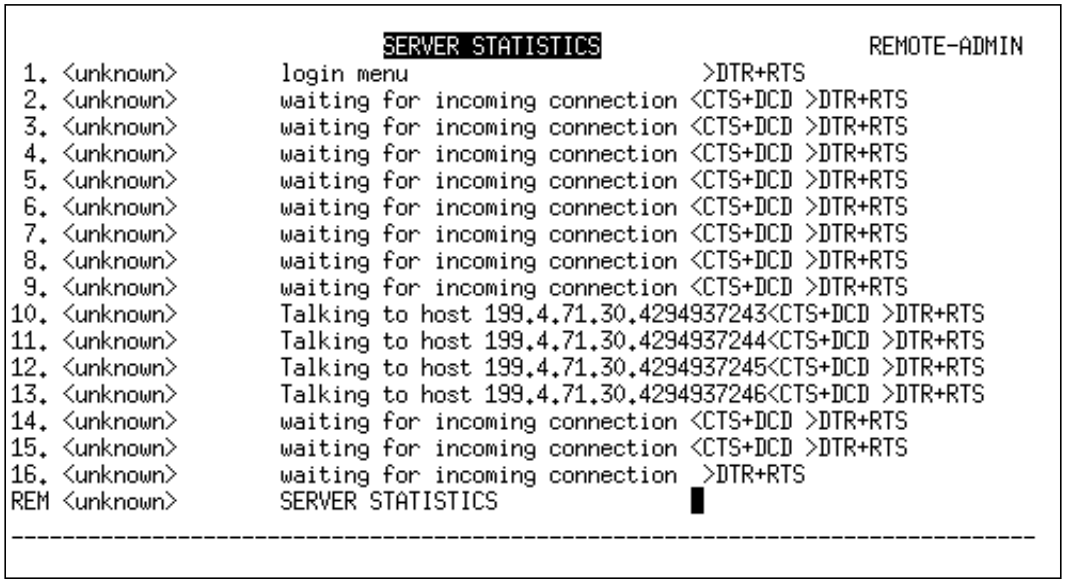



*Figure B-13: Server Statistics—User Statistics*

### Procedure—Port Status Statistics

1. From the Administration Menu, select **Stats**. The Server Statistics window displays (see Figure B-11).

2. Press **<Return>** to display the pop-up window with the Statistics options.

3. Select **Port Status**, then press **<Return>**.

4. The Port Status statistics displays (see Figure B-14).

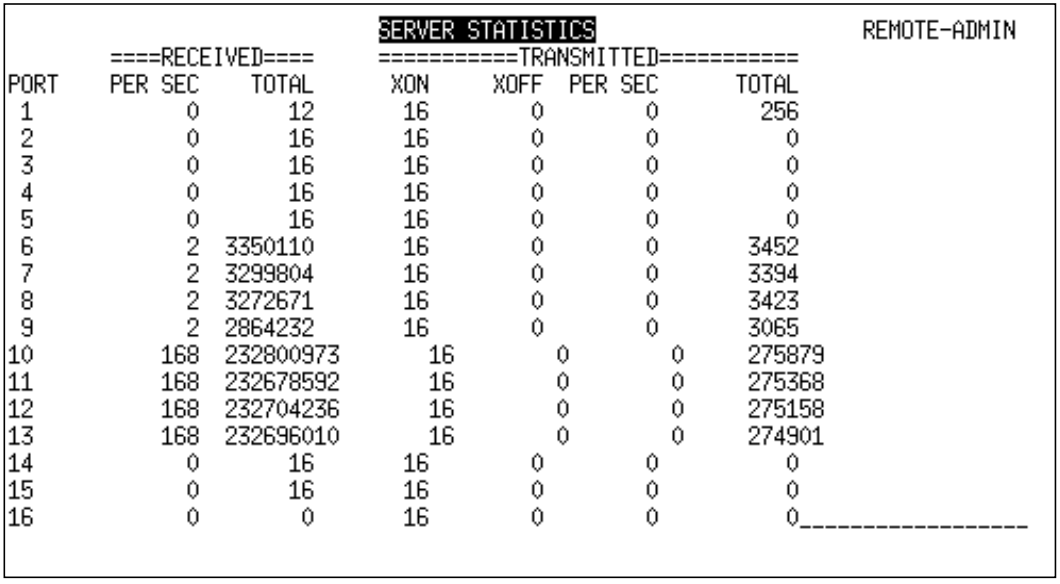



*Figure B-14: Server Statistics Menu—Port Status Statistics*

# Software Installation

## Operating System Installation Overview

The UNIX® software is installed at the factory. However, the following procedures may be necessary if the software becomes corrupted or changes are made after the installation.

*Note: Do not connect any peripherals during these procedures.*

Refer to the *Solaris™ Install Manual* that accompanies the software for details on installing the Solaris™ Operating System into an RF-C! controller.

This procedure describes the software installation for the RF-C! controller. Information and instructions for completing the operating system installation are provided (see paragraph, "Beginning the Operating System Installation" and paragraph, "Installing Solaris 2.5.1 Software").

Because the procedures in this document involve many interactive screens and different interfaces, use the vendor documentation for Solaris 2.X as references.

# Operating System Requirements

You will need the following materials to perform the software installation procedures in this chapter:

### For Solaris 2.X

- SPARC-Compliant Definition (SCD) CD-ROM drive (part of the RF-C! controller). (Solaris software is distributed only on CD-ROM media.)
- Solaris 2.X CD-ROM
- A completed Solaris preinstallation worksheet (see Table C-1)
- A terminal device such as a VT100 terminal or Sun™ workstation

*Table C-1: Configuration Table for Solaris*

| Configuration Type | Example |
|---|---|
| **Hostname** | phoenixa or phoenixb |
| **IP address** | 10.0.0.2 (side A) 10.0.0.3 (side B) |
| **Subnet mask** | 255.255.255.0 |
| **Name service (side A and side B)** | None |
| **Root password (side A and side B)** | 6–8 character user specified root password |

# Beginning the Operating System Installation

To begin the installation of the operating system, boot the Solaris 2.X software from a CD-ROM onto your RF-C! controller system. Use the following installation procedures:

- Booting Solaris from CD-ROM
- Specifying network information
- Specifying subnet information
- Specifying time zone and date

Perform these procedures on both primary and secondary systems, if applicable.

## Booting Solaris from CD-ROM

Perform the following procedure to boot the Solaris from CD-ROM.

1. Insert the *Solaris 2.X Software* CD-ROM into the CD-ROM caddy and insert the caddy in the CD-ROM player.

2. From the UNIX ok prompt, type:

   **boot cdrom <Enter>**

   The boot process takes approximately 2 minutes. Once the boot occurs, the terminal options display (see Figure C-1).

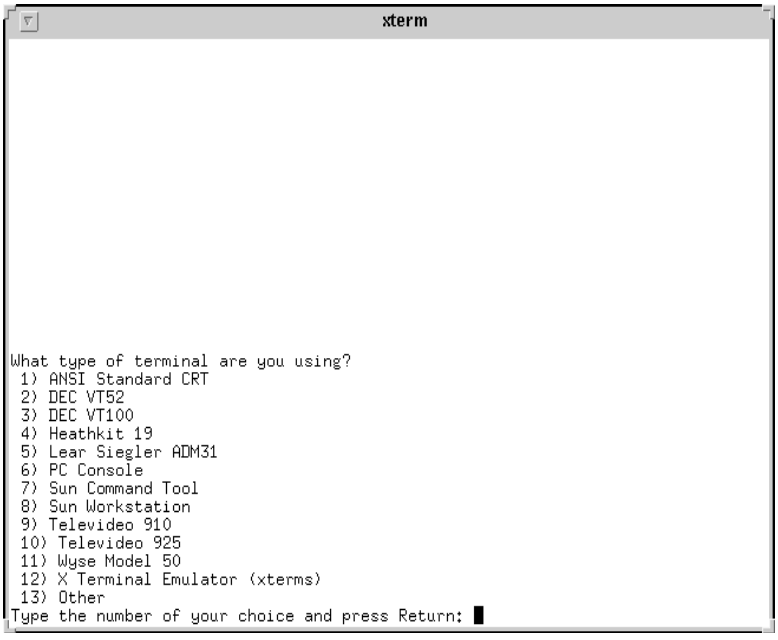



*Figure C-1: Terminal Selection Options*

3. Use the arrow keys to select the type of terminal you are using and press **<Enter>**:

   12 (for NCD terminal)
   7 (for Sun Command Tool)
   3 (for VT100)

   The Solaris Installation Program screen is displayed (see Figure C-2).

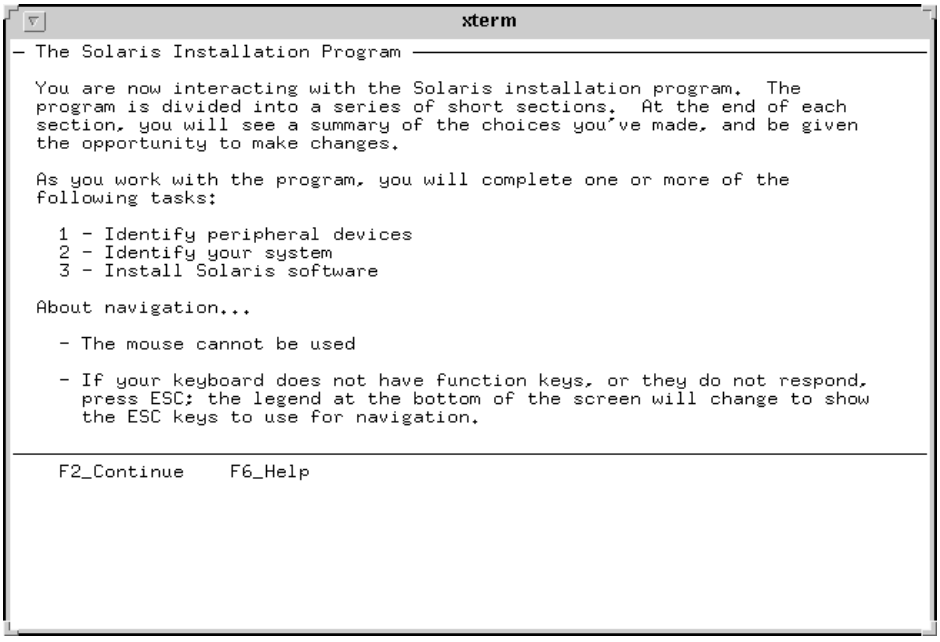



*Figure C-2: The Solaris Installation Program Screen*

## Specifying Network Information

Perform the following procedure to specify network information.

*Note: If you are using a Sun system, and the instruction says "press* **<F2>***", press the function key* **<F2>***. If you are using a VT100 terminal, you must press* **<Esc>** *and the number key, not the function key. For example, if the instruction says "press* **<F2>***", the VT100 equivalent is to press* **<Esc >** *and* **<2>** *(the number key) simultaneously.*

1. Press **<F2>**.

   The Identify this System screen displays (see Figure C-3).

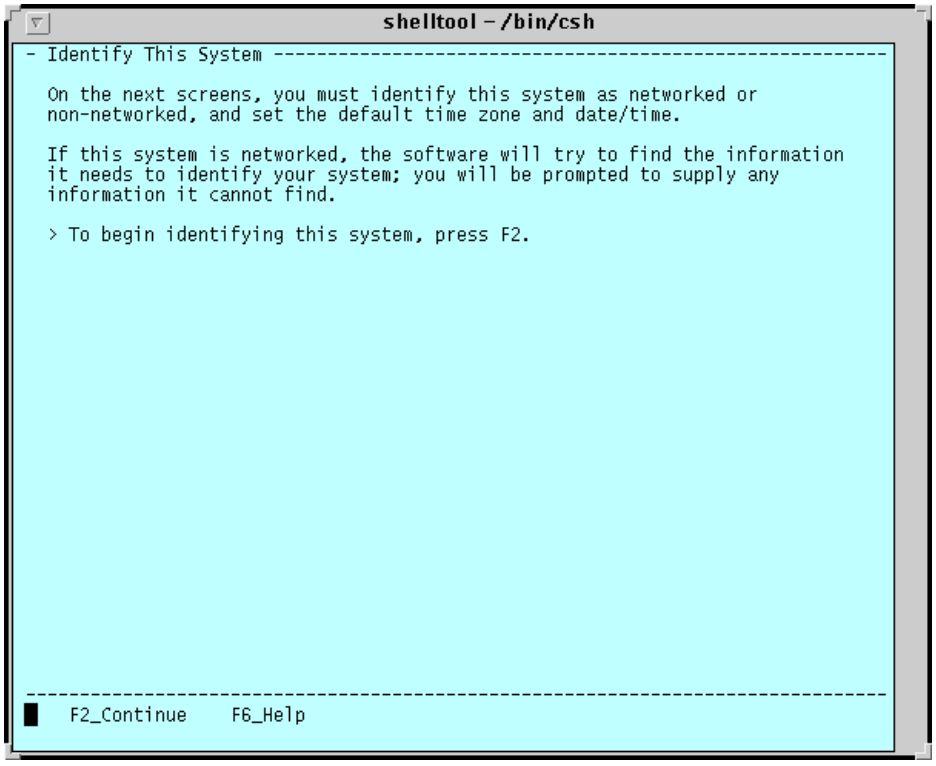



*Figure C-3: Solaris Identify This System Screen*

2. Press **<F2>** to continue.

   The Host Name screen displays.

In the Host Name screen, type:

[**phoenixa**] **<F2>** for the A side

**[phoenixb] <F2>** for the B side

*Note: Your host name may differ.*

The Network Connectivity screen displays.

*Note: To highlight or select an option, use the arrow keys to position the cursor on the option and press* **<Enter>**. *To continue, press* **<F2>**.

3. At the Network connectivity prompt, select Yes and press **<Enter>**.

4. Press **<F2>** to continue.

   The Internet Protocol Address screen displays.

5. Using the arrow keys, choose le0 and press **<Enter>**.

6. Press **<F2>** to continue.

7. Type the IP address and press **<F2>** (see Table C-1).

*Note: Your IP address may differ.*

   The network Confirm Information screen displays.

8. Verify the network information. If the information is correct, press **<F2>** to continue.

   If the information is incorrect, press **<F4>** and repeat the steps as required.

   The Name Service screen displays the Solaris configuration information (see Table C-1).

## Subnet Information

1. At the Name Service... prompt, use the tab keys to select none and press the **<spacebar>** to select.

2. Press **<F2>** to continue.

   The Subnets screen displays (see Figure C-4).

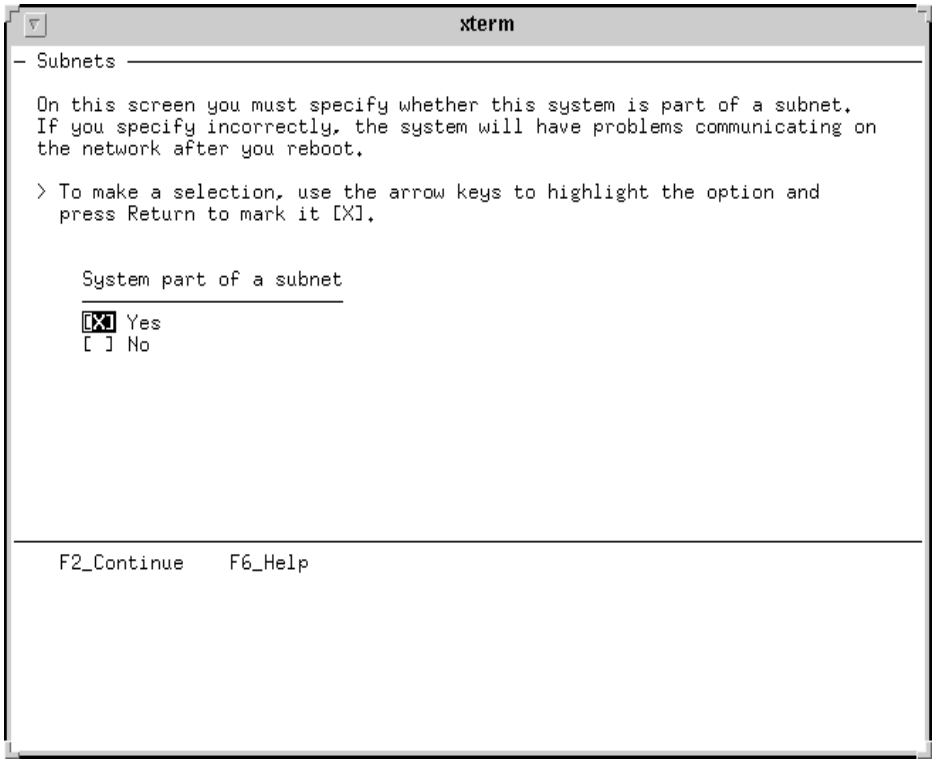



*Figure C-4: Subnets Screen Example*

*Note: Step 3 occurs only if networked.*

3. Specify that the system is part of a subnet. Using the arrow keys, select Yes and press: **<Enter> <F2>**

   The Netmask screen displays (see Figure C-5).

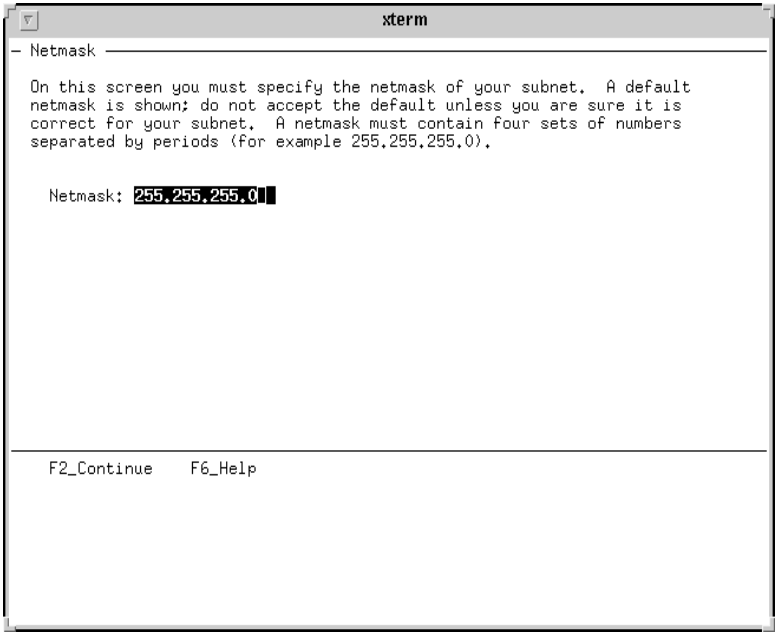



*Figure C-5: Netmask Screen Example*

4. Define the netmask of your subnet (see Table C-1). In the Netmask field, type:

   **[the subnet value]** (for example: [255.255.255.0]) **<F2>**

   The Subnet Confirmation screen displays.

5. Verify the information. If the information is incorrect, press **<F4>** and repeat the steps as required. If the information is correct, press **<F2>** to continue.

   The Time Zone Regions screen displays.

## Time Zone and Date

Perform the following procedure to set the time zone and date.

1. Specify your default time zone by using the arrow keys to select the desired region and press:

   **<Enter> <F2>**

The Time Zone screen displays (see Figure C-6).

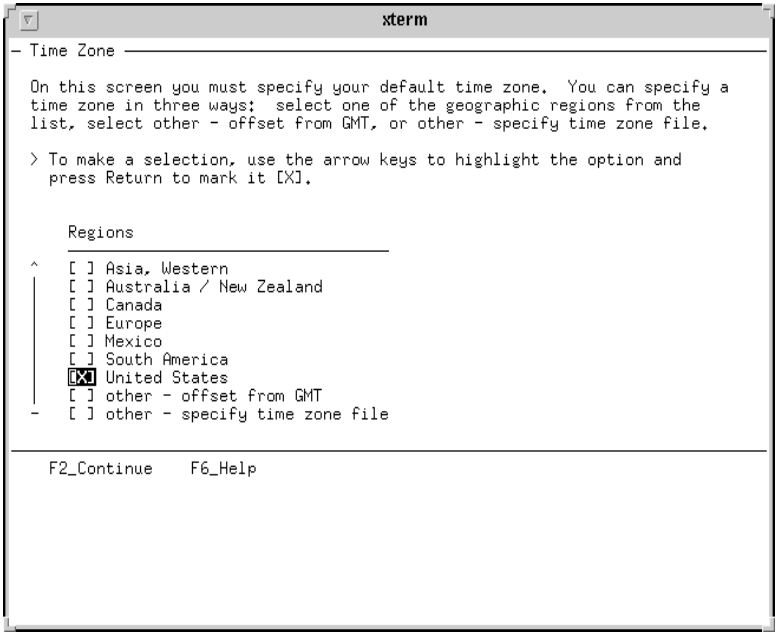



*Figure C-6: Time Zone Screen Example*

2. Select your time zone by using the arrow keys and press:

   **<Enter> <F2>**

   The Date and Time screen displays (see Figure C-7).

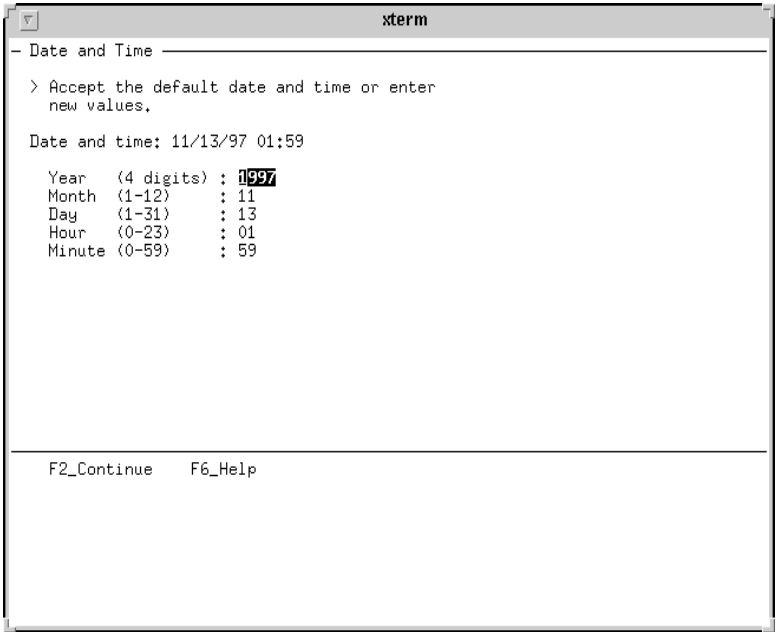



*Figure C-7: Date and Time Screen Example*

3. Set the date and time by using the default values or modifying the fields as necessary.

4. To confirm the information, press **<F2>**.

   The date and time Confirm Information screen displays the date and time zone information. This process takes approximately 2 minutes.

   The Confirm Information screen displays (see Figure C-8).

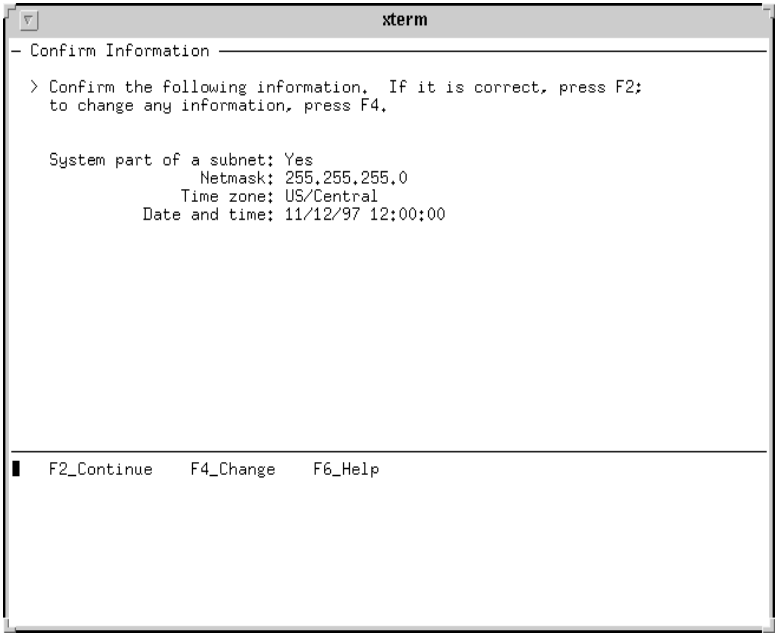



*Figure C-8: Confirm Information Screen Example*

5. Verify the information is correct.

   If the information is not correct press **<F4>** and repeat the steps to make changes. If the information is correct press **<F2>**.

   The Initial Install Solaris screen is displayed (see Figure C-9).

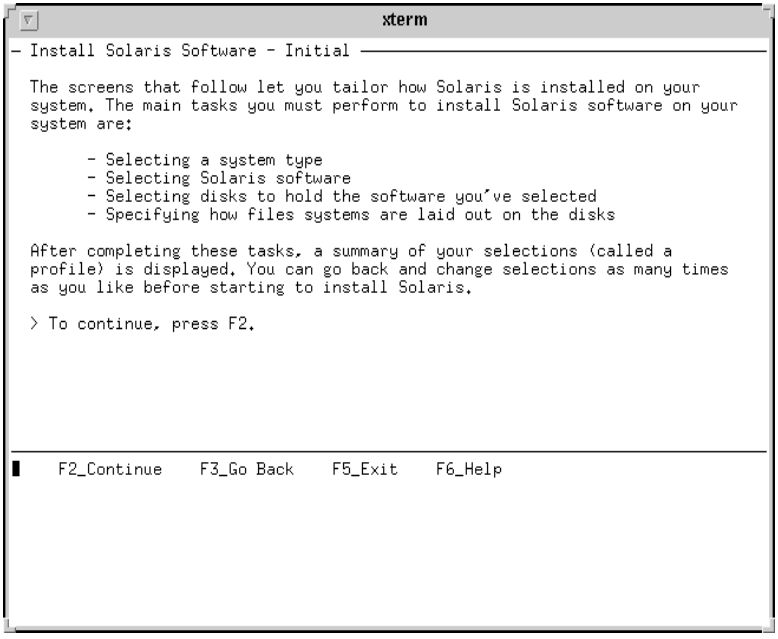



*Figure C-9: Initial Install Solaris Screen*

6. To ensure proper formatting of the drive, press **<F5>** to exit the Solaris installation.

   The system pauses approximately 2 minutes. The Exit Solaris Installation screen displays (see Figure C-10).

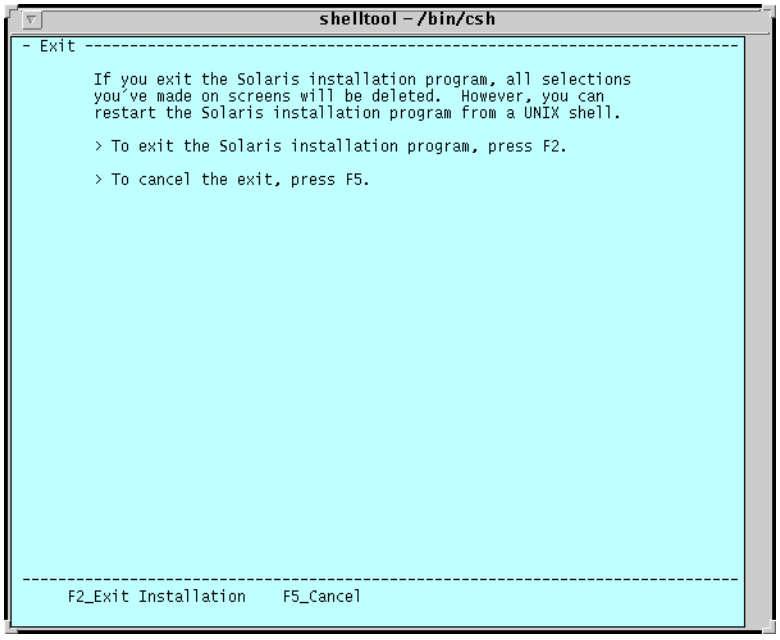



*Figure C-10: Exit Solaris Installation Screen Example*

7. Press **<F2>** to exit the Solaris installation.

You are now ready to format and partition the system disk.

*Note: All information defined to this point is saved.*

# Formatting the Hard Disk Drive

Perform the following procedure to format the hard disk drive:

1. From the UNIX # prompt, type:

   **format <Enter>**

2. Specify the disk number. Type:

   **0** (the number zero) **<Enter>**

   The FORMAT MENU screen displays (see Figure C-11).

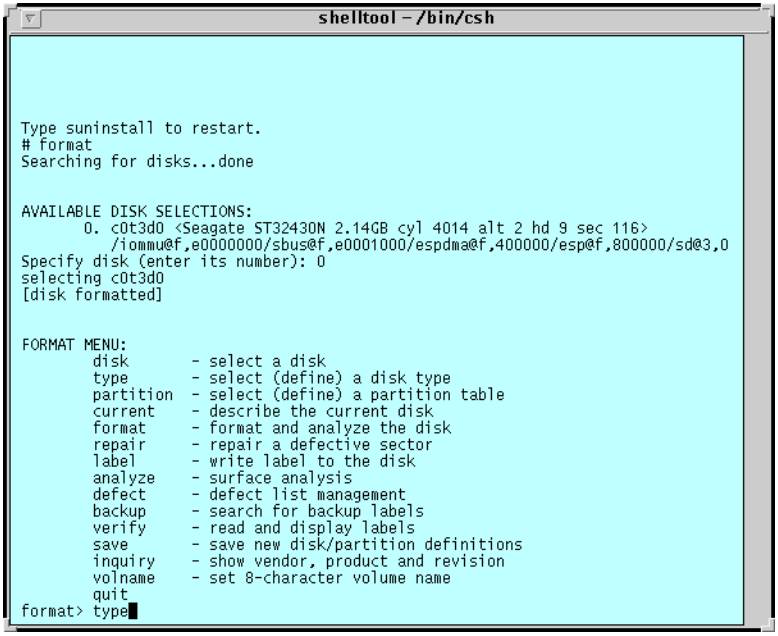



*Figure C-11: Format Menu Screen Example*

3. From the format> prompt, type:

   **format <Enter>**

4. At the Ready to format.....Continue? prompt. Type:

   **y <Enter>**

*Note: This procedure requires approximately 2 hours to complete.*

## Partitioning the Disk

Once the disk formatting process finishes, you are ready to partition the disk.

1. At the format> prompt, type:

   **partition <Enter>**

   The system is displayed the PARTITION MENU (see Figure C-12).

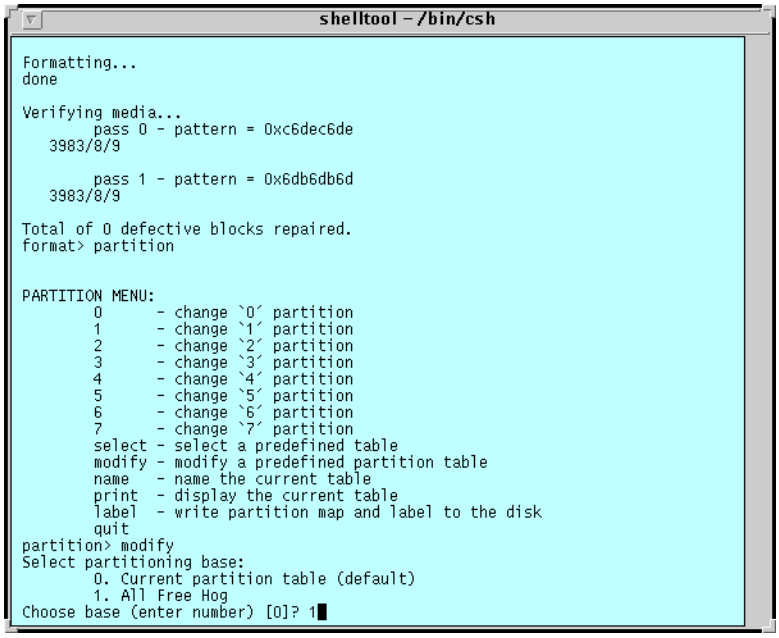



*Figure C-12: Partition Disk Menu Example*

2. At the partition> prompt, type:

   **modify <Enter>**

3. At the Choose base... prompt, type:

   **1 <Enter>** (All Free Hog)

4. At the Do you wish...table [yes]?> prompt, press **<Return>**.

5. At the Free Hog partition [6]? prompt, press:

   **<Enter>**

6. The system prompts you to enter sizes of partitions:
   a. For the size of partition 0, type **50mb <Enter>**
   b. For the size of partition 1, type **256mb <Enter>**
   c. Press **<Enter>** for the size of partitions 3, 4, 5, and 6.

7. Press **<Enter>** to accept the current partition table at the Okay to make this the current partition table (yes)? prompt.

8. At the Enter table name (remember quotes) prompt, type:

   **["phoenixa"] <Enter>** (for the primary side)

   **["phoenixb"] <Enter>** (for the secondary side)

9. At the Ready to label disk, continue? prompt, type:

   **y <Enter>**

10. At the partition> prompt, type:

    **print <Enter>**

    The system displays the current partition table and the total disk cylinders available (see Table C-2).

*Table C-2: Disk Partition Table*

| Part | Tag | Size |
|---|---|---|
| **0** | root | 50 MB |
| **1** | /swap | 256 MB |
| **3** | /usr/openwin | 150 MB |
| **4** | /var | 150 MB |
| **5** | /opt | 80 MB |
| **6** | /usr | 150 MB |
| **7** | /export/home | remaining |

11. Use the default for partition permission. Press:

    **<Enter>**

12. Use the default for new starting cylinder. Press:

    **<Enter>**

13. Use the default for partition size. Press:

    **<Enter>**

14. At the partition> prompt, type:

    **label <Enter>**

15. At the Ready to label disk, continue? > prompt, type:

    **y <Enter>**

16. Verify that the disk values are correct. At the partition> prompt, type:

    **quit <Enter>**

## Formatting the Hard Drive

17. At the format prompt, type:

    **volname <Enter>**

18. From the format> prompt, type:

    **["phoenixa"] <Enter>** (for the primary side)

    **["phoenixb"] <Enter>** (for the secondary side)

19. At the ready to label disk, continue? prompt, type:

    **y <Enter>**

20. From the format> prompt, type:

    **q <Enter>**

    You are now ready to enter the Solaris install program.

# Installing Solaris 2.5.1 Software

Perform the following procedure to install the Solaris 2.X software:

*Note: If you are using a Sun system, and the instruction says "press* **<F2>***", press the function key* **<F2>***. If you are using a VT100 terminal, you must press* **<Esc>** *and the number key, not the function key. For example, if the instruction says "press* **<F2>***", the VT100 equivalent is to press* **<Esc >** *and* **<2>** *(the number key) simultaneously.*

1. From the UNIX # prompt, type:

   **suninstall <Enter>**

2. At the Install Solaris Software - Initial prompt, press **<F2>**

3. If a previous version of Solaris is located, the system prompts with the Upgrade System...(install option). Press **<F4>**.

*Note: Step 3 occurs only if Solaris was previously loaded.*

4. Use the arrow keys to select Standalone and press:

   **<F2> <Enter>**

5. Select the Solaris software to install. Use the arrow keys to select:

   End User.

6. To continue, press:

   <**F2**> **<Return>**

7. Use the arrow keys to select the available formatted disk selection.

8. Use the arrow keys to elect the disk for installing Solaris. Select c0t3d0 and press **<F2>**.

9. To preserve the data, press **<F2>**.

   Do not preserve slices or file systems.

10. At the Automatically Layout File Systems? prompt, select manual layout. Press **<F4>**.

11. Use the arrow keys to move through the fields and type the appropriate mount points for each slice:
    - 0 **/<Tab>50<Tab>**
    - 1 **swap<Tab>256<Tab>**
    - **3 /usr/openwin<Tab>150<Tab>**
    - 4 **/var<Tab>150<Tab>**
    - 5 **/opt<Tab>80<Tab>**
    - 6 **/usr<Tab>150<Tab>**
    - 7 **/export/home<Tab>Enter Free Space<Tab>**

*Note: An allocation error may appear before the screen is displayed. If so, ignore this error.*

12. At the File system and Disk Layout prompt press **<F2>**.

13. Bypass Mount Remote File Systems and continue. Press **<F2>**.

14. Verify your system profile has the following attributes:
    - System type: Standalone
    - Software: Solaris 2.5.1, End User software

15. To continue, press **<F2>**.

16. At the WARNING: Unused disk space (c0t3d0) prompt, press **<F2>**.

17. Begin installation. Press **<F2>**.

*Note: Installation takes approximately 25 minutes.*

18. Once the installation completes select Reboot and press **<F2>**.

## Create Root Password

*Note: Follow instructions on the screen.*

The system asks you to input the root password.

1. Type:

   **[root password] <Enter>**

2. Again, type:

   **[root password] <Enter>**

3. Eject the CD-ROM. Type:

   **eject <Enter>**

# Loading the RF-C! Controller Software Tape

This section includes the procedures to load the RF-C! controller / WMS-Data release software and additional software sent on digital audio tape (DAT). The tape contains a **tar** with five files (see Table C-3).

*Table C-3: RF-C!/WMS-Data Install Files*

| File Name | File Description | Version Number |
|---|---|---|
| **2.5.1_Recommended.060998.tar.Z** | Solaris patches | |
| **2.5.1_y2000.041598.tar.Z** | Year 2000 patch | |
| **THEMISvme.10mp.sol2.5.tar** | Themis VME driver | 3.3 (SPARC 10) |
| **THEMISvme.20mp.sol25.tar** | Themis VME driver | 2.2 (SPARC 20) |
| **tftpboot.tar** | Terminal server firmware | See Release Notes |
| **setup** | Configures system and adds RF-C!/ WMS-Data users | not applicable |
| **korem.tar** | RF-C!/WMS-Data software | See Release Notes |

## Installing Solaris and Themis Patches

Use the following procedure to unload the files from the DAT and to install the Solaris and Themis patches:

1. Insert the 4mm DAT into the DAT drive.

2. Log into the Solaris operating system as root user.

3. Type the following commands to unload the files from the DAT:

   **mkdir /export/home/setup <Return>**

   **cd /export/home/setup <Return>**

   **tar xvf /dev/rmt/0l <Return>**

*Note: In the* **tar** *command, please note that the* **0l** *is the number zero and the letter l.*

The **tar** command creates the seven files listed in Table C-3.

4. To unpack and install the patches, type the following commands:

   **uncompress 2.5.1_Recommended.060998.tar.Z <Return>**

   **tar xvf 2.5.1_Recommended.060998.tar <Return>**

   **cd 2.5.1_Recommended <Return>**

   **./install_cluster-nosave <Return>**

5. A continuation confirmation is displayed. Answer **Y** and press **<Return>**.

   Patch installation should take approximately five to six hours. While the patches are being installed, the status is displayed, including possible error codes of 2, 6, or 8. Ignore these error codes.

6. Perform a shutdown. Type:

   **shutdown -g0 -y -i6 <Return>**

7. Install the Year 2000 patch. Log in as root and type the following commands:.

   **cd /export/home/setup <Return>**

   **uncompress 2.5.1_y2000.041598.tar.Z <Return>**

   **tar xvf 2.5.1_y2000.041598.tar <Return>**

   **cd 2.5.1_y2000 <Return>**

   **./install_cluster-nosave <Return>**

   *Note: Answer **yes** at the prompt. Patch installation should take approximately 1.5 hours.*

8. Perform a shutdown. Type:

   **shutdown -g0 -y -i6 <Return>**

9. To unpack and install the Themis VME patch, log into the Solaris system as root and type the following commands:

   **cd /export/home/setup**

   **cat tftpboot.tar | (cd /; tar xvf -)**

   **ls /tftpboot** (this should list the version specified in Table 2)

*Note: If a Sparc 10 CPU has been installed, then perform Step 10.*

10. At the prompt type: **tar xvf THEMISvme.10mp.sol25.tar**

*Note: If a Sparc 20 CPU has been installed, then perform Step 11.*

11. At the prompt type the following command:

    **tar xvf THEMISvme.20mp.sol25.tar**

12. At the prompt type the following command:

    **pkgadd -d . THEMISvme**

*Note: You will need to verify that the version matches Table 2. If so, answer the questions using default responses and continue with the installation by answering **yes**.*

13. Perform a shutdown. Type:

    **shutdown -g0 -y -i6 <Return>**

## Installing the RF-C! Controller Software

Once the Solaris and Themis patches are in, install the RF-C! controller software using the following procedure:

1. At the login prompt, type:

   > **root <Return>**

2. At the password prompt, type:

   **[password] <Return>**

3. Type the following commands:

   **cd /export/home/setup <Return>**

   **./setup <Return>**

   The system will automatically reboot, and display the system log in.

4. Login as **korem**

   System will prompt for a new password. This is not preset, and any valid password may be entered. You will then be prompted to confirm this password by re-entering it.

5. Log on as superuser of this system by typing **su <Return>**.

6. Enter the password for superuser by typing: {**your specified root password**} **<Return>**

7. Type the following commands:

   **cd /export/home/korem <Return>**

   **tar xvf ../setup/korem.tar <Return>**

   The system unpacks the files and loads them onto the RF-C! controller.

8. Type the following command to install the software:

   **ln -s HRFC**_XXXXXX **current <Return> (**Where XXXXXX is the release version as listed in the Release Notes)

## Installing the Synchronous Serial Communications (SSC) Board Driver

The driver for the SSC board in included on the DAT. Install the SSC board driver to RF-C! controller using the following procedure:

*Note: Disconnect the 1PPS cable from the SSC board.*

1. Type the following commands:

   **cd current/sscbdriver <Return>**

   **sync <Return>**

   **./attach_sscb <Return>**

   **shutdown -g0 -y -i6 <Return>**

*Note: Connect the 1PPS cable to the SSC board before proceeding further with the installation process.*

## Linking WMS-Data Software

1. At log in prompt, type: **korem <Return>**

   System will prompt for the password entered in during the installation of the HRFC software.

2. Type the following commands:

   **cp current/KoreM.ini . <Return>**

   **chmod +w KoreM.ini <Return>**

3. Become Superuser by typing:

   **su <Return>**

4. Type: (your specified root password) **<Return>**.

   Perform Step 5 if this RF-C! is not redundant equipped.

5. Type **cd /export/home/korem/current/disable_red <Return>**.

6. Type **rm -rf /export/home/setup <Return>**.

7. Continue with the terminal server configuration as described in *Appendix B Terminal Server Configuration*.

## Starting the RF-C! Controller Software

The RF-C! controller software should be set up to start whenever the system is powered on. To set this option, use the following procedure:

1. Log on by typing: **root <Return>**.

   System prompts for current root password. Type in the password.

2. Type the following commands:

   **cd /export/home/korem/current/bin <Return>**

   **./enable_korem <Return>**

   **exit <Return>**

   The system software will begin running after the enable_korem command. If the software does not start, check Chapter 4, "Troubleshooting". If the software starts successfully, make the current installation the prime side and begin the installation on the secondary side.

# SuperStream Connection Pinouts

## SuperStream Connections

This section contains the WMS Data RF-C! RS-232 and RS-485 SuperStream connection pinouts. These are the NIU to RF-C! C-NET2 interface connections.

### SuperStream Connection Pinouts

The following tables (Table D-1 through Table D-6) show the cable connections for Pinouts. See Figure D-1 for the RJ45 socket pin designations.

*Table D-1: RS-232 C-NET2 Cable for Internal NIU*

| RF-C! Signal | RF-C! Connection (DB-9, female) | NIU Connection (DB-25, male) |
|---|---|---|
| CH_4_232_DATA_OUT | Pin 3 | Pin 3 |
| CH_4_232_CLK_OUT | Pin 6 | Pin 17 |
| GND | Pin 5 | Pin 1 |
| CH_4_232_CLK_IN | Pin 8 (short lead wire) | No connection |

*Table D-2: RS-232 C-NET2 Cable for External NIU*

| RF-C! Signal | RF-C! Connection (DB-9, female) | NIU Connection (DB-25, male) |
|---|---|---|
| CH_4_232_DATA_OUT | Pin 3 | Pin 5 |
| CH_4_232_CLK_OUT | Pin 6 | Pin 6 |
| GND | Pin 5 | Pin 4 |
| CH_4_232_CLK_IN | Pin 8 (short lead wire) | No connection |

*Table D-3: RS-485 C-NET2 Cable for Internal NIU*

| RF-C! Signal | RF-C! Connection (DB-9, female) | NIU Connection (DB-25, male) |
|---|---|---|
| CH_4_485_DATA_P | Pin 1 | Pin 6 |
| CH_4_485_DATA_M | Pin 2 | Pin 5 |
| CH_4_485_CLK_P | Pin 7 | Pin 8 |
| CH_4_485_CLK_M | Pin 9 | Pin 7 |
| CH_4_232_CLK_IN | Pin 8 (short lead wire) | No connection |

*Table D-4: RS-485 C-NET2 Cable for External NIU*

| RF-C! Signal | RF-C! Connection (DB-9, female) | NIU Connection (DB-25, male) |
|---|---|---|
| CH_4_485_DATA_P | Pin 1 | Pin 3 |
| CH_4_485_DATA_M | Pin 2 | Pin 4 |
| CH_4_485_CLK_P | Pin 7 | Pin 1 |
| CH_4_485_CLK_M | Pin 9 | Pin 2 |
| CH_4_232_CLK_IN | Pin 8 (short lead wire) | No connection |

*Table D-5: NUI C-LAN Cable (External NIU to External NIU)*

| NIU Signal | NIU Side 1 (RJ45, male) | NIU Side 2 (RJ-45, male) |
|---|---|---|
| CDATA+ | Pin 3 | Pin 3 |
| CDATA- | Pin 4 | Pin 4 |
| CTIME+ | Pin 1 | Pin 1 |
| CTIME- | Pin 2 | Pin 2 |

*Table D-6: FM$^3$ Link Receiver Cable*

| Link Receiver Signal | NIU Side (clip-on connector) | Receiver Side (DB-9, male) |
|---|---|---|
| Clock output A | Not applicable | Pin 9 |

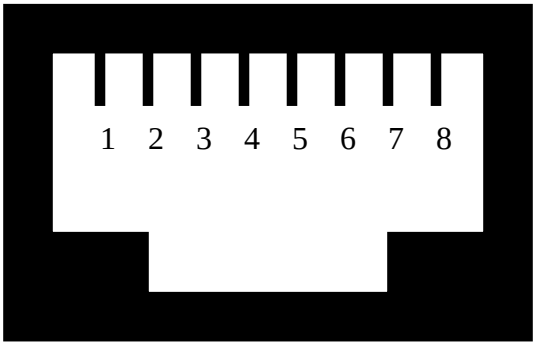
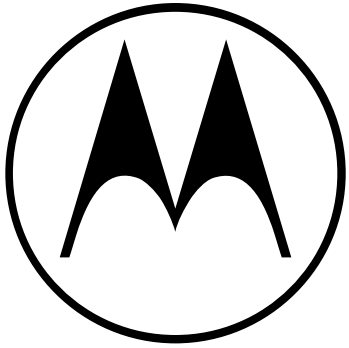



*Figure D-1: RJ45 Socket Pinout Designations*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