# RADYNE

# RCS20

## M:N Redundancy Switch
## Installation and Operation Manual

**IMPORTANT NOTE:** The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

# Table of Contents

## FIGURES

## TABLES

# PREFACE

## About this Manual

This manual gives installation and operation information for the Comtech EF Data Radyne RCS20 M:N Redundancy Switch unit. This manual is intended for anyone who installs or operates the unit.

## Cautions and Warnings

**WARNING** indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

**CAUTION** indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.

**IMPORTANT** or **NOTE** indicates information critical for proper equipment function, or a statement that is associated with the task being performed.

## Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

## Product Support

For all product support, please call:

**+1.240.243.1880**

+1.866.472.3963 (toll free USA)

## Regulatory Compliance

### International Symbols

| Symbol | Definition |
|---|---|
| ~ | Alternating Current |
| | Fuse |

| Symbol | Definition |
|---|---|
| | Protective Earth |
| | Chassis Ground |
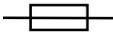
### Telecommunications Terminal Equipment Directive

In accordance with the Telecommunications Terminal Equipment Directive 91/263/EEC, do not connect this equipment directly to the Public Telecommunications Network.

### CE Mark

Comtech EF Data declares that the RCS20 M:N Redundancy Switch meets the necessary requirements for the CE Mark.

### RoHS Compliancy

This unit satisfies (with exemptions) the requirements specified in the European Union Directive on the Restriction of Hazardous Substances, Directive 2002/95/EC, (EU RoHS).

### European Union Low Voltage Directive (LVD) (2006/95/EC)

| Symbol | Description |
|---|---|
| <HAR> | Type of power cord required for use in the European Community. |
| ⚠ | **CAUTION:** Double-pole/Neutral Fusing<br>**ACHTUNG:** Zweipolige bzw. Neutralleiter-Sicherung |

### European Union Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive (1999/5/EC) and EN 301 489-1

Independent testing verifies that the unit complies with the European Union R&TTE Directive, its reference to EN 301 489-1 (Electromagnetic compatibility and Radio spectrum Matters [ERM]; ElectroMagnetic Compatibility [EMC] standard for radio equipment and services, Part 1: Common

technical requirements), and the Declarations of Conformity for the applicable directives, standards, and practices that follow.

## EMC (Electromagnetic Compatibility)

In accordance with European Directive 2004/108/EC, independent testing showed that the RCS20 M:N Redundancy Switch complied with these standards:

| | | |
|---|---|---|
| **Emissions** | EN 55022 Class B | Limits and methods of measurement of radio interference characteristics of Information Technology Equipment (Also tested to FCC Part 15 Class B) |
| **Immunity** | EN 55024 | Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement. |

Additionally, the RCS20 M:N Redundancy Switch complied with these standards:

| | |
|---|---|
| EN 61000-3-2    Harmonic Currents Emission | EN 61000-3-3    Voltage Fluctuations and Flicker |

## Electrical Safety

The RCS20 M:N Redundancy Switch has been shown to comply with the EN 60950 Safety of Information Technology Equipment (including electrical business machines) safety standard.

**CAUTION**

If the unit is operated in a vehicle or movable installation, make sure the unit is stable. Otherwise, EN 60950 safety is not guaranteed.

## Related Documents

| |
|---|
| EN300-421 and EN301-210 ETSI |
| ETSI EN302-307 |
| INTELSAT Earth Station Standards IESS-308, -309, -310, and -315 |
| EUTELSAT SMS |

## Comtech EF Data Headquarters

http://www.comtechefdata.com

Comtech EF Data Corp.

2114 West 7th Street

Tempe, Arizona USA 85281

+1.480.333.2200

# Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

# Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

# Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

# Chapter 1.  Introduction

## 1.1    Overview

The Radyne RCS20 M:N Redundancy Switch provides backup switching/protection for up to nine pairs of satellite modem channels (modulators/demodulators). The RCS20 is a companion product to the Radyne DD240, DM240, DMD15, DMD20, DMD2401, and DMD50 units. The RCS20 may be referred to in this manual as the RCS20, "the switch", or "the unit".

The RCS20 can be operated automatically, in which case an automatic backup of a failed online modem occurs after a preprogrammed delay. The switch may also be operated manually, allowing the operator to manually switch to a backup modem.

## 1.2    Features

- Backup Switching Protection for up to Nine Satellite Modems (1 for 9 Protection)
- Flexible Backup Configuration, 1:9, 2:8, 2 x (1:4), etc.
- Large Display With Easy-to-Use Menu Structure
- Automatic or Manual Modes of Operation
- Flexible Automatic Configuration Mode
- Independent Modulator and Demodulator Switching
- Two Fully-Redundant Power Supplies
- Passive Relay Switching for Terrestrial and IF Signals

## 1.3    RCS20 Switching System Components

The RCS20 is comprised of three separate units that make up the switching system:

- The Redundancy Control Unit (RCU20)
- The Digital Data Switch (DDS20)
- The Intermediate Frequency Switch (IFS20)

## 1.3.1  RCU20 Redundancy Control Unit

Front panel controls and indicators provide for auto/manual configuration, as well as display of online/off line status information for all modems in the Redundancy configuration.



**Figure 1-1  RCU20 Redundancy Control Unit – Front Panel**
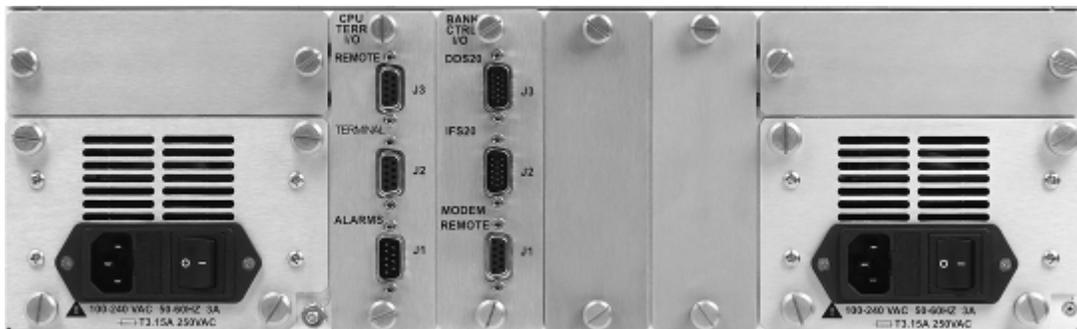


**Figure 1-2  RCU20 Redundancy Control Unit – Back Panel  (AC Powered)**
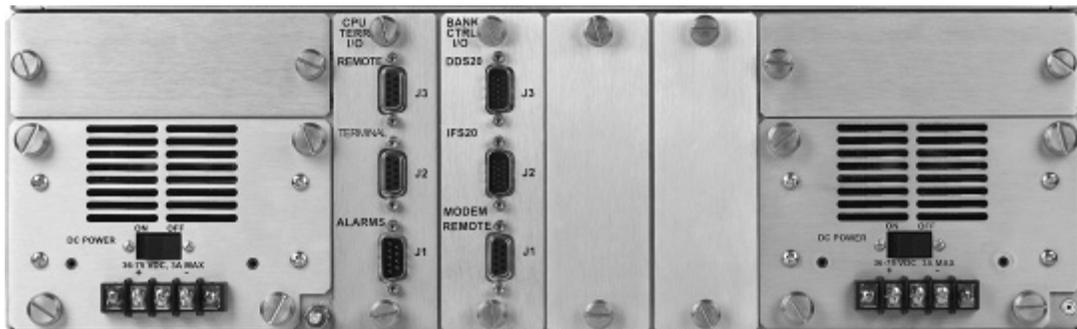


**Figure 1-3  RCU20 Redundancy Control Unit – Back Panel (DC Powered)**

## 1.3.2 Digital Data Switch (DDS20) Configurations

The DDS20 provides all of the data interconnections between the online and backup modems. The DDS20 also provides buffering of terrestrial data signals to backup modulators allowing 'hot-standby' modes of operation. The DDS20 receives control and DC power through an interconnecting cable from the RCU20. Terrestrial interface options for the DDS20 include the following options:

- Universal Interface:      RS-449, V.35, RS-232, IDR & IBS Alarms
- ASI Interface:   BNC Female
- G.703 Interface:Unbalanced T1, E1, T2, E2, T3, E3, STS-1
- Ethernet:        RJ45 - 10/100/1000 Base-T.

The DDS20 is available in the following three configurations:

- Universal DDS20
- DDS20-ASI-M or DDS20-G.703-M (Modulator only)
- DDS20-ASI-D or DDS20-G.703-D (Demodulator only)

## 1.3.2.1    Universal DDS20

The Universal DDS20 has nine available slots supporting up to a 1:9 or 2:8 configuration.



**Figure 1-4  Universal DDS20 Digital Data Switch – Front Panel**
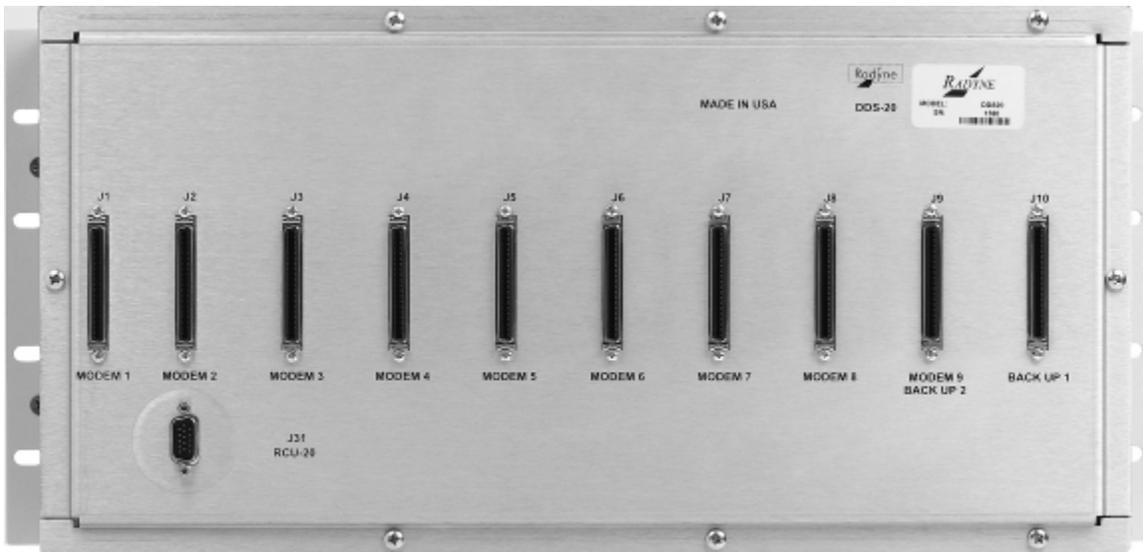


**Figure 1-5  Universal DDS20 Digital Data Switch – Back Panel**

## 1.3.2.2    DDS20-ASI-M or DDS20-G703-M (Modulator-only)

The DDS20-ASI-M or G703-M is a modulator-only configuration.
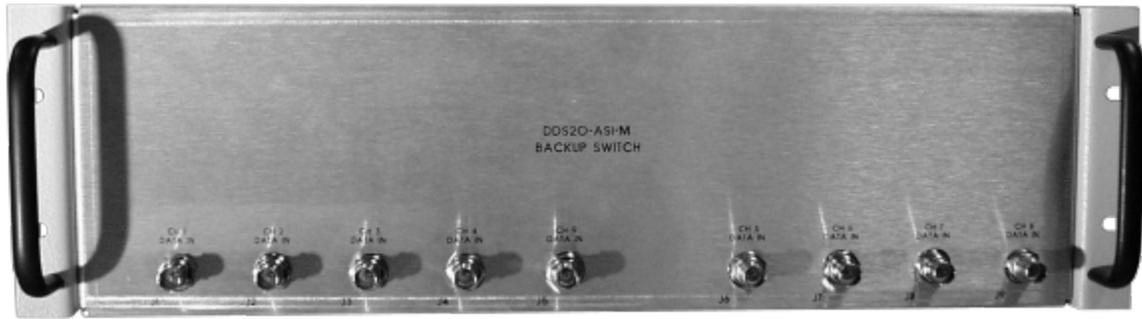


**Figure 1-6  DDS20 ASI or G703-M Digital Data Switch – Front Panel**
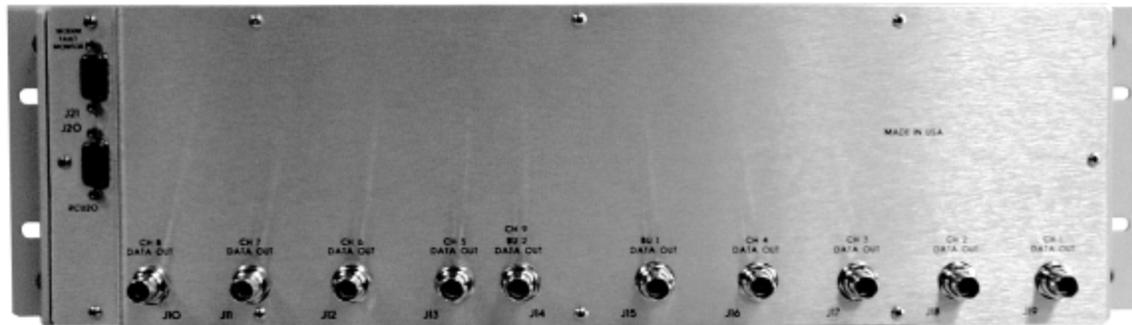


**Figure 1-7  DDS20 ASI or G703-M Digital Data Switch – Back Panel**

## 1.3.2.3    DDS20-ASI or DDS20-G.703-D (Demodulator-only)

The DDS20-ASI-D or DDS20-G.703-D is a demodulator-only configuration.



**Figure 1-8  DDS20-ASI-D or DDS20-G.703-D Digital Data Switch – Front Panel**
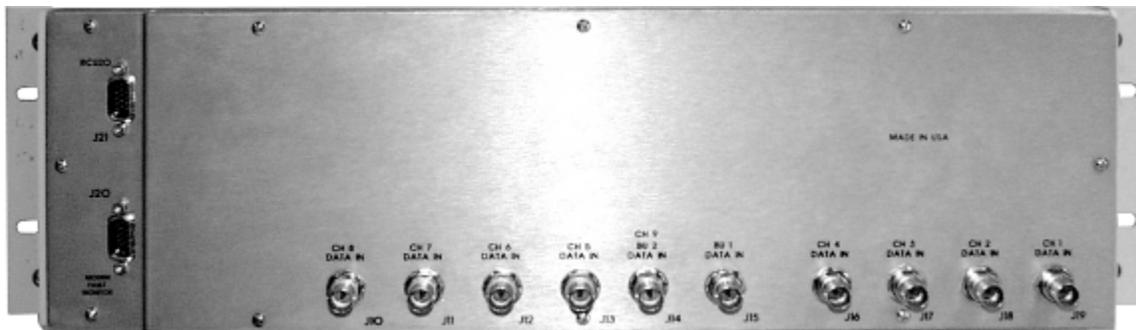


**Figure 1-9  DDS20-ASI-D or DDS20-G.703-D Digital Data Switch – Back Panel**

## 1.3.2.4    DDS20-GigE (10/100/1000 Gigabit Ethernet) Backup Switch

The DDS20-GigE Backup Switch configuration supports the DMD20, DMD50, DM240 and DD240 products. The Ethernet switch can support up to a 1:9 system.



**Figure 1-10  DDS20-GigE Backup Switch – Front Panel**



**Figure 1-11  DDS20-GigE Backup Switch – Back Panel**

### 1.3.3  Intermediate Frequency Switch (IFS20) Configurations

The IFS20 Intermediate Frequency Switch interfaces the IF signals of the modems with the Earth Station IF system and provides backup switching. The RCU20 can be configured with or without the IFS20. When the system does not require independent uplink and downlink ports, then the RCU20 will monitor the status of the primary modem and ensure backup when a primary modem faults.

When the system is configured with an IFS20, it will provide all of the switching relays and optional signal splitters that are necessary to connect any combination of up to nine Modulators and Demodulators to nine independent uplink and nine independent downlink transponders. The IFS20 receives control and DC power through an interconnecting cable from the RCU20. The IFS20 is available in the following three configurations:

### 1.3.3.1    70/140 IFS20

The IFS20 configuration is used for 70/140 MHz.
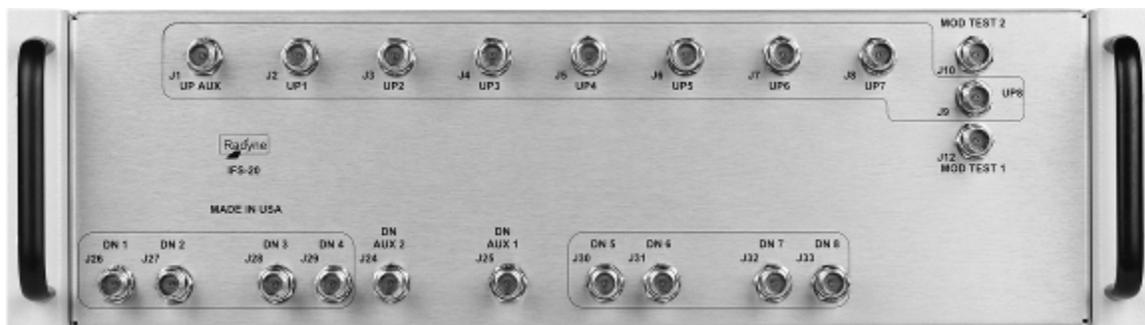


**Figure 1-12  70/140 IFS20 Intermediate Frequency Switch – Front Panel**
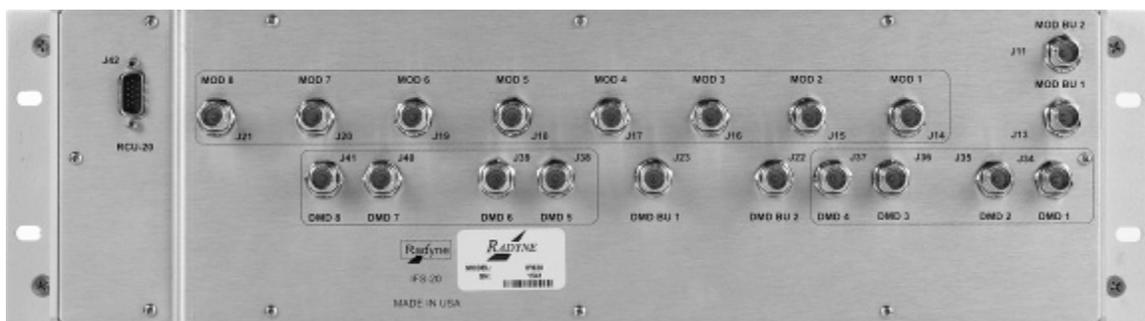


**Figure 1-13  70/140 IFS20 Intermediate Frequency Switch – Back Panel**

## 1.3.3.2   L-Band IFS20 (Transmit Only)

This IFS20 configuration is used for L-Band transmit only systems.
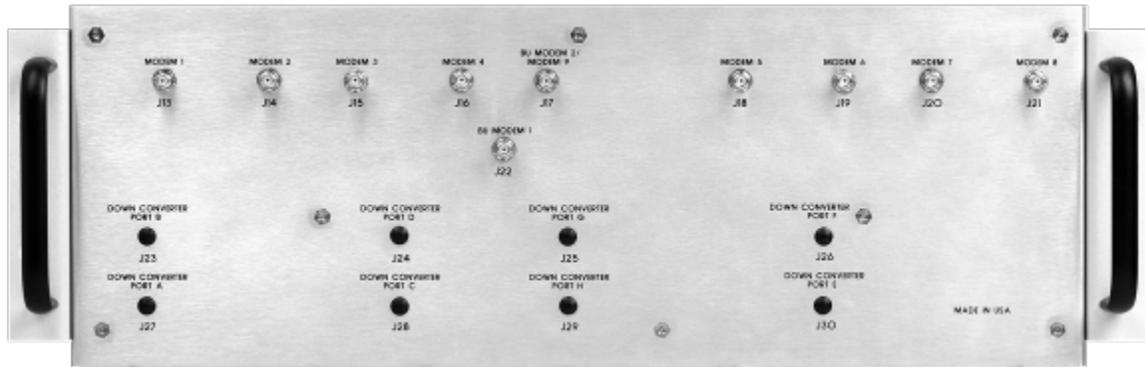


Figure 1-14  L-Band (Transmit Only) IFS20 Intermediate Frequency Switch – Front Panel
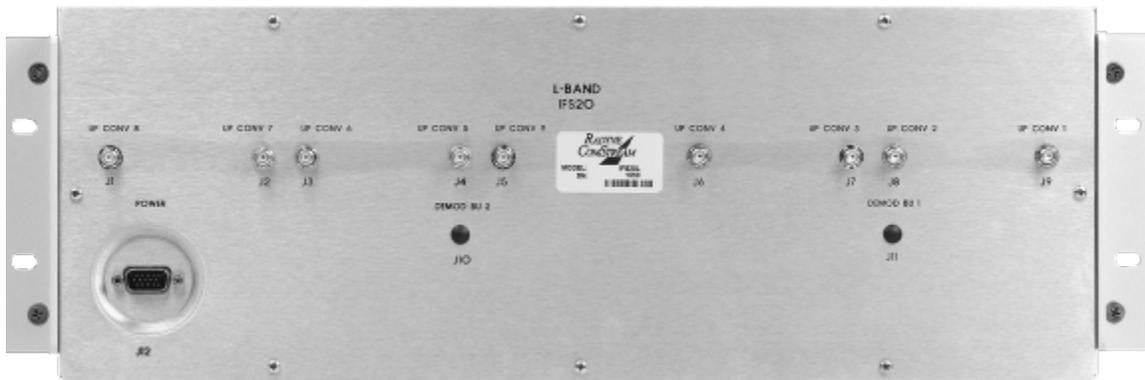


Figure 1-15  L-Band (Transmit Only) IFS20 Intermediate Frequency Switch – Back Panel

## 1.3.3.3   L-Band IFS20 (Transmit & Receive)

This IFS20 configuration is used for L-Band transmit and receive systems.
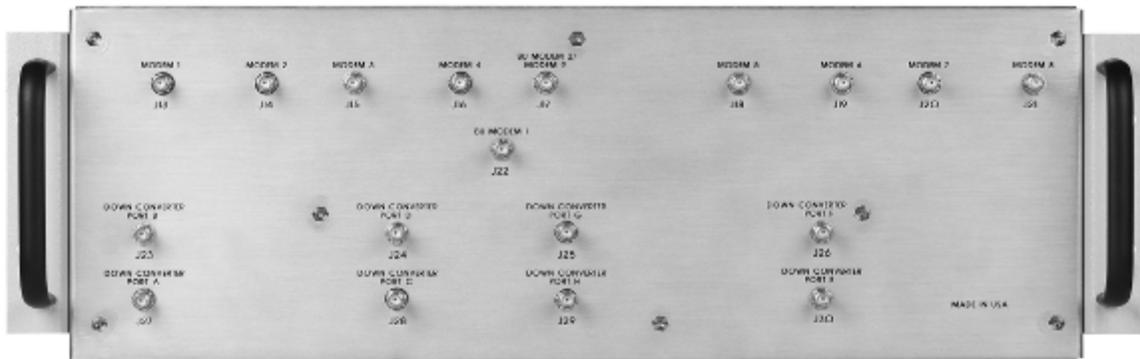


**Figure 1-16  L-Band (Transmit & Receive) IFS20 Intermediate Frequency Switch – Front Panel**
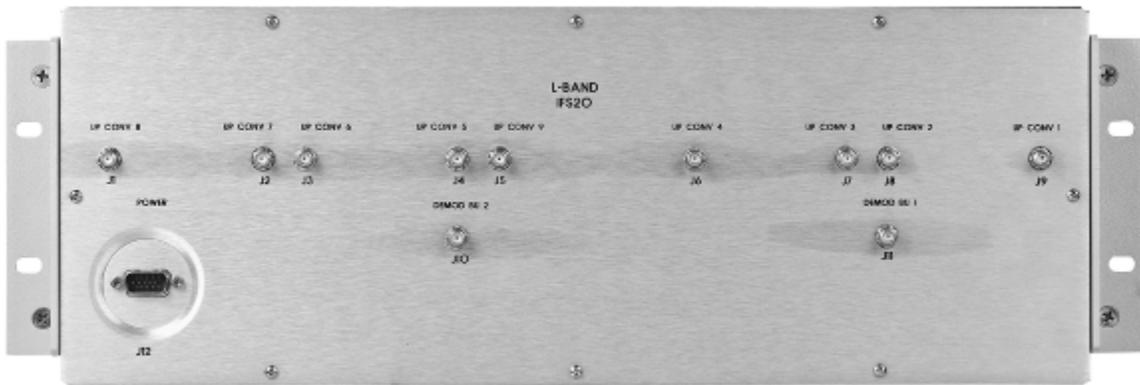


**Figure 1-17  L-Band (Transmit & Receive) IFS20 Intermediate Frequency Switch – Back Panel**

# Chapter 2. Installation

## 2.1  Overview

This chapter provides unpacking instructions, and instructions for installing an RCS20 M:N Redundancy Switch into a Satellite Modem system with cabling configurations for up to nine channels and nine transponders.

The RCS20 organizes the modems connected to the switch according to satellite communications channels. These channels are labeled on the DDS20 and IFS20 panels, and are defined as follows:

| | |
|---|---|
| Channel 0 - Backup 1 | Channel 5 - Modem 5 |
| Channel 1 - Modem 1 | Channel 6 - Modem 6 |
| Channel 2 - Modem 2 | Channel 7 - Modem 7 |
| Channel 3 - Modem 3 | Channel 8 - Modem 8 |
| Channel 4 - Modem 4 | Channel 9 - Modem 9/Backup 2 |

## 2.2   Unpacking the Unit

**WARNING**

There are no user-serviceable parts or configuration settings located inside the RCS20, DDS20, or IFS20 Chassis. There is a shock hazard internally at the power supply module.

DO NOT OPEN any of these Chassis under any circumstances.

The RCS20 M:N Redundancy Switch was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

- RCS20 Redundancy Control Unit
- IFS20 70/140, L-Band Tx or L-Band Rx-Tx
- DDS20 Digital Data Switch, Ethernet Switch, ASI-M or ASI-D
- 2 ea. AC Power Cords
- 2 ea. Bank Control 15-Pin HD Sub-Cables
- M:N Switch System Test Data Sheet

- M:N Switch to Modem Cable(s) for Backup Modulator and Demodulator
- Test I/O Mating Connector
- Optional 1:N Switch to Modem, I/O and Coaxial Cables for Modems 1 – 9
- Optional Modem bypass cable(s) for Modems 1 – 9

**NOTE**

Cables ordered in addition to those listed may arrive separately.

### 2.2.1 Test Data Sheet

Each RCS20 M:N Redundancy Switch system is shipped with a Test Data Sheet. This report contains information on the results of the Switch quality control testing. The report also includes information pertaining to the system settings that were made at the factory. It is recommended that the customer/user save this report for future reference.

## 2.3    Removal and Assembly

Carefully unpack the unit and ensure that all of the above items are in the carton. If the available AC mains power at the installation site requires a different cordset from those included in the package, then a suitable and approved cordset (for the country where the equipment is to be installed) will be required before proceeding with the installation.

Should the Power Cable/AC Connector be of the wrong type for the installation, either the cable or the power connector end should be replaced. The power supply itself is designed for universal AC application. See specifications for appropriate voltages and currents.

## 2.4    Installation Planning

Adequate site planning and preparation simplifies the installation process and results in a more reliable system.

### 2.4.1 Rack Information

The RCS20 is designed so that it can be installed in a standard 19-inch rack. The RCS20 is 5¼", 3 Rack Units (3RU) high and must be installed on the front of a rack with the front panel facing forward

The DDS20 is 8¾" (5RU) high and is preferably installed at the top of a rack unit with the Terrestrial Interface connectors available at the top of the rack and the modem connections available at the at the bottom of the DDU20 in the interior of the rack. The DDS20 may also be installed at the rear of a rack with the Terrestrial Interface connectors available at the rear of the rack and the modem connections available in the interior of the rack.

The IFS20A is also 8¾" (5 RU) high and is designed to be installed at the rear of a rack with the Up/Downconverter interface connections facing to the rear of the rack with the modem IF connections available in the interior of the rack. The IFS20A may also be installed in the top of a rack with the Up/Downconverter interface connections available at the top of the rack and the modem IF connections available inside the rack.

To allow for the easy installation of cables and adequate air circulation through the units, a minimum of six inches of clearance must be provided at the sides and rear of the units. In addition, the RCS20 requires a minimum of 1¾" (1 RU) of clearance on top of the unit.

If the Switch is installed on slide rails, the cables must be of sufficient length to allow the units to be pulled forward on the rails.

## 2.4.2  Operating Environment

Operate the unit with its cover on at all times.



**CAUTION**

Do not operate the unit in any of these extreme operating conditions:

- Ambient temperatures less than 0°C (32°F) or more than 50°C (122°F). (maximum storage temperature allowed is -20°C (-4°F) to 70°C (158°F)).
- Precipitation, condensation, or humid atmospheres of more than 95% relative humidity.
- Unpressurized altitudes of more than 2000 meters (6561.7 feet).
- Excessive dust.
- Flammable gases.
- Corrosive or explosive atmospheres.


When installing The RCS20 in an equipment rack, adequate ventilation must be provided. The ambient temperature in the rack should be between 10° and 35°C, and held constant for best equipment operation. The air available to the rack should be clean and relatively dry. The units should not be placed immediately above a high-heat or EMF Generator to ensure the output signal integrity and proper receive operation.

Do not install the RCS20 in an unprotected outdoor location where there is direct contact with rain, snow, wind or sun. The only tools required for rack installing the RCS20 are four (4) customer supplied rack-installing screws and the appropriate screwdriver. Rack installing brackets are an integral part of the front bezel of the unit and are not removable.

## 2.4.3  Electrical

Make sure that the site has adequate electrical power. The power sources must be properly grounded
and must be free from electrical interference as much as possible.

If a redundant configuration is to be used, then each power cord on the RCS20 must be plugged into its
own separate power circuit. Each circuit must have its own independent circuit breaker.

Grounding is automatic when the three-prong power plug is inserted into a power receptacle. Verify by
testing that there is no voltage present between the chassis of the Switch and the power line ground.

> **WARNING – RISK OF PERSONAL INJURY AND EQUIPMENT DAMAGE**
>
> Do not bypass or defeat the protective ground. Do not use a three-to-two-prong adapter.

The RCS20 is rated for a nominal operating range of 100-240 volts AC; for the appropriately equipped DC
option, nominal operating range is 48 ±5 volts DC. The unit has a maximum power consumption of 250
watts.

The installation and connection to the line supply must be made in compliance to local or national wiring
codes and regulations.

The RCS20 is shipped with line inlet cables suitable for use in the country of operation. If it is necessary
to replace these cables, ensure the replacement has an equivalent specification.

Examples of acceptable ratings for the cables include HAR, BASEC and HOXXX-X.

Examples of acceptable connector ratings include VDE, NF-USE, UL, CSA, OVE, CEBEC, NEMKO,
DEMKO, BS1636A, BSI, SETI, IMQ, KEMA-KEUR and SEV.

## 2.4.3.1      Grounding

> **CAUTION**
>
> PROPER GROUNDING PROTECTION IS REQUIRED: The installation instructions
> require that the integrity of the protective earth must be ensured and that the
> equipment shall be connected to the protective earth connection at all times.
>
> It is therefore imperative during installation, configuration, and operation for the user to
> ensure that the unit has been properly grounded using the ground stud provided on
> the rear panel of the unit.
>
> In Finland: "Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan."
>
> In Norway: "Apparatet må tilkoples jordet stikkontakt."
>
> In Sweden: "Apparaten skall anslutas till jordat uttag."

## 2.4.3.2    Battery

> **WARNING**
>
> The RCS20 contains a Lithium Battery. DANGER OF EXPLOSION EXISTS if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local and national regulations.

## 2.4.3.3    Fuses

> **CAUTION**
>
> Always replace the fuses with the correct fuse type and rating. Use correct fuses to help prevent damage to the equipment.

Typical for either slide-in power module on the rear panel of the RCU (Redundancy Control Unit):

- **For AC operation,** the RCS20 requires two *common* 3.15 Amp/250 volts 20mm x 5mm Slow-blow fuses that are contained within a fuse holder that is press-fit into the body of the IEC power inlet module.
- **For DC operation,** no fuses are required.

## 2.5    Connecting the RCS20

> **WARNINGS**
>
> Dangerous AC voltages exist inside of the RCS20 when either one of the AC Plug-in Switch Modules are enabled or plugged in. Do not remove cover when AC power is applied. Remove power cord from AC modules if top cover needs to be removed.
>
> See Chapter 5 for additional information on replacing the AC/DC Plug-in Modules.
>
> The RCU20 MUST be powered down when installing / removing the bank control I/O OR when cabling up to the IFS20 or DDS20 with the CA3429 cables. Failure to do so can result in damage to the bank control I/O and cause loss of redundancy in the system.

Use coaxial cable that is of good quality (e.g., RG58/U (50Ω) or RG59/U (75Ω)) for connections to the IF Tx and Rx (transmit and receive) BNC female connectors.

Use Type 'D' connectors that have back-shells with continuous metallic shielding.

Type 'D' cabling must have a continuous outer shield (either foil or braid, or both). The shield must be bonded to the back-shell.

## 2.6    System Cabling Configuration

See Appendix B for the cabling configurations between the RCS20 and its various companion products.
The following figures are provided to illustrate the proper placement of the cables:

## 2.7    Modem Checkout and Initial Power-Up

The following descriptions assume that the RCS20 is installed in a suitable location with AC power
applied to both slide out power supplies. Before initial power-up of the RCS20, the IFS20 and DDS20
must be connected to the RCU20 via the supplied 15-Pin High-Density Female 'D' Connection Cables.

|  | WARNING |
|---|---|
|  | Never apply power to the slide out power supply modules unless they are firmly seated in the RCU20, as there is a potential shock hazard at the AC/DC Converter within the module |

Turn the unit on by switching both AC power switches (located above the power entry connectors at the
rear of the RCU20) to the on position. At power-up, the switch processor will perform a self-diagnostic
before beginning the primary monitor/control program. If a failure is detected during the power-up tests,
the Major Alarm LED will illuminate. If there is no failure, there will be no indication on the front panel.

The initial field checkout of the switch can either be accomplished from the front panel or from a terminal
connected to the Terminal Port. Using a terminal has the advantage of providing full screen access to all
of the switch parameters, but requires a separate terminal or computer with terminal emulation software.
If a terminal is used, the Terminal Port baud rate must first be set from the front panel.

## 2.8    Storage

We recommend that you store the unit in its original sealed packing. Store the unit in a dry location where
the temperature is stable, away from direct contact with rain, snow, wind, sun, or anything that may cause
damage.

# Chapter 3.  Theory of Operation

## 3.1    Overview

This chapter provides additional basic information on the RCU20, DDS20, and IFS20 hardware and internal operation.

## 3.2    RCU20 Major Assemblies

The RCU20 Redundancy Control Unit contains the modules that control and monitor the operation of the M:N Switch System. The RCU20 is composed of the following major assemblies and components:

- Central Processor Unit (CPU) Board
- Front Panel Board
- Controller Interface Module
- Clock Distribution Module (optional)
- Redundant Power Supplies
- Ethernet Module (optional)
- Bank Control Module

### 3.2.1  Central Processing Unit (CPU) Board

The Central Processor Unit (CPU) Board contains the M:N Switch intelligence and memory circuitry. The on-board microprocessor is an MC68302, which has a 24-bit address bus and a 16-bit data bus. The microprocessor controls and coordinates all major functions of the Switch and performs all necessary calculations. The non-volatile system memory on the board stores the switching parameter settings for each Modem Channel. Control and data signals are routed to the appropriate devices in the system through various latches and transceivers that are controlled by the microprocessor.

### 3.2.2  Front Panel

Front panel controls and indicators provide for auto/manual configuration, as well as display of online/off line status information for all modems in the Redundancy configuration. See Section 4.1

### 3.2.3  Controller Interface Module

The controller interface module (CPU TERR I/O) provides ports for external monitoring and control. See Section 5.2.3.2.

### 3.2.4  Clock Distribution Module (Optional)

Consult factory for availability. See Section 5.2.3.1.

### 3.2.5  Redundant Power Supplies

The M:N Switch comes equipped with two fully redundant internal power supplies (PS1 and PS2) that supply DC voltage to the system. Each supply is fully independent of the other, including their source of AC power and fusing.

The Switch can remain fully operational as long as it is supplied with a source of voltage from either power supply. Only if the voltage output failed on both supplies would the Switch become inoperative. PS1 and PS2 are located one on either side of the RCS20.

### 3.2.6  Ethernet Module (Optional)

Consult factory for availability.

### 3.2.7  Bank Control Module

The Bank Control Module provides connection to auxiliary equipment. See Section 5.2.3.3.

### 3.2.8  RCU20 Back Panel

Tthe RCS20 contains the plug-in slots for the Interface Control Module, the Clock Distribution Modules, Bank Control Modules and Ethernet modules. Also contained in the back panel are the two AC fuses and power receptacles.

## 3.3    IFS20 Major Assemblies

The IFS20 IF Switch interfaces the IF signals of the Modems with the earth station IF system and provides backup switching. The unit provides all of the switching relays, signal combiners and splitters, terminations and interconnecting cables that are necessary to connect any combination of up to eight Modulators and Demodulators to eight independent uplink and eight independent downlink transponders.

The IFS20 has no internal power supply. It receives its DC power from the RCU20 through the cable that connects to J35. The IFS20 internal connectors are SMB-type. The major parts of the IFS20 are:

- IF Switch Relays (eight uplink, and eight downlink).
- Back Panel/Front Panel

### 3.3.1  IF Switch Relays

The IFS20 contains 16 IF Switch Relays; eight uplink and eight downlink. The relays switch the IF signals to the Backup units. The signals to each downlink relay pass through a splitter with a loss of about 3.5 dB (including the loss due to energy splitting).

### 3.3.2  IFS20 Back Panel/Front Panel

See Section 5.3.

## 3.4  DDS20 Major Assemblies

The DDS20 Data Switch provides terrestrial interface and data signal switching for up to nine independent pairs of Modulators and Demodulators. There are two parallel and independent backup busses allowing any of the eight on-line Modulators and Demodulators to be switched to either of the backup Modulators or Demodulators. The DDS20 has no internal power supply, it receives DC power from the RCU20 through the cable that connects at J31.

### 3.4.1  Motherboard

The DDS20 Motherboard contains the modem connectors and backup busses.

### 3.4.2  Slide-In Data Switch Interface Modules

The DDS20 contains one slide-in data switch interface module for each prime modem, containing terrestrial interface connectors and data switch relays.

### 3.4.3  Housing

The housing contains the card guides and mounting ears for the motherboard.

### 3.4.4  DDS20 Back Panel

The DDS20 back panel contains the electrical connections.

## 3.5    RCS20 Channel Definitions

The RCS20 organized the modems connected to the switch according to satellite communications channels. These channels are labeled on the DDS20 and IFS20 panels, and are defined as follows:

Channel 0 - Backup 1

Channel 1 - Modem 1

Channel 2 - Modem 2

Channel 3 - Modem 3

Channel 4 - Modem 4

Channel 5 - Modem 5

Channel 6 - Modem 6

Channel 7 - Modem 7

Channel 8 - Modem 8

Channel 9 - Modem 9/Backup 2

# Chapter 4.  User Interfaces

## 4.1    Operating Procedures

Operation of the RCS20 consists of controlling the unit operating parameters and monitoring status and responses via one of the following control interfaces:

- Front Panel Interface
- Remote Port Interface
- Terminal Interface

Any of these methods may be used separately or together to monitor and control the RCS20.

## 4.2    Front Panel Interface
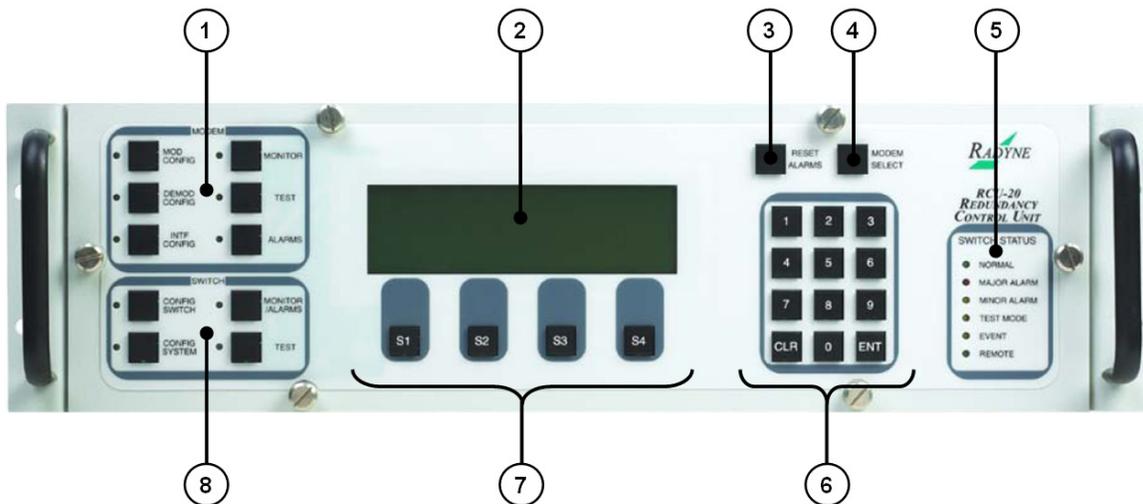


Figure 4-1. Front Panel Interface

The RSC20 front panel (Figure 4-1) allows complete control and monitoring of all Modem and Switch parameters and functions via a keypad, LCD display and Modem and Switch status LEDs.

Table 4-1. Front Panel Interface Feature Descriptions

| Feature No. | Label | Description |
|---|---|---|
| 1 | MODEM | Modem Control. This group of keys is used to control the modems that are connected to the RCS20 from the RCS20 front panel. This feature is presently not implemented for the RCS20 |

| Feature No. | Label | Description |
|---|---|---|
| 2 | (---) | LCD Front Panel Display. This is the 8 lines by 40 characters Liquid Crystal Display, used to communicate with the RCS20. |
| 3 | RESET ALARMS | Reset Alarms. This key resets all RCS20 current and latched major and minor alarms. |
| 4 | MODEM SELECT | Select Current Modem. This key selects which modem is currently being controlled by the Modem group of keys. This feature is presently not implemented for the RCS20. |
| 5 | SWITCH STATUS | Switch Status LEDs. Refer to Section 4.1.5 for a description of these LEDs. |
| 6 | (---) | Numeric Keypad. This group of keys is used to enter numeric parameters for the RCS20 and connected modems. |
| 7 | (---) | Soft keys. This group of keys is used for various functions as described by the label shown above each key on the bottom line of the LCD Display. |
| 8 | SWITCH | Switch Control. This group of keys is used to control the RCS20 and decide which menu tree is displayed on the front panel. |

## 4.2.1  Modem Control Keys

The following keys, when pressed, control the modems that are connected to the RCS20:

(Currently this feature is not implemented on the RCS20)

## 4.2.1.1   MODEM MOD CONFIG

Pressing this key brings up a series of menus on the LCD that allow control of the currently selected modulator that is connected to the RCS20. The currently selected modulator and demodulator can be changed by pressing the MODEM SELECT key. This feature is presently not implemented on the RCS20

## 4.2.1.2   MODEM DEMOD CONFIG

Pressing this key brings up a series of menus on the LCD that allow control of the currently selected demodulator that is connected to the RCS20. The currently selected modulator and demodulator can be changed by pressing the MODEM SELECT key. This feature is presently not implemented on the RCS20

## 4.2.1.3   MODEM INTFC CONFIG

Pressing this key brings up a series of menus on the LCD that allow control of the terrestrial interface for the currently selected modem. The currently selected modem can be change by pressing the MODEM SELECT key. This feature is presently not implemented on the RCS20.

## 4.2.1.4    MODEM MONITOR

Pressing this key brings up a series of menus on the LCD that allow the monitoring of status parameters for modems connected to the RCS20. This feature is presently not implemented on the RCS20.

## 4.2.1.5    MODEM TEST

Pressing this key brings up a series of menus on the LCD that allow testing of the modems connected to the RCS20. This feature is presently not implemented on the RCS20.

## 4.2.1.6    MODEM ALARMS

Pressing this key brings up a series of menus on the LCD that allow monitoring of alarms for the modems connected to the RCS20. This feature is presently not implemented on the RCS20.

## 4.2.2  LCD Front Panel Display

The front panel display is an 8 line by 40-character LCD display. The display is lighted and the brightness can be set to increase when the front panel is currently in use. The LCD display automatically dims after a period of inactivity.

The display has two distinct areas showing current information. The bottom row of the display shows the functions of each of the four soft keys (labeled 'S1', 'S2', 'S3', and 'S4' in Figure 3-1). If a soft key provides a function, then that function will be displayed just above the corresponding key. If no function is displayed above a soft key, then there is no function associated with that key, and pressing it will have no effect. The rest of the display shows current parameter and status information. The LCD display is a window into a large matrix of switch and modem parameters that can monitored and changed from the front panel.

The display backlight will extinguish after a programmable delay if no there is no keyboard activity. The backlight will then turn on whenever a key is pressed. The backlight delay can be adjusted from the menu.

## 4.2.3  Reset Alarms Key

This key resets all RCS20 current and latched major and minor alarms.

## 4.2.4  Module Select Key

This key selects which modem is currently being controlled by the Modem group of keys. This feature is presently not implemented for the RCS20

## 4.2.5  Switch Status LEDs

Refer to Table 4-2 for the description and colors of the Switch Status LEDs. 4.2.1.6 MODEM ALARMS.

### Table 4-2. Switch Status LED Function

| LED | Color | Description |
|---|---|---|
| Normal | Green | Indicates that the unit is currently under power. |
| Major Alarm | Red | Indicates that at least one satellite channel did not receive Redundancy protection and is off-line. |
| Minor Alarm | Yellow | Indicates that a Redundancy warning exists and the RCS20 may not be providing Redundancy protection. |
| Minor Alarm | Flashing Yellow | Indicates a prime modem configuration. The configuration change should be taught. |
| Test Mode | Yellow | Indicates that the switch is performing one of the system tests. |
| Event | Yellow | Indicates that a condition of system event as occurred that the RCS20 has stored in memory. The events may be viewed from the Front Panel or from the Terminal port. |
| Event | Flashing Yellow | Indicates a prime modem is currently being backed-up. |
| Remote | Green | Indicates that the unit is set to respond from either the Terminal port or the Remote M&C port |

## 4.2.6  Numeric Keypad

This group of keys is used to perform various functions for the RCS20 and connected modems. Table 4-3 describes the function of these keys.

### Table 4-3. Numeric Keypad Function

| Key | Description |
|---|---|
| ENTER | Loads edited values into memory and advances to next screen in the menu tree. |
| CLEAR | Aborts loading values into memory and advances to the previous screen in the menu tree. |
| Numeric keys 0-9 | Used to edit numeric parameters. |

## 4.2.7  Soft Keys (S1 - S4)

This group of keys is used for various functions as described by the label shown above each key on the bottom line of the LCD Display.

### Table 4-4. Soft Key Function

| Key | Description |
|---|---|
| soft key ('NEXT') | Aborts loading values into memory and advances to the next screen in the menu tree. |
| soft key ('PREVIOUS') | Aborts loading values into memory and advances to the previous screen in the menu tree. |

## 4.2.8  Switch Control Keys

The following keys, when pressed, control the RCS20 and decide which of the menu trees is displayed on the LCD front panel display.

### 4.2.8.1   SWITCH CONFIG SWITCH

Pressing this key brings up a series of menus on the LCD that allow control of the RCS20 switch configuration parameters.

### 4.2.8.2   SWITCH CONFIG SYSTEM

Pressing this key brings up a series of menus on the LCD that allow control of the RCS20 system, M&C, and communication parameters.

### 4.2.8.3   SWITCH MONITOR/ALARMS

Pressing this key brings up a series of menus on the LCD that allow monitoring of major and minor alarms and control of alarm masking for the RCS20.

### 4.2.8.4   SWITCH TEST

Pressing this key brings up a series of menus on the LCD that allow testing of the RCS20 configurations and connections.

## 4.2.9  Basic Front Panel Controls

The following functions may be performed from the front panel:

- Parameters on the screen can be edited
- Next screen in the menu tree can be displayed
- Previous screen in the menu tree can be displayed

### 4.2.9.1   Changing parameters from the Front Panel

Whenever there is a parameter that can be changed or edited from the front panel, the first character of the parameter value will highlight with a blinking box. This box is called the cursor, and the cursor defines

what parameter is currently being edited. If  there are several parameters on one screen, two of the soft keys will be labeled ← and →. These keys are used to move the cursor from one parameter to the next, and therefore any of the configuration parameters displayed on the screen can be edited. The left arrow ( ← ) moves the cursor to the left, and the right arrow ( → ) moves the cursor to the right. If the cursor is at the beginning or end of a row containing several parameters, the cursor will wrap to the opposite side of the display.

Editing a configuration parameter value is accomplished in one of several ways. If the parameter is numerical, the desired value should be entered from the numeric keys. Occasionally, the numeric values can be incremented and decremented by pressing soft keys labeled 'UP' and 'DOWN' respectively. In either case, when all of the numerical parameters have been edited to the desired values, pressing the ENTER key will execute a load of the parameters into memory, and then advance to the next screen in the menu tree. Pressing the CLEAR key will *not* execute a load of parameters into memory (the original parameter values before editing will be retained), and then advance to the previous screen in the menu tree.

If a parameter has a non-numeric value, the allowed values for that parameter can be edited by pressing soft keys with the desired values. In cases where there are multiple parameters shown on a screen, the values are edited with the soft keys and loaded by pressing the ENTER key, which also advances to the next screen in the menu tree. Pressing the soft key labeled 'NEXT' or 'PREVIOUS' will abort loading the parameters into memory, and advance to the appropriate screen. In cases where there is a single parameter shown on a screen, pressing the soft key labeled with the desired value will immediately load the parameter into memory. In this case, the parameter load can be aborted by pressing the CLEAR key, which will return to the previous screen, or by pressing the soft key labeled 'NEXT', which will advance to the next screen in the menu tree.

### 4.2.9.2    Moving to the Next Screen in a Menu Tree

If the user desires to advance to the next screen in the menu tree, the soft key labeled 'NEXT' should be pressed. Some submenu screens can only return to a previous screen, in this case a soft key will be labeled 'RETURN'. In either case, if any numerical parameters are being edited, the values will *not* be loaded into memory. When the last screen of a menu tree is reached, advancing to the next screen will wrap to the first screen of the menu tree.

### 4.2.9.3    Moving to the Previous Screen in a Menu Tree

If the user desires to return to the previous screen from a Subscreen in the menu tree, the CLEAR key should be pressed. If any numerical parameters are being edited, the values will *not* be loaded into memory. If the clear key is pressed while the first screen of a menu tree is displayed, the previous screen will wrap to the last screen in the menu tree.

## 4.3    Front Panel Screens

There are four menu trees used to control the RCS20:

- CONFIG SWITCH

- CONFIG SYSTEM

- MONITOR/ALARMS

- TEST

These menu trees and their functions are discussed in the subsections that follow.

**NOTE**

The screens as depicted in the subsections that follow are representations. Your screens may vary slightly.

## 4.3.1  CONFIG SWITCH Menu Tree

## 4.3.1.1    MODEM CHANNEL CONNECTIONS
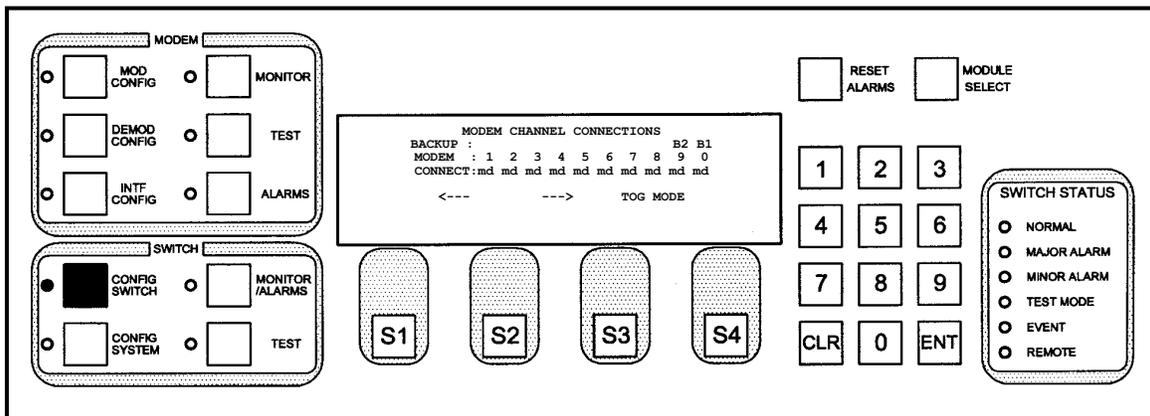


This screen allows the user to assign connections to the channels. The RCS20 must be programmed with satellite channel numbers used for redundancy protection. Channel 0 is the dedicated backup, and Channel 9 may either be prime or backup. Channels 1 to 8 are dedicated backups. These connections may be any of the following:

- **m** - modulator

- **d** - demodulator

- **md** - modulator/demodulator

- **none** - No Connection

### 4.3.1.1.1    Programming steps:

1. Press ← or → to move the blinking cursor to the channel to be programmed

2. Press <TOG MODE> to switch through the choices above.

3. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

4. Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the channel connection. |
| S2 | → | Press to move the blinking cursor to the left. Used to select the channel connection. |
| S3 | TOG MODE | Used to toggle through the choices above. Multiple connections may be entered. |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.1.2   MODEM ADDRESSES
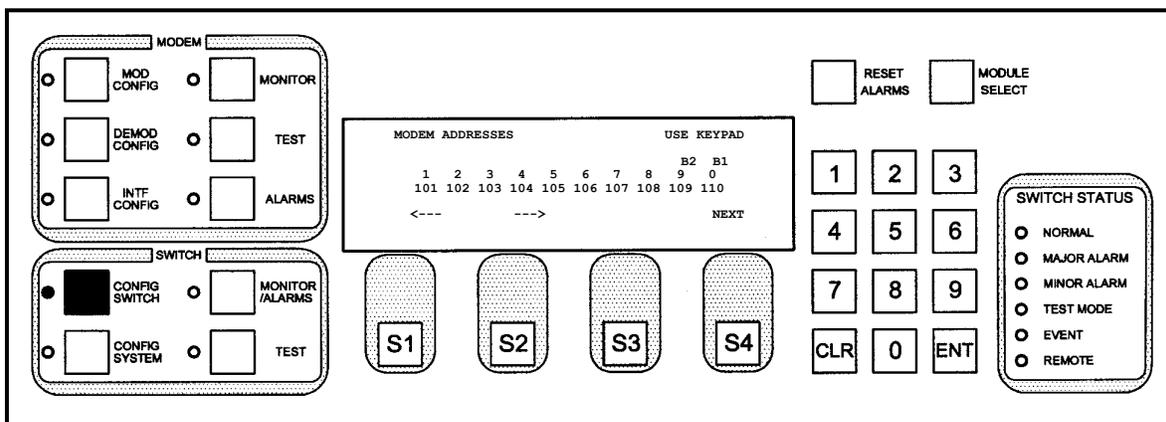


This screen allows the user to program the remote addresses of each modem connected to the redundancy system. All addresses must be in the range of 32 to 255 decimal. All entries on this screen are in decimal. Multiple addresses may be programmed.

### 4.3.1.2.1   Programming steps:

1. Press ← or → to move the blinking cursor to the channel to be programmed.
2. Use the numeric keypad to enter the address for the channel at the cursor.
3. Enter an address for each modem connected to the redundancy system at the blinking cursor. Addresses for channels that do not have a modem connected will be ignored.
4. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
5. Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the modem (labeled Modems |

| Key | Label | Function |
|---|---|---|
|  |  | 1 through 0) to which the address is to be changed. |
| S2 | → | Press to move the blinking cursor to the right. Used to select the modem (labeled Modems 1 through 0) to which the address is to be changed. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Enter an address for each modem connected to the redundancy system at the blinking cursor. Addresses for channels that do not have a modem connected will be ignored. Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.1.3   MODEM CHANNEL CONNECTION TEST
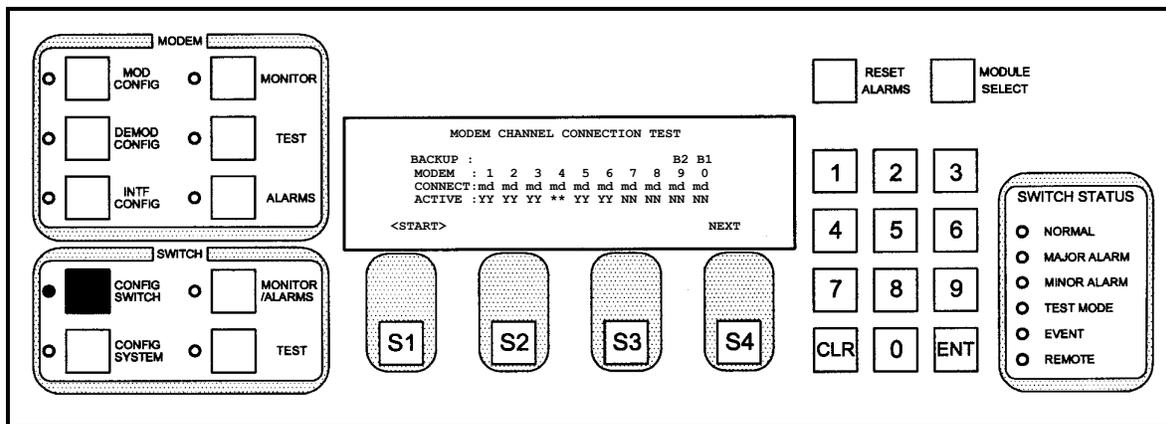


This screen allows the user to test communication channels between the RCS20 and all modems connected to the system. The ** indicates communication is in progress, and will move between all configured channels before the test is complete.

### 4.3.1.3.1   Programming steps:

1.  Press <START> to begin the test. The ** will move from Channel 0 to all configured channels.

A 'Y' in the ACTIVE Row indicates normal communication, and an 'N' indicates communication failure between the RCS20 and the modems. The MODEM Row lists the communication channels for each modem. For example, an 'N' in the ACTIVE Row under Modem 4 indicates a problem with the modem connected to Channel 4. Possible problems could be a bad connection to the Modem 4 Remote Port, or an incorrect address for Modem 4, either at the modem or at the RCS20.

**IMPORTANT**

This test is performed approximately every 30 seconds by the RCS20, and the ** may appear without pressing <START>.

| Key | Label | Function |
|---|---|---|
| S1 | START | Press to begin the test. As each modem is being tested, the screen will indicate astericks (**) at that location in the ACTIVE row. As the astericks move across the screen, a 'Y' or N will appear indicating if the modulator and/or demodulator has a valid connection. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.4   MODEM 9 / BACKUP 2 CONFIGURATION
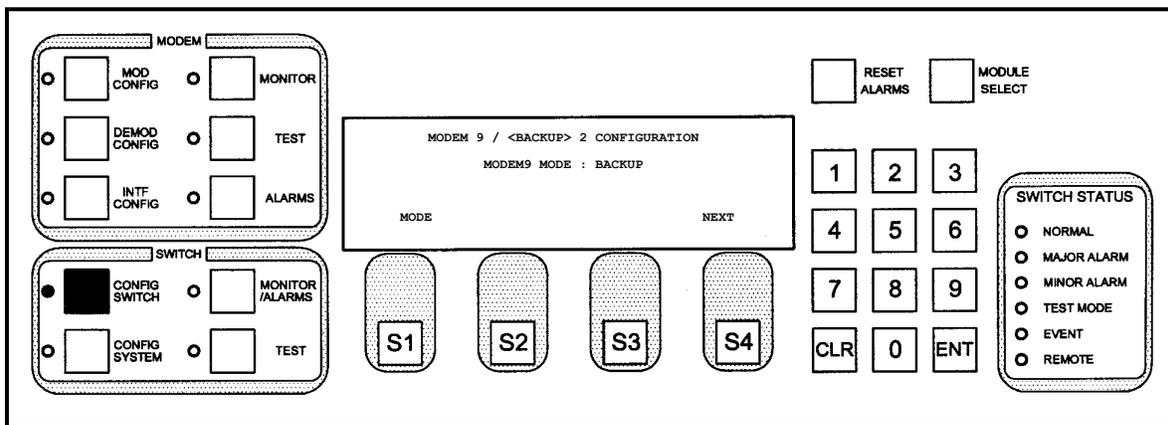


This screen allows the user to select the mode operation for Channel 9. The Channel 9 Modem can operate as a prime or backup.

## 4.3.1.4.1    Programming steps:

1.  Press <MODE> to cycle to the MODEM 9 / BACKUP 2 MODE Subscreen.

| Key | Label | Function |
|---|---|---|
| S1 | MODE | Press to go the MODEM 9 / BACKUP 2 MODE Subscreen. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.5   MODEM 9 / BACKUP 2 MODE
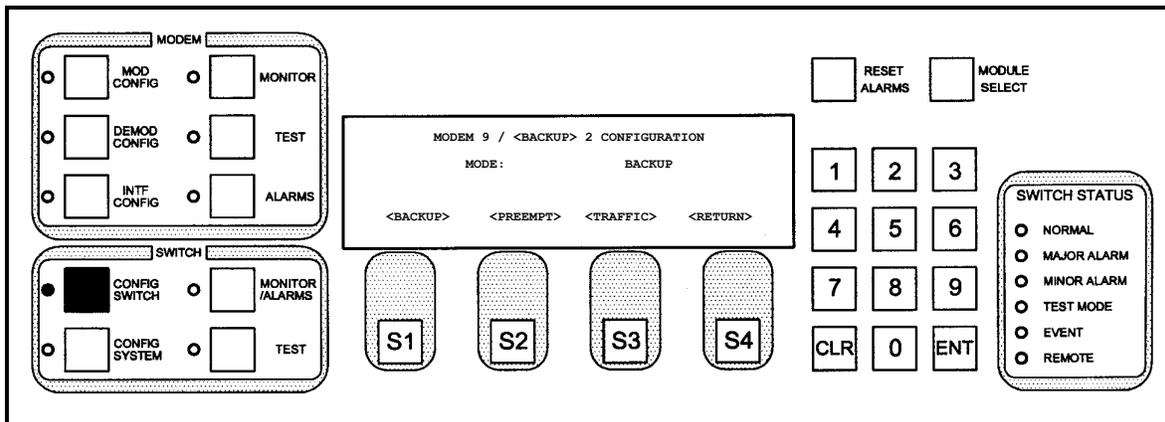


This screen allows the user to select the mode operation for Channel 9. The channel 9 modem can operate as a prime, a preemptable prime, or a dedicated backup.

## 4.3.1.5.1     Programming steps:

1.  Press <BACKUP> to configure Channel 9 as a dedicated backup channel. The switch parameter table will be updated immediately. In this mode, Channel 9 cannot be used as a prime channel, and Modem 9 will not be connected to up/down converters.
2.  Press <PREEMPT> to configure Channel 9 as a preemptable prime channel. The switch parameter table will be updated immediately. In this mode, Channel 9 will normally carry low priority data, but will drop the low priority data channel and serve as a backup if any of the modems on the dedicated Prime Channels 1 tthrough 8 fail.
3.  Press <TRAFFIC> to configure Channel 9 as a dedicated prime channel. The switch parameter table will be updated immediately. In this mode, Channel 9 will be connected to an up/down converter and will work the same as the other dedicated prime channels. Also, Channel 9 data and IF will be switched to the backup channel if the modem connected to Channel 9 fails.

| Key | Label | Function |
|-----|-------|----------|
| S1 | BACKUP | Press to Channel 9 as a dedicated backup channel. |
| S2 | PREEMPT | Press to configure Channel 9 as a preemptable prime channel. |
| S3 | TRAFFIC | Press to configure Channel 9 as a dedicated prime channel. |
| S4 | RETURN | Press to return to the Modem 9 / Backup 2 Configuration Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.6   BACKUP MODE CONFIGURATION
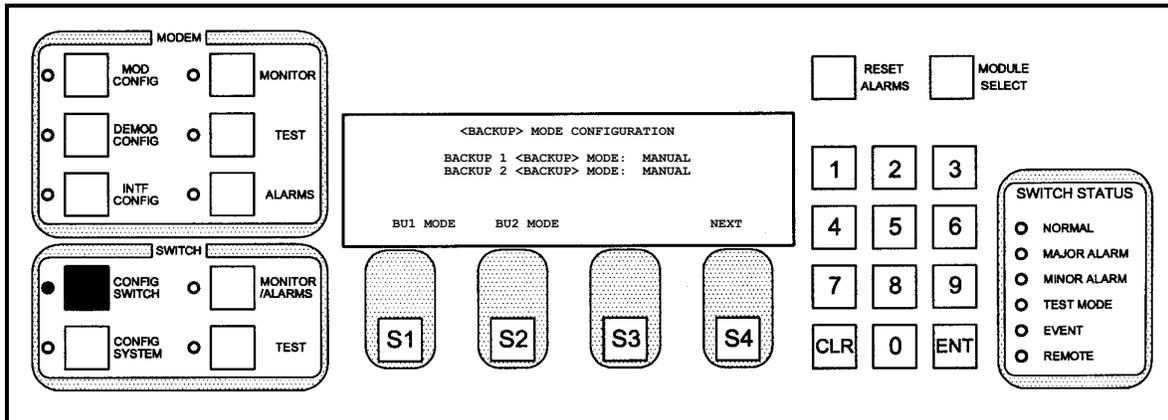


This screen displays the mode of backup operation for Backup Channels 1 and 2. If Channel 9 is configured as a prime channel, the selections for Backup Channel 2 will be unavailable.

## 4.3.1.6.1    Programming steps:

1. Press <BU1 MODE> to configure the mode of backup operation for Backup Channel 1 (Channel 0).
2. Press <BU2 MODE> to configure the mode of backup operation for Backup Channel 2 (Channel 9). The label for this key is not displayed if Channel 9 is configured as a prime channel.

| Key | Label | Function |
|---|---|---|
| S1 | BU1 MODE | Selects Backup Unit 1 for change and cycles to the BACKUP MODE 1 SELECT Subscreen. |
| S2 | BU2 MODE | Selects Backup Unit 2 for change and cycles to the BACKUP MODE 2 SELECT Subscreen. The label for this key will not be displayed if Channel 9 is configured as a prime channel. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.7   BACKUP MODE 1 SELECT
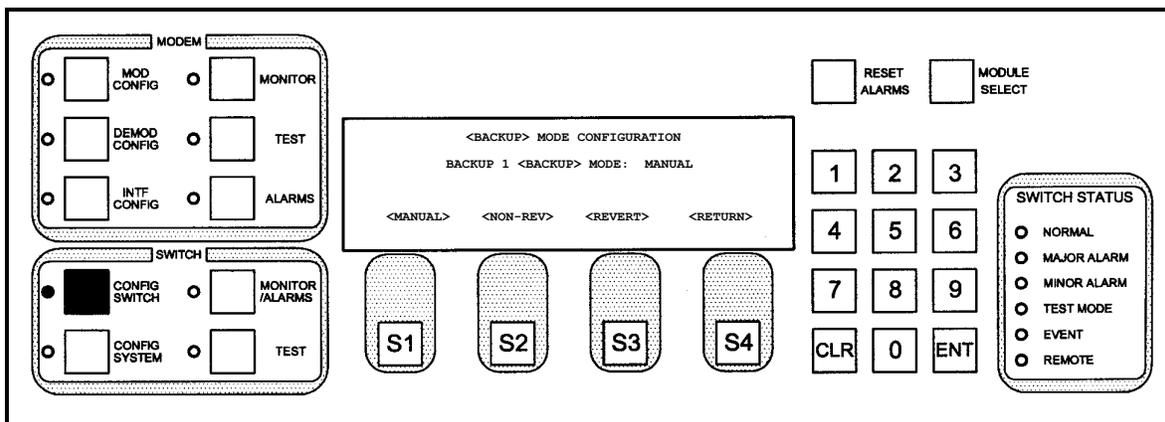


This screen allows the user to select the mode of backup operation for Backup Channel 1 (Channel 0). The following backup modes are available:

- **Manual** - allows the operator to force backups to occur even if prime channel modems have not failed.
- **Non-Revertive** - allows automatic backups to occur when prime channels fail, but once a channel is backed up, it will remain backed up until manually reset by the operator.
- **Revertive** - allows automatic backups to occur when prime channels fail, and after a channel is backed up, if the prime channel clears its error, the backup can become available for another prime channel.

### 4.3.1.7.1    Programming steps:

1. Press <MANUAL> to configure Backup Channel 1 for manual operation. The switch parameter table will be updated immediately.
2. Press <NON-REV> to configure Backup Channel 1 for automatic non-revertive operation. The switch parameter table will be updated immediately.
3. Press <REVERT> to configure Backup Channel 1 for automatic revertive operation. The switch parameter table will be updated immediately.
4. Press <CLR> or <RETURN> to abort programming (no switch parameters changed). The display will return to Config Switch Screen 4 (Backup Mode Configuration).

| Key | Label | Function |
|-----|-------|----------|
| S1 | MANUAL | Sets the backup unit for Manual Backup Mode. The switch parameter table will be updated immediately. |
| S2 | NON-REV | Sets the backup unit for Non-Revertive Backup Mode. The switch parameter table will be updated immediately. |
| S3 | REVERT | Sets the backup unit for Revertive Backup Mode. The switch parameter table will be updated immediately. |

| Key | Label | Function |
|---|---|---|
| S4 | RETURN | Pressed to return to the Backup Mode Configuration Screen. |
| Numeric Keypad | --- | Press <CLR> or <RETURN> to abort programming (no switch parameters changed). Returns to the Backup Mode Configuration Screen. |

## 4.3.1.8   BACKUP MODE 2 SELECT
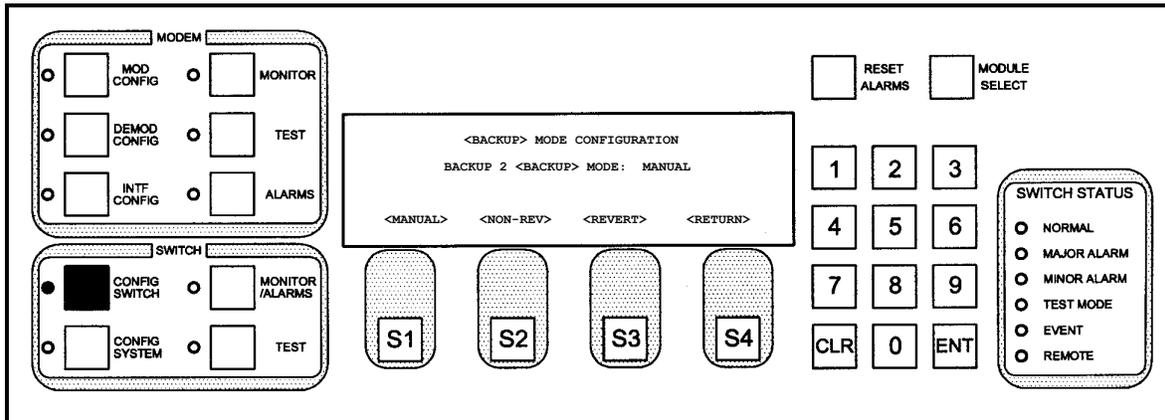


This screen allows the user to select the mode of backup operation for Backup Channel 2 (Prime Channel 9), if this channel is configured as a backup channel. The following backup modes are available:

- **Manual** - allows the operator to force backups to occur even if prime channel modems have not failed.
- **Non-Revertive** - allows automatic backups to occur when prime channels fail, but once a channel is backed up, it will remain backed up until manually reset by the operator.
- **Revertive** - allows automatic backups to occur when prime channels fail, and after a channel is backed up, if the prime channel clears its error, the backup can become available for another prime channel.

## 4.3.1.8.1   Programming steps:

1. Press <MANUAL> to configure Backup Channel 2 for manual operation. The switch parameter table will be updated immediately.
2. Press <NON-REV> to configure Backup Channel 2 for automatic non-revertive operation. The switch parameter table will be updated immediately.
3. Press <REVERT> to configure Backup Channel 2 for automatic revertive operation. The switch parameter table will be updated immediately.
4. Press <CLR> or <RETURN> to abort programming (no switch parameters changed). The display will return to Config Switch Screen 4 (Backup Mode Configuration).

| Key | Label | Function |
|---|---|---|
| S1 | MANUAL | Sets the backup unit for Manual Backup Mode. The switch parameter table will be updated immediately. |
| S2 | NON-REV | Sets the backup unit for Non-Revertive Backup Mode. The switch parameter table will be updated immediately. |
| S3 | REVERT | Sets the backup unit for Revertive Backup Mode. The switch parameter table will be updated immediately. |
| S4 | RETURN | Pressed to return to the Backup Mode Configuration Screen. |
| Numeric Keypad | --- | Press <CLR> or <RETURN> to abort programming (no switch parameters changed). Returns to the Backup Mode Configuration Screen. |

## 4.3.1.9   MODEM SWITCHING STYLE
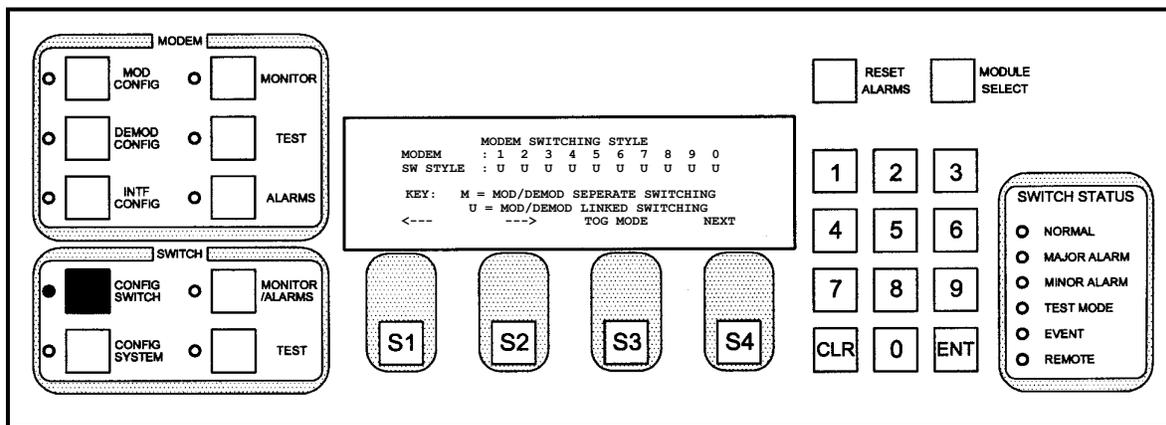


This screen allows the user to perform:

- **Linked Switching (U)** - switching the modulator and demodulator together.
- **Independent Switching (M)** - switching the modulator and demodulator separately.

When a prime channel is programmed for Linked Switching, both the modulator and the demodulator will be switched to a backup channel if either the modulator or the demodulator fail. When a prime channel is programmed for Independent Switching, only the modulator will be backed up if the modulator fails, and only the demodulator will be backed up if the demodulator fails.

**IMPORTANT**

When using DoubleTalk® Carrier-in-Carrier® (CnC)[1] switching mode, Independent Switching should NOT be used.

---

[1] DoubleTalk® is licensed from Raytheon Applied Signal Technology.

DoubleTalk® is a registered trademark of Raytheon Applied Signal Technology.

Carrier-in-Carrier® is a registered trademark of Comtech EF Data.

## 4.3.1.9.1    Programming steps:

1. Press ← or → to move the blinking cursor the channel to be programmed
2. Press <TOG MODE> to toggle between U (linked switching) and M (independent switching).
3. Select the desired switching styles for each prime channel.
4. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
5. Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Pressed in conjunction with S2 (→) to position a blinking cursor to select the switching style. |
| S2 | → | Pressed in conjunction with S1 (←) to position a blinking cursor to select the switching style. |
| S3 | TOG MODE | Pressed to toggle toggle between U (linked switching) and M (independent switching). |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.1.10  AUTO MODE BACKUP ASSIGNMENT SUMMARY
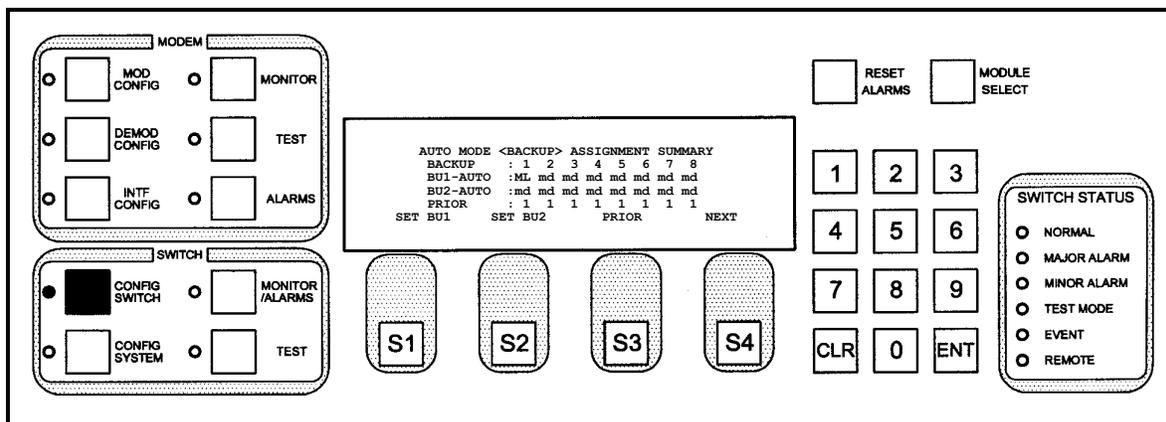


This screen displays the assigned connections to the channels. The unit must be programmed with the prime channels used for automatic backup protection. There are up to two backup channels available for the up to nine prime channels. For the screen shown previously, the following letter codes indicate backup assignment information:

- **M** - indicates that a modulator is programmed for automatic backup and is currently in hot standby.
- **D** - indicates that a demodulator is programmed for automatic backup and is currently in hot standby.

- **L** - indicates that a demodulator is programmed for automatic backup and is currently in "Looped Back" standby. This means that the demodulator is looped to itself and is not locked to the actual Rx signal. This is necessary in CnC switching mode.
- **m** - indicates that a modulator is programmed for automatic backup.
- **d** - indicates that a demodulator is programmed for automatic backup.
- **B** - indicates a modulator or demodulator is currently backed up.

The screen (shown above) displays the following information:

The MODEM Line shows all of the prime channels available for protection. This line displays either the numbers 1 through 8, or 1 through 9 if Prime Channel 9 is configured as a backup.

The BU1 Line shows the prime channels that are programmed for automatic backup by Backup Channel 1. This line will have the label BU1-MANUAL if Backup Channel 1 is configured for manual backup. Note that the automatic backup assignments can be programmed into the RCS20 while the backup channel is in manual mode; the auto backup assignments will then become active when the backup channel is placed into auto-revertive or auto-non-revertive backup mode.

The BU2 Line shows the prime channels that are programmed for automatic backup by Backup Channel 2. This line will have the label BU2-AUTO if Backup Channel 2 is configured for auto-revertive or auto-non-revertive backup.

The PRIOR Line on the above display shows the priority assignments for each prime channel. Priority numbers range from 1 to 9, with 1 being the highest priority and 9 being the lowest priority. Prime channels with the highest priority (1) assigned to a backup channel will be placed in hot standby by that backup channel. When 2 or more prime channels have the same highest priority, then the lowest channel number will be placed in hot standby. Priorities are also used during automatic revertive backups, if more prime channels are faulted then there are backups available, then the highest priority prime channels will be backed up and other priority failed prime channel will drop traffic.

| Key | Label | Function |
|---|---|---|
| S1 | SET<br>BU1 | Selects Backup Unit 1 for change and cycles to the AUTO MODE BACKUP 1 ASSIGNMENT PROGRAM Subscreen. |
| S2 | SET<br>BU2 | Selects Backup Unit 2 for change and cycles to the AUTO MODE BACKUP 2 ASSIGNMENT PROGRAM Subscreen. |
| S3 | PRIOR | Cycles to the BACKUP ASSIGNMENTS, PRIORITIES: Screen. |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.11  AUTO MODE BACKUP 1 ASSIGNMENT PROGRAM
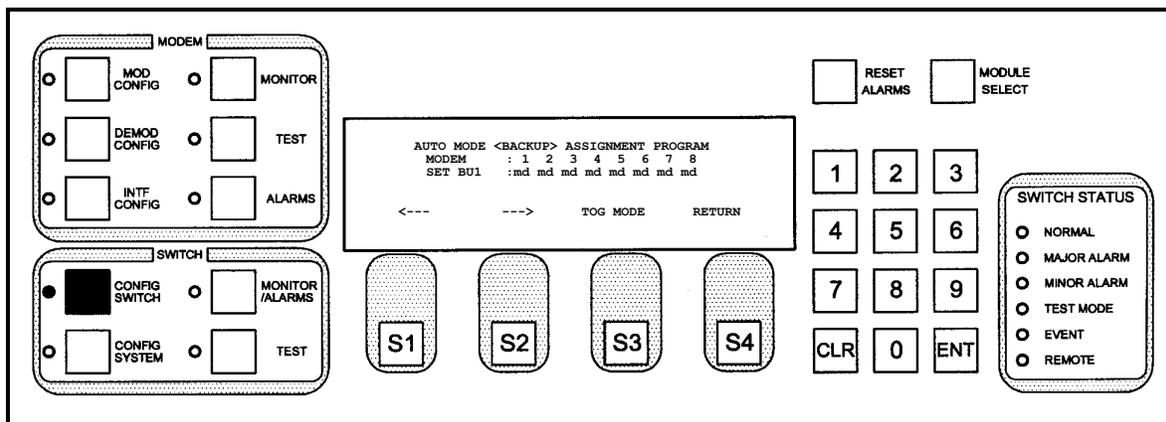


The Auto Mode Backup 1 Assignment Program Subscreen allows the user to program the RCS20
Backup Channel 1 to provide automatic switching for any or all of the prime channel modems. The
following letter codes indicate backup assignment information for Backup Channel 1 on this screen:

- **M** - indicates that a modulator is programmed for automatic backup and is currently in hot
  standby.
- **D** - indicates that a demodulator is programmed for automatic backup and is currently in hot
  standby.
- **m** - indicates that a modulator is programmed for automatic backup.
- **d** - indicates that a demodulator is programmed for automatic backup.
- **B** - indicates a modulator or demodulator is currently backed up.

### 4.3.1.11.1   Programming steps:

1. Press ← or → to move the blinking cursor the channel to be programmed.
2. Press <TOG MODE> to switch from ' ' , to 'm', to 'd' to 'md' or vice-versa. The independent
   switching modes 'm' and 'd' will not be available if a channel is programmed for linked switching.
   - A blank (' ') indicates a prime channel is not assigned to Backup Channel 2.
   - 'm' indicates the modulator only is assigned to backup 2.
   - 'd' indicates the demodulator only is assigned to backup 2.
   - 'md' indicates the modulator and demodulator is assigned to Backup Channel 2.
3. Select the desired Backup Channel 2 automatic backup assignments for each prime channel.
4. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
5. Press <ENT> to load the information on the screen into the Switch Parameter Table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the modem (labeled Modems 1 through 8) to which the backup assignment summary is to be changed. |

| Key | Label | Function |
|---|---|---|
| S2 | → | Press to move the blinking cursor to the right. Used to select the modem (labeled Modems 1 through 8) to which the  is to be changed. |
| S3 | TOG MODE | Used to toggle through the choices above. Multiple connections may be entered. |
| S4 | RETURN | Press to return to the AUTO MODE BACKUP ASSIGNMENT SUMMARY Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.12  AUTO MODE BACKUP 2 ASSIGNMENT PROGRAM
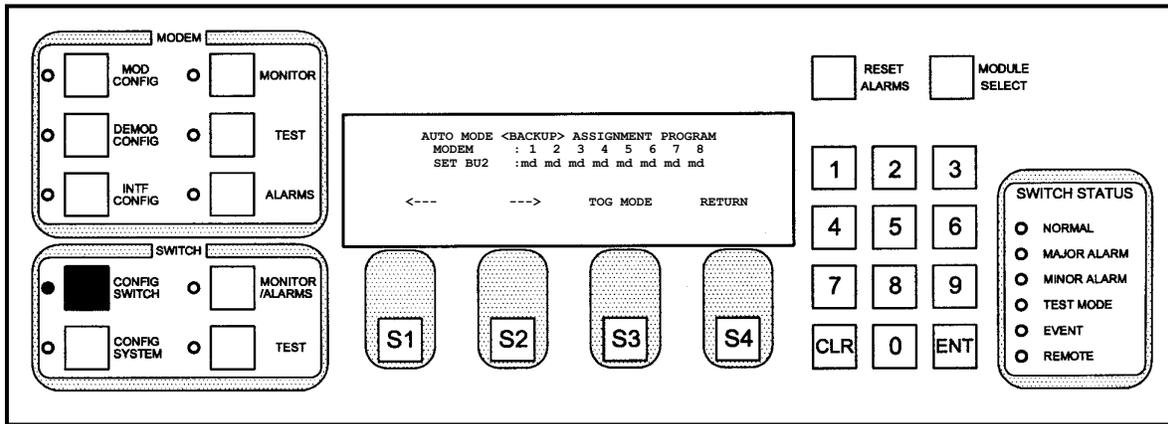


This subscreen allows the user to program the RCS20 Backup Channel 2 to provide automatic switching for any or all of the prime channel modems. The following letter codes indicate backup assignment information for Backup Channel 2 on this screen:

- **M** - indicates that a modulator is programmed for automatic backup and is currently in hot standby.
- **D** - indicates that a demodulator is programmed for automatic backup and is currently in hot standby.
- **m** - indicates that a modulator is programmed for automatic backup.
- **d** - indicates that a demodulator is programmed for automatic backup.
- **B** - indicates a modulator or demodulator is currently backed up.

### 4.3.1.12.1  Programming steps:

1. Press ← or → to move the blinking cursor the channel to be programmed.
2. Press <TOG MODE> to switch from ' ' , to 'm', to 'd' to 'md' or vice-versa. The independent switching modes 'm' and 'd' will not be available if a channel is programmed for linked switching.
   - ○ A blank (' ') indicates a prime channel is not assigned to Backup Channel 2.
   - ○ 'm' indicates the modulator only is assigned to backup 2.
   - ○ 'd' indicates the demodulator only is assigned to backup 2.
   - ○ 'md' indicates the modulator and demodulator is assigned to Backup Channel 2.

3.  Select the desired Backup Channel 2 automatic backup assignments for each prime channel.

4.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

5.  Press <ENT> to load the information on the screen into the Switch Parameter Table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the modem (labeled Modems 1 through 8) to which the backup assignment summary is to be changed. |
| S2 | → | Press to move the blinking cursor to the right. Used to select the modem (labeled Modems 1 through 8) to which the is to be changed. |
| S3 | TOG MODE | Used to toggle through the choices above. Multiple connections may be entered. |
| S4 | RETURN | Press to return to the AUTO MODE BACKUP ASSIGNMENT SUMMARY Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.13 BACKUP ASSIGNMENTS, PRIORITIES
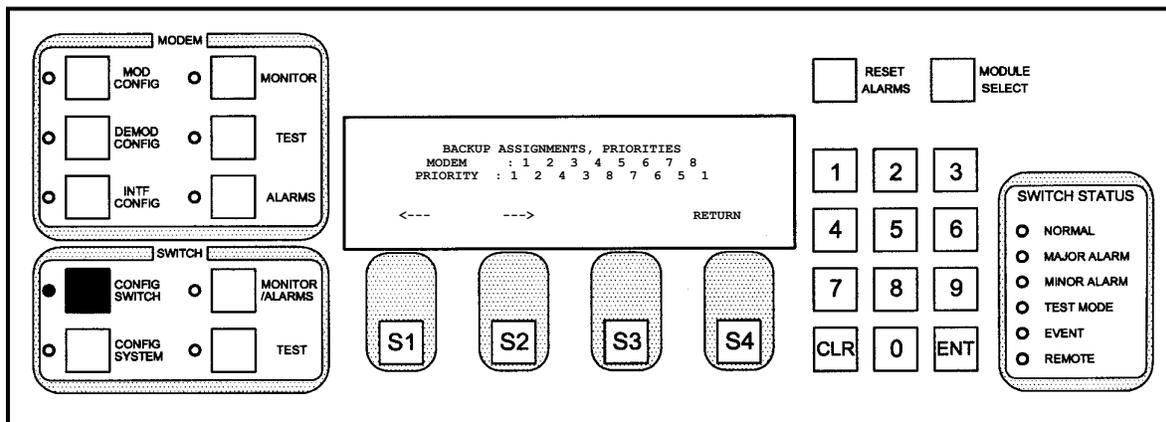


This subscreen allows the user to program the RCS20 with priorities for each prime channel. A 1 indicates the highest priority channel and a 9 indicates the lowest priority channel. The highest priority prime channel for each backup channel will have its modulator and/or demodulator placed in hot standby. For revertive backup mode, the highest priority channel modulators and demodulators will be backed up if multiple channels fail.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the modem (labeled Modems 1 through 8) to which the backup priority is to be changed. |
| S2 | → | Press to move the blinking cursor to the right. Used to select the modem (labeled Modems 1 through 8) to which the backup priority is to be changed. |
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the AUTO MODE BACKUP ASSIGNMENT SUMMARY Screen. Press the <CLR> or <NEXT> on the keypad to abort programming (no switch parameters changed). Press the <ENT> to load the information on the screen into the switch parameter table. |

| Key | Label | Function |
|---|---|---|
| Numeric Keypad | --- | Used to enter the priority for the selected prime modem. |

## 4.3.1.14 IFS20L DEMOD BKUP ASSIGNMENT SUMMARY
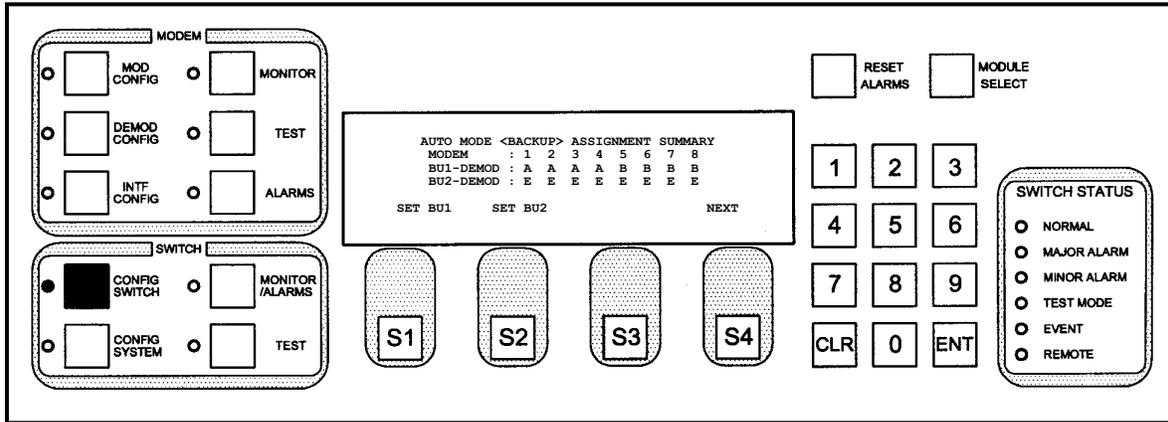


This screen is used to assign the channels. Channel assignments depend on whether the default or Combined IFL configuration is in use. See Section 4.3.2.9.3 for more information about Combined IFL.

When the default configuration is used, assignments may be made as follows:

- A through D for Backup 1
- E through H for Backup 2

When Combined IFL (see Section 4.3.2.9.3) is used, a 1:9 configuration is the only permitted configuration, and assignments may be made only as follows:

- A through H  for Backup 1

In all cases, multiple demodulator backups may be assigned to any channel.

| Key | Label | Function |
|---|---|---|
| S1 | SET BU1 | Selects Backup Unit 1 for change and cycles to the IFS20L DEMOD BKUP 1 ASSIGNMENT PROGRAM Subscreen. |
| S2 | SET BU2 | Selects Backup Unit 1 for change and cycles to the IFS20L DEMOD BKUP 2 ASSIGNMENT PROGRAM Subscreen. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.15  LEARN/BACKUP TEST CONFIGURATION
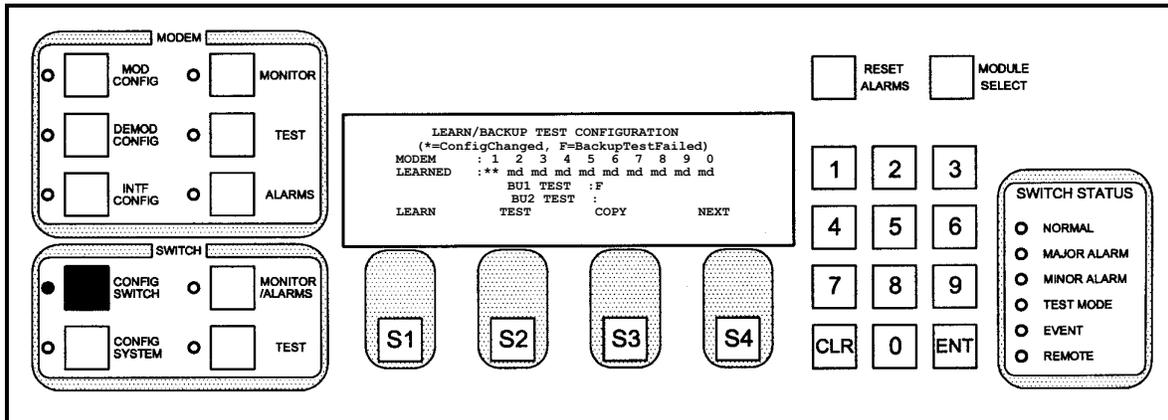


This screen displays modem learn state and backing test status. The status may be one of the following:

- **\*** - Configuration Changed
- **F** - Backup Test Failed

Multiple modems may be tested. To modify parameters, press S1, S2, or S3.

| Key | Label | Function |
|---|---|---|
| S1 | LEARN | Press to cycle to the LEARN TEST CONFIGURATION Subscreen. |
| S2 | TEST | Press to cycle to the BACKUP TEST CONFIGURATION Subscreen. |
| S3 | COPY | Press to cycle to the COPY MODEM CONFIGURATION Subscreen. |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.1.16  LEARN TEST CONFIGURATION
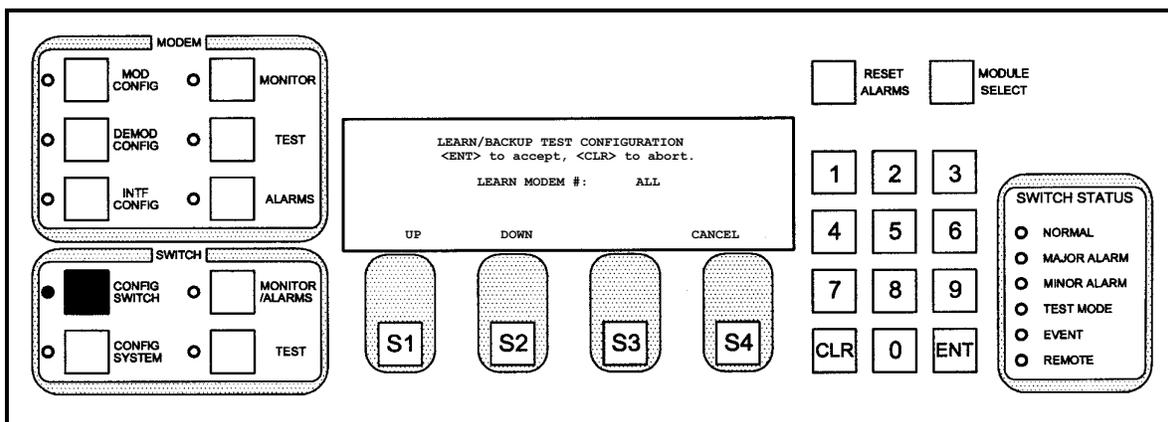


This screen allows the user to select modems to learn.

| Key | Label | Function |
|---|---|---|
| S1 | UP | Press to cycle up through the modem test options (ALL, MODEM0, MODEM1 - MODEM9). |

| Key | Label | Function |
|---|---|---|
| S2 | DOWN | Press to cycle down through the modem test options (ALL, MODEM9, MODEM8 - MODEM0). |
| S3 | --- | N/A |
| S4 | CANCEL | Press to cycle back to the LEARN/BACKUP TEST CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <ENT> to accept the selection from S1 and S2. Press <CLR> to abort changes and cycle back to the LEARN/BACKUP TEST CONFIGURATION Screen. |

## 4.3.1.17 BACKUP TEST CONFIGURATION
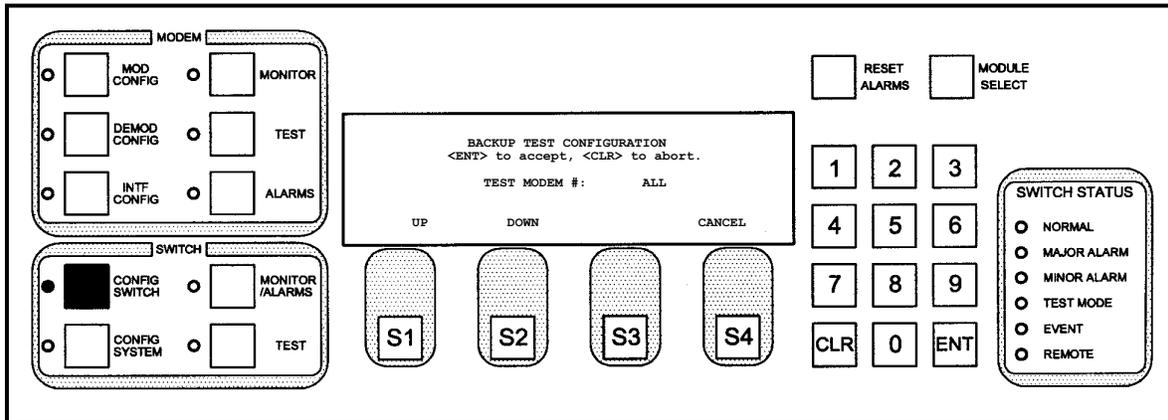


This screen allows the user to perform backup tests on a selected modem.

| Key | Label | Function |
|---|---|---|
| S1 | UP | Press to cycle up through the modem test options (ALL, MODEM0, MODEM1 - MODEM9). |
| S2 | DOWN | Press to cycle down through the modem test options (ALL, MODEM9, MODEM8 - MODEM0). |
| S3 | --- | N/A |
| S4 | CANCEL | Press to cycle back to the LEARN/BACKUP TEST CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <ENT> to accept the selection from S1 and S2. Press <CLR> to abort changes and cycle back to the LEARN/BACKUP TEST CONFIGURATION Screen. |

## 4.3.1.18   COPY MODEM CONFIGURATION
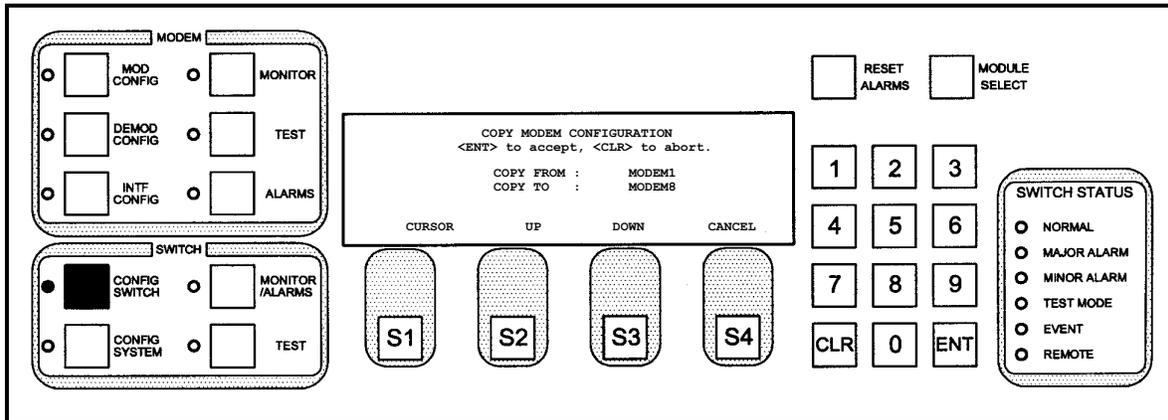


This screen allows the user to copy configurations between (from/to) modems.

| Key | Label | Function |
|---|---|---|
| S1 | CURSOR | Press to toggle between COPY FROM and COPY TO. |
| S2 | UP | Press to cycle up through the modems in the line selected by pressing S1 (MODEM1 - MODEM9). |
| S3 | DOWN | Press to cycle down through the modems in the line selected by pressing S1 (MODEM9 - MODEM1). |
| S4 | CANCEL | Press to cycle back to the LEARN/BACKUP TEST CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <ENT> to accept the selection from S1, S2, and S3.<br>Press <CLR> to abort changes and cycle back to the LEARN/BACKUP TEST CONFIGURATION Screen. |

## 4.3.1.19   MOD FAULT DELAY
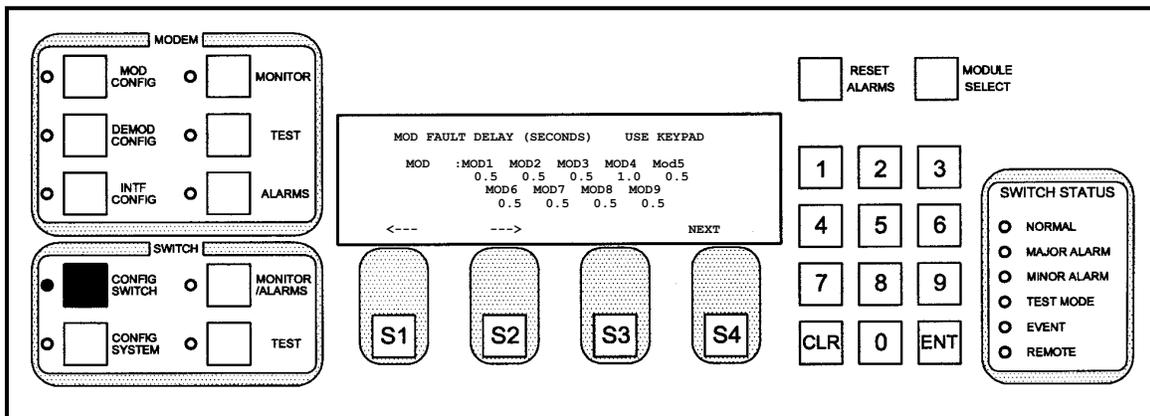


This screen allows the user to program the modulator fault delays (in seconds) for each prime channel on the RCS20. The fault delays for a modulator are used to debounce the modulator faults, thus if a modulator fails, a timer is started and the failure will not be recognized by the RCS20 until the timer

reaches fault delay seconds. The fault delay can be from 0.0 seconds to 199.9 seconds for each of the modulators (each modulator may be set to a different time delay if desired).

### 4.3.1.19.1    Programming steps:

1.  Press ← or  → to move the blinking cursor the prime channel to be programmed.
2.  Use the numeric keypad to enter the modulator fault delay for the selected prime channel.
3.  Select the desired modulator fault delays for each prime channel (each modulator may be set to a different time delay if desired).
4.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
5.  Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
| --- | --- | --- |
| S1 | ← | Press to move the blinking cursor to the left. Used to select the modulator (labeled MOD1 through MOD9) to which the time delay is to be changed. |
| S2 | → | Press to move the blinking cursor to the left. Used to select the modulator (labeled MOD1 through MOD9) to which the time delay is to be changed. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Used to enter the time delay for the selected modulator. Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

### 4.3.1.20   DEMOD FAULT DELAY
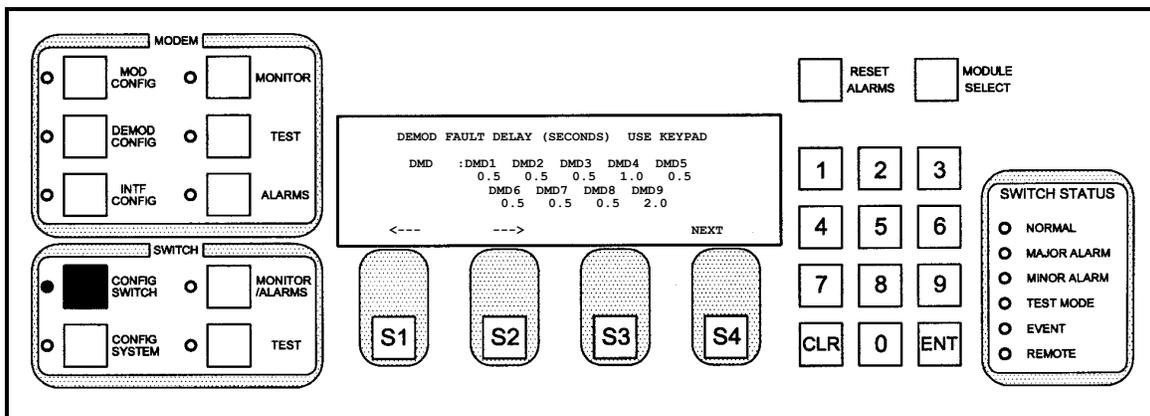


This screen allows the user to program the demodulator fault delays (in seconds) for each prime channel on the RCS20. The fault delays for a demodulator are used to debounce the demodulator faults, thus if a demodulator fails, a timer is started and the failure will not be recognized by the RCS20 until the timer reaches fault delay seconds. The fault delay can be from 0.0 seconds to 199.9 seconds for each of the demodulators (each demodulator may be set to a different time delay if desired).

## 4.3.1.20.1    Programming steps:

1.  Press ← or → to move the blinking cursor the prime channel to be programmed.
2.  Use the numeric keypad to enter the demodulator fault delay for the selected prime channel.
3.  Select the desired demodulator fault delays for each prime channel (each demodulator may be set to a different time delay if desired).
4.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
5.  Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|-----|-------|----------|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the demodulator (labeled DMD1 through DMD9) to which the time delay is to be changed. |
| S2 | → | Press to move the blinking cursor to the left. Used to select the demodulator (labeled DMD1 through DMD9) to which the time delay is to be changed. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Used to enter the time delay for the selected demodulator. Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.1.21   DEMOD AQU DELAY
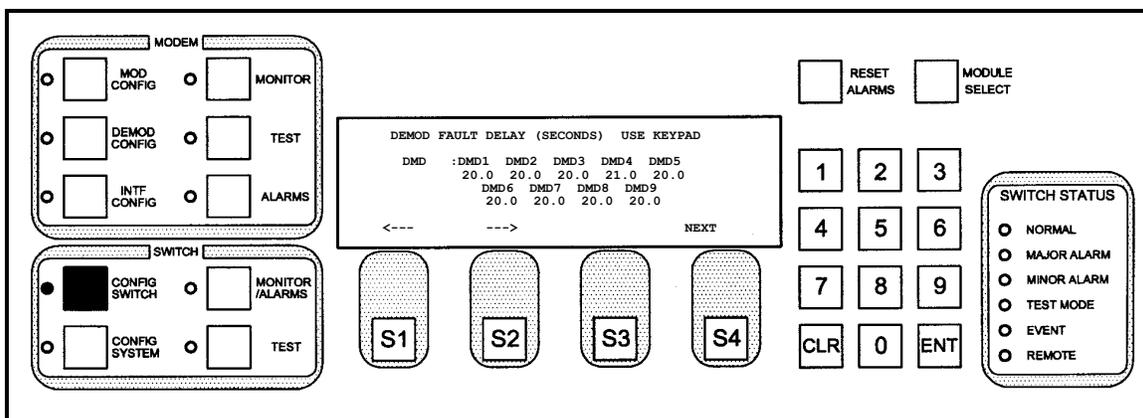


This screen allows the user to set the length of time (in seconds) for each prime channel on the RCS20. The fault delays for a demodulator are used to debounce the demodulator faults, thus if a demodulator does not acquire, a timer is started and the failure will not be recognized by the RCS20 until the timer reaches fault delay seconds. The fault delay can be from 0.0 seconds to 199.9 seconds for each of the demodulators (each demodulator may be set to a different time delay if desired).

## 4.3.1.21.1    Programming steps:

1.  Press ← or → to move the blinking cursor the prime channel to be programmed.
2.  Use the numeric keypad to enter the demodulator fault delay for the selected prime channel.

3.  Select the desired demodulator acquisition delays for each prime channel (each demodulator may be set to a different time delay if desired).

4.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

5.  Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the demodulator (labeled DMD1 through DMD9) to which the acquisition time is to be changed. |
| S2 | → | Press to move the blinking cursor to the left. Used to select the demodulator (labeled DMD1 through DMD9) to which the acquisition time is to be changed. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Used to enter the acquisition time for the selected demodulator. Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.1.22  FORCE MANUAL BACKUP
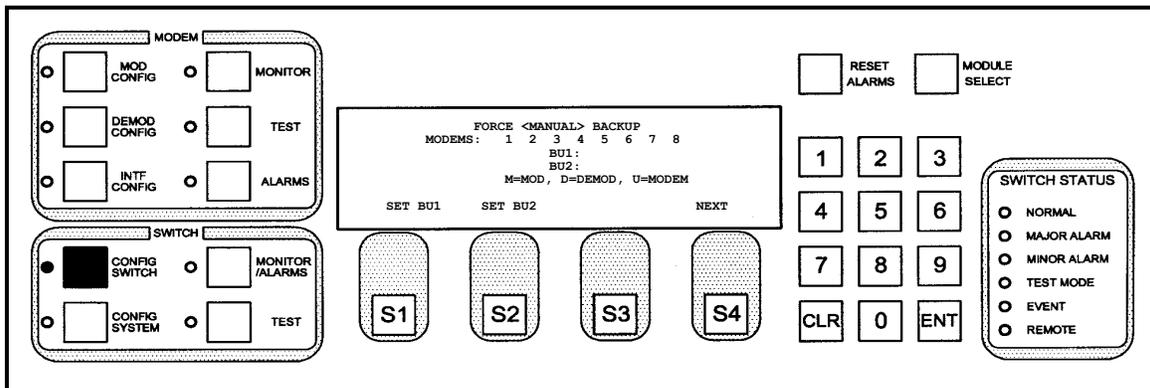


This screen allows the user to switch prime channels into backup manually. Backup Channel 1 must be in manual mode to force prime channels into backup. If a prime channel is configured for linked switching, then switching the prime channel modulator only will also switch the demodulator. Multiple modems may be set. These connections may be any of the following:

*   **M** - Modulator
*   **D** - Demodulator
*   **U** - Modem

## 4.3.1.22.1   Programming steps:

1.  Press SET BU1 to switch prime channels to Backup Channel 1.

2.  Press SET BU2 to switch prime channels to Backup Channel 2.

3.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

4. Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

> **IMPORTANT**
>
> SET BU2 will be unavailable if Channel 9 is configured as a prime channel.

| Key | Label | Function |
|---|---|---|
| S1 | SET BU1 | Selects Backup Unit 1 for change and cycles to the FORCE MANUAL BACKUP 1 Subscreen. |
| S2 | SET BU2 | Selects Backup Unit 2 for change and cycles to the FORCE MANUAL BACKUP 2 Subscreen. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>. |

## 4.3.1.23  FORCE MANUAL BACKUP 1
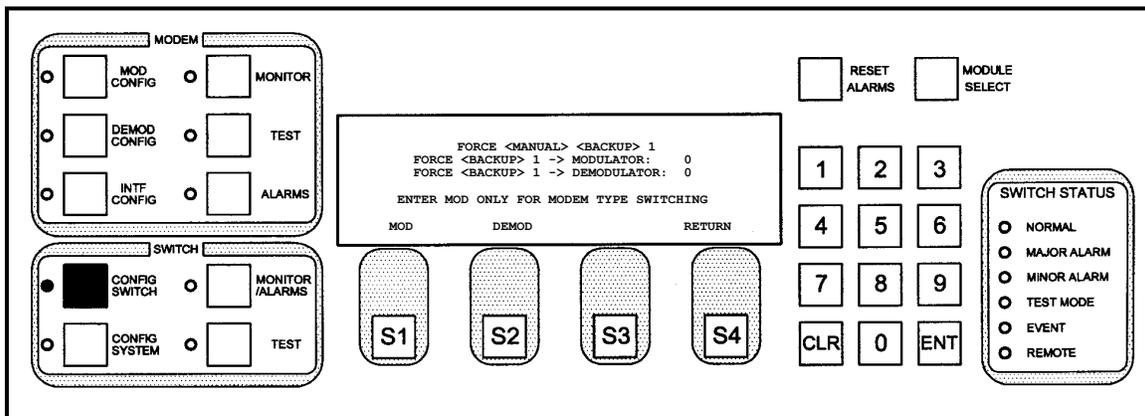


This subscreen allows the user to switch prime channels to backup Channel 1 manually. Backup Channel 1 must be in manual mode for to force prime channels into backup. If a prime channel is configured for linked switching, then switching the prime channel modulator only will also switch the demodulator.

### 4.3.1.23.1   Programming steps:

1. Press <MOD> or <DEMOD> to move the blinking cursor to the modulator or demodulator selection.
2. Use the numeric keypad to enter the prime channel number to switch to Backup Channel 1.
3. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

4. Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

| Key | Label | Function |
|---|---|---|
| S1 | MOD | Press to place the blinking cursor on MODULATOR. |
| S2 | DEMOD | Press to place the blinking cursor on DEMODULATOR. |
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the AUTO MODE BACKUP ASSIGNMENT SUMMARY Screen. |
| Numeric Keypad | --- | Used to enter the prime channel number to switch to Backup Channel 1. Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>. |

## 4.3.1.24 FORCE MANUAL BACKUP 2
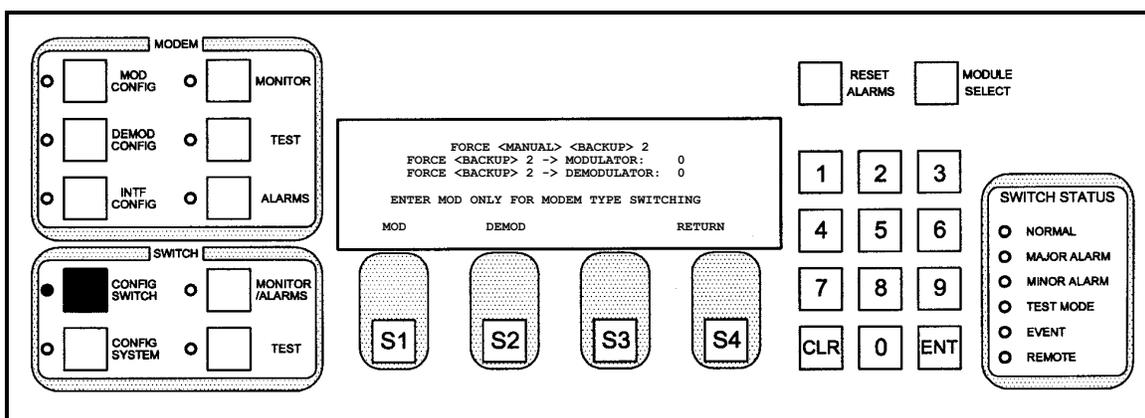


This subscreen allows the user to switch prime channels to backup Channel 2 manually. Channel 9 must be configured as Backup Channel 2, and Backup Channel 2 must be in manual mode to force prime channels into backup. If a prime channel is configured for linked switching, then switching the prime channel modulator only will also switch the demodulator.

### 4.3.1.24.1 Programming steps:

1. Press <MOD> or <DEMOD> to move the blinking cursor to the modulator or demodulator selection.
2. Use the numeric keypad to enter the prime channel number to switch to Backup Channel 2.
3. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
4. Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

| Key | Label | Function |
|---|---|---|
| S1 | MOD | Press to place the blinking cursor on MODULATOR. |
| S2 | DEMOD | Press to place the blinking cursor on DEMODULATOR. |

| Key | Label | Function |
|---|---|---|
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the AUTO MODE BACKUP ASSIGNMENT SUMMARY Screen. |
| Numeric Keypad | --- | Used to enter the prime channel number to switch to Backup Channel 2.<br>Press <CLR> or <NEXT> to abort programming (no switch parameters changed).<br>Press <ENT> to load the information on the screen into the switch parameter table.<br>Switching will occur immediately after pressing <ENT>. |

## 4.3.2  CONFIG SYSTEM Menu Tree

### 4.3.2.1   CONTROL MODE CONFIGURATION
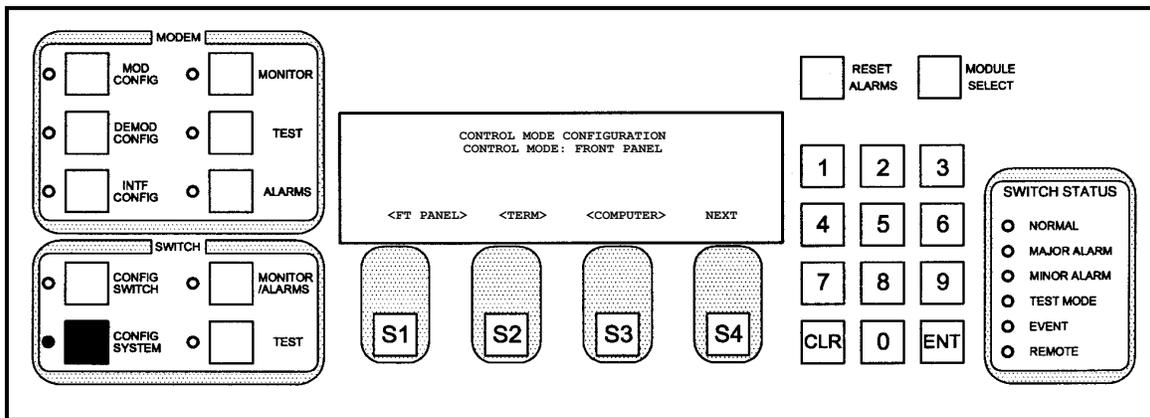


This screen allows the user to modify the control mode. The Control Mode may be one of the following:

- **FT PANEL** - Front Panel Control - Commands will only be accepted from the front panel and keypad.
- **TERM** - Remote Terminal Control - Commands will only be accepted through the RS-232 terminal connection.
- **COMPUTER** - Command Interface Control - Commands will only be accepted from the RS-484 remote port connection.

### 4.3.2.1.1    Programming steps:

1. Press <FT PANEL>, <TERM>, or <COMPUTER> to select the desired control mode. The mode will be selected immediately after pressing the appropriate key.

| Key | Label | Function |
|---|---|---|
| S1 | FT PANEL | Press to select Front Panel Control. |
| S2 | TERM | Press to select Remote Terminal Control. |
| S3 | COMPUTER | Press to select Command Interface Control. |
| S4 | NEXT | Press to cycle to the next screen. |

| Key | Label | Function |
|---|---|---|
| Numeric Keypad | --- | Press <NEXT> to advance to next screen. Press <CLR> to return to previous screen. |

## 4.3.2.2   TERMINAL PORT CONFIGURATION
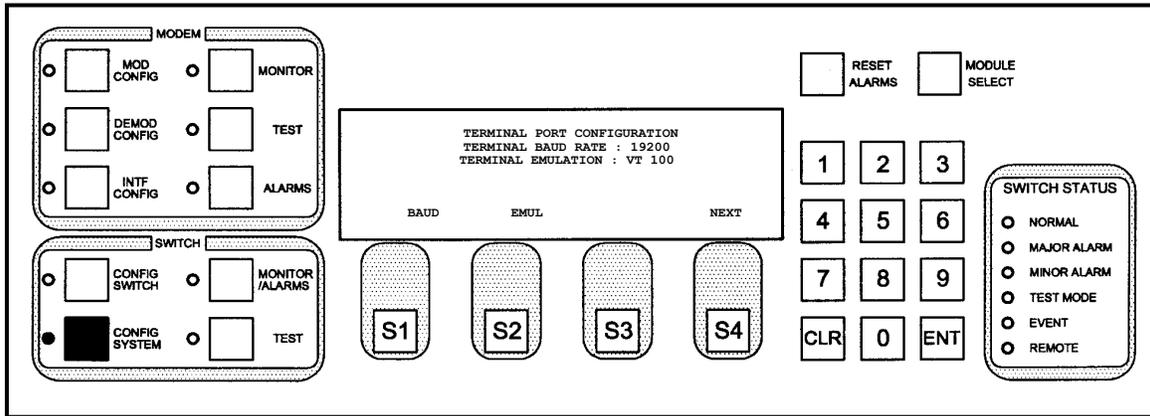


This screen displays both the Terminal Baud Rate and the Terminal Emulation Type, and allows the user to cycle to Subscreens to change the configurations. The baud rate may be any of the following:

- 19200
- 9600
- 2400

The emulation type may be any of the following:

- ADDS VP
- VT 100
- WYSE 50

### 4.3.2.2.1   Programming steps:

1. Press <BAUD> to cycle to the TERMINAL PORT BAUD RATE Subscreen to change the configuration. Press <EMUL> to cycle to the TERMINAL PORT EMULATION Subscreen to change the configuration.

**IMPORTANT**

After changing the Terminal Port Baud Rate, power must be cycled before the baud rate change takes effect.

| Key | Label | Function |
|---|---|---|
| S1 | BAUD | Press to cycle to the TERMINAL PORT BAUD RATE Subscreen. |
| S2 | EMUL | Press to cycle to the TERMINAL PORT EMULATION Subscreen. |

| Key | Label | Function |
|---|---|---|
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.3   TERMINAL PORT BAUD RATE
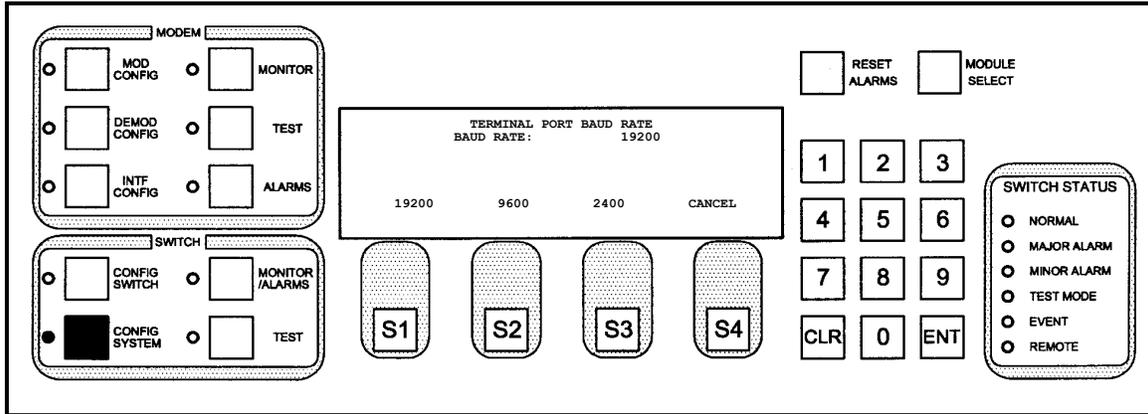


This subscreen allows the user to modify the RCS20 terminal port baud rate.

### 4.3.2.3.1   Programming steps:

1. Press <19200>, <9600>, or <2400> to select the desired terminal port baud rate. The switch parameter table will be updated immediately.
2. Press <CLR> or <NEXT> to abort programming.

**IMPORTANT**

After changing the Terminal Port Baud Rate, power must be cycled before the baud rate change takes effect.

| Key | Label | Function |
|---|---|---|
| S1 | 19200 | Press to select 19200 bps. |
| S2 | 9600 | Press to select 9600 bps. |
| S3 | 2400 | Press to select 2400 bps. |
| S4 | CANCEL | Press to cycle back to the TERMINAL PORT CONFIGURATION Screen |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). |

## 4.3.2.4   TERMINAL PORT EMULATION
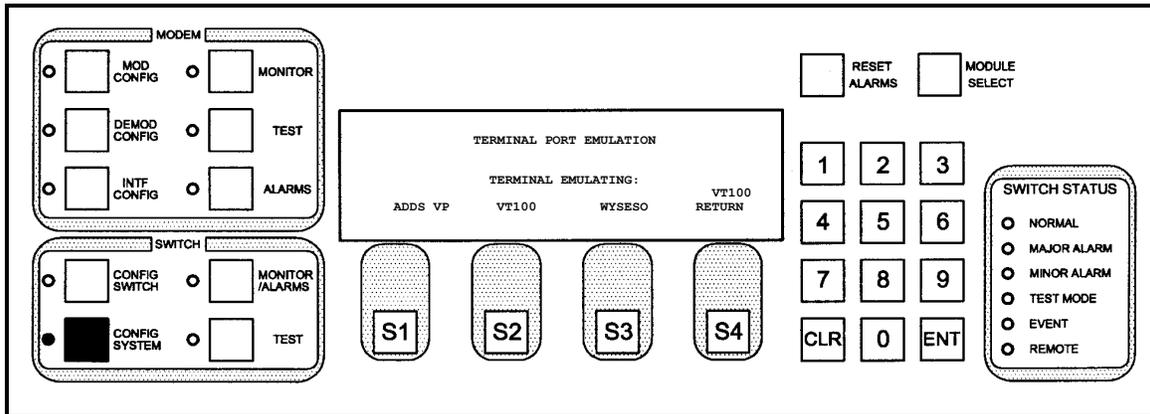


This subscreen allows the user to modify the RCS20 terminal port terminal emulation.

## 4.3.2.4.1   Programming steps:

1.  Press <ADDS VP>, <VT 100>, or <WYSE 50> to select the desired terminal port emulation type.

    The switch parameter table will be updated immediately.

2.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

| Key | Label | Function |
|---|---|---|
| S1 | ADDS VP | Selects ADDS VP as Term Emulation |
| S2 | VT 100 | Selects VT100 as Term Emulation. |
| S3 | WYSE 50 | Selects WYSESO as Term Emulation. |
| S4 | RETURN | Press to cycle back to the TERMINAL PORT CONFIGURATION Screen |
| Numeric Keypad | --- | Press <CLR> to abort programming. |

## 4.3.2.5   REMOTE PORT CONFIGURATION
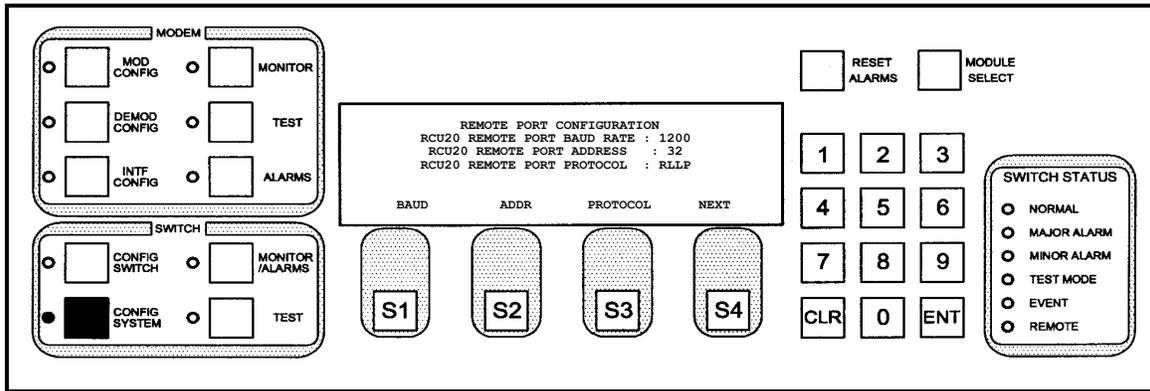


This screen displays the Remote Port Baud Rate, the Remote Port Address, and the Terminal Emulation Type, and allows the user to cycle to Subscreens to change the configurations. The baud rate may be any of the following:

| 115200 | 57600 | 38400 | 19200 | 9600 | 4800 | 2400 | 1200 |

The Remote Port Address may be a value from 32 to 255, and is entered from the keypad. The Remote Port Protocol may be one of the following:

- RLLP
- 2400

1.   Press <BAUD> to cycle to the REMOTE PORT BAUD RATE CONFIGURATION Subscreen to change the baud rate.
2.   Press <ADDR> to cycle to the REMOTE PORT ADDRESS Subscreen to change the address.
3.   Press <PROTOCOL> to cycle to the REMOTE PORT PROTOCOL CONFIGURATION Subscreen to change the protocol type.
4.   Press <CLR> to abort programming (no switch parameters changed).

| Key | Label | Function |
|---|---|---|
| S1 | BAUD | Press to cycle to the REMOTE PORT BAUD RATE CONFIGURATION Subscreen. |
| S2 | ADDR | Press to cycle to the REMOTE PORT ADDRESS Subscreen. |
| S3 | PROTOCOL | Press to cycle to the REMOTE PORT PROTOCOL CONFIGURATION Subscreen. |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> to abort programming (no switch parameters changed). |

## 4.3.2.6    REMOTE PORT BAUD RATE CONFIGURATION
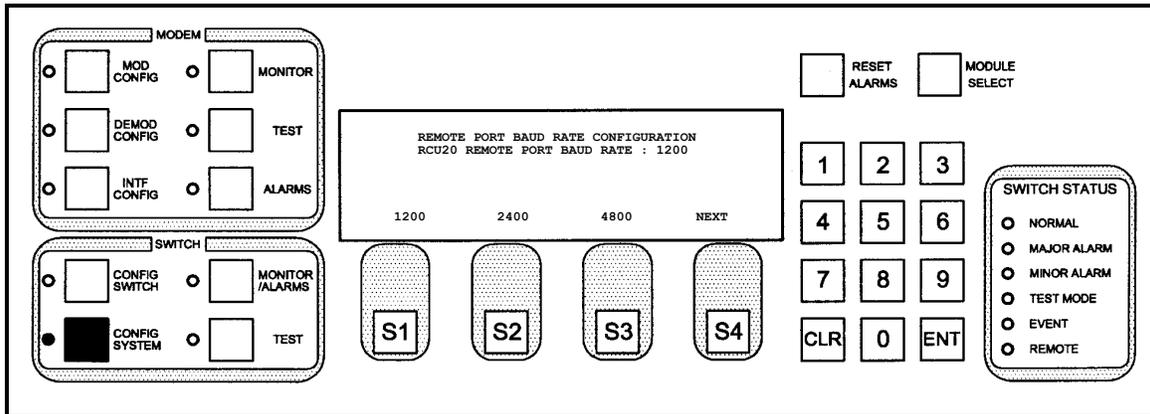


This subscreen allows the user to modify the Remote Port Baud Rate.

## 4.3.2.6.1    Programming steps:

1.    Select either <115200>, <57600>, <38400>, <19200>, <9600>, <4800>, <2400>, or <1200> for the baud rate.

2.    Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

| Key | Label | Function |
|---|---|---|
| S1 | 1200 | Press to select 1200 bps. |
| S2 | 2400 | Press to select 24800 bps. |
| S3 | 4800 | Press to select 4800 bps. |
| S4 | Next | Press to show next available baud rates. |
| Numeric Keypad | --- | Press <CLR> to abort programming (no switch parameters changed). |
| S1 | 9600 | Press to select 9600 bps. |
| S2 | 19200 | Press to select 19200 bps. |
| S3 | 38400 | Press to select 38400 bps. |
| S4 | Next | Press to show next available baud rates. |
| S1 | 57600 | Press to select 57600 bps. |
| S2 | 115200 | Press to select 115200 bps. |
| S3 | --- | N/A |
| S4 | Return | Press to abort. |

## 4.3.2.7   REMOTE PORT ADDRESS
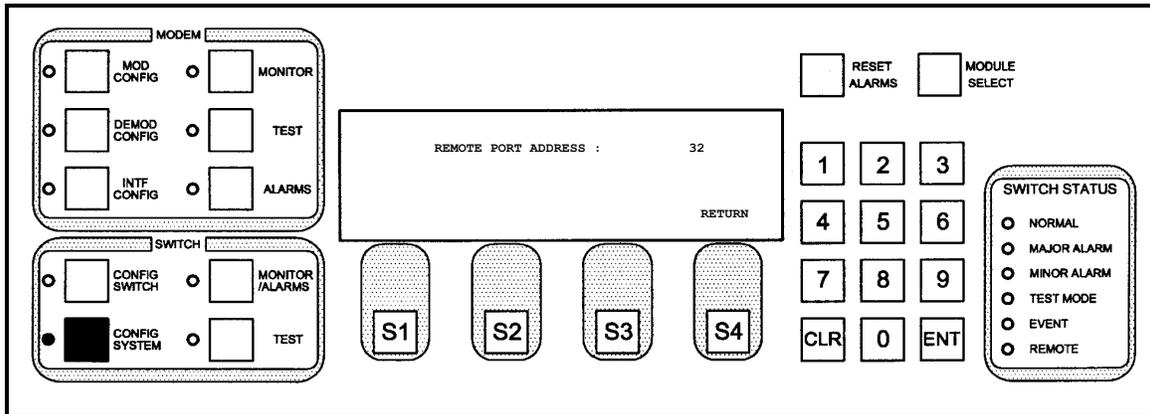


This subscreen allows the user to modify the RCS20 remote port baud address.

## 4.3.2.7.1    Programming steps:

1.  Use the numeric keypad to enter the desired multi-drop address for the RCS20. Valid addresses are 32 through 255.
2.  Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
3.  Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

| Key | Label | Function |
|---|---|---|
| S1 | --- | N/A |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to select the value entered on the keypad and cycle back to the TERMINAL PORT CONFIGURATION Screen |
| Numeric Keypad | --- | Use the numeric keypad to enter the desired multi-drop address for the RCS20. Valid addresses are 32 through 255. Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>. |

## 4.3.2.8   REMOTE PORT PROTOCOL CONFIGURATION
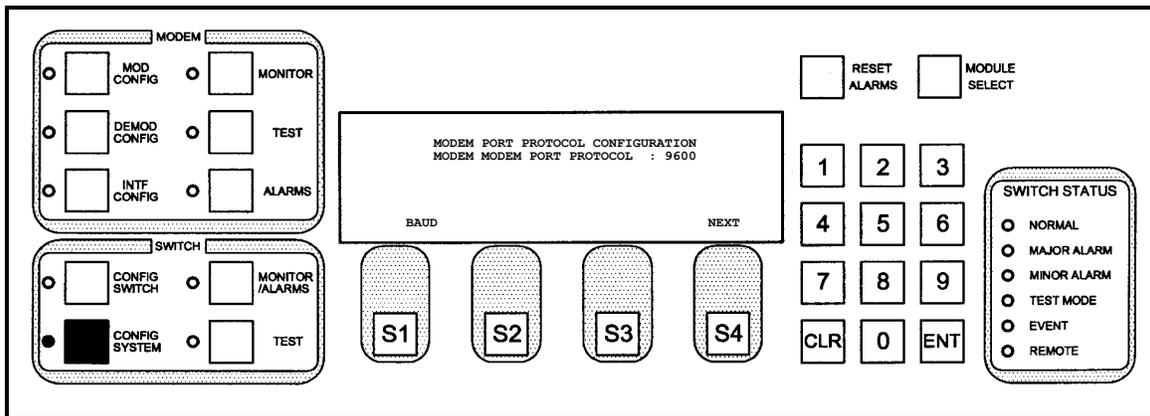


This subscreen allows the user to modify the modem remote port communication protocol. The remote port protocol determines the binary format for communication between the RCU20 and all modems connected to the RCU20. Communication between the RCU20 and modems occurs over a RS-485 connection found on the Bank Control Expansion Card found at the rear of the RCU20. RLLP protocol is used by the following Radyne Products: DMD15, DMD2401, DVB3000 and DVB3030. 2400 protocol is used by the DMD2400 only.

### 4.3.2.8.1   Programming steps:

1.   Press <RLLP> or <2400> to select the desired modem remote port communication protocol. The switch parameter table will be updated immediately.

2.   Press <CLR> or <RETURN> to abort programming (no switch parameters changed)

| Key | Label | Function |
|---|---|---|
| S1 | RLLP | Press to select Standard RLLP format. |
| S2 | 2400 | Press to select Binary Protocol for use with DMD2400s |
| S3 | --- | N/A |
| S4 | RETURN | Press to cycle back to the REMOTE PORT CONFIGURATION Screen |
| Numeric Keypad | --- | Press <CLR> or <RETURN> to abort programming (no switch parameters changed) |

## 4.3.2.9   MODEM PORT CONFIGURATION
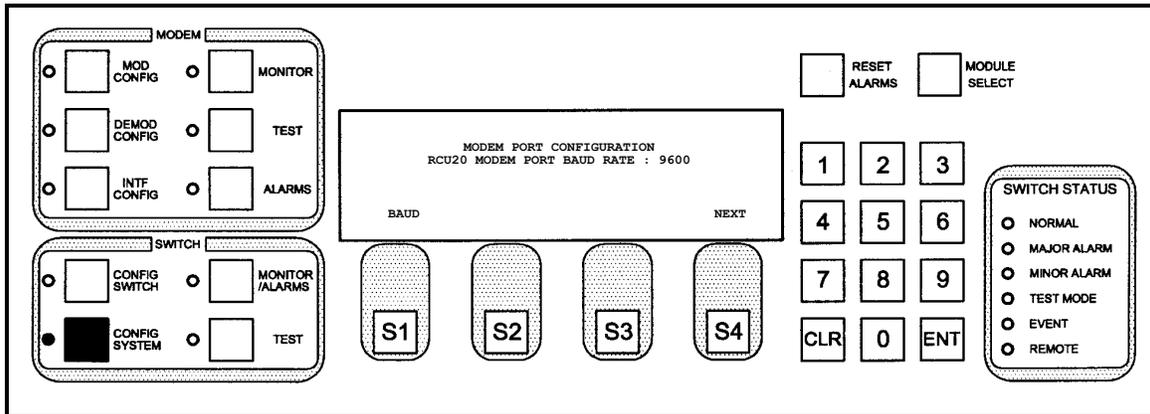


This screen displays the Remote Port Baud Rate and allows the user to cycle to Subscreens to change the configurations. The baud rate may be any of the following:

<div align="center">

9600           19200           38400           57600

</div>

1.   Press <BAUD> to cycle to the REMOTE PORT BAUD RATE CONFIGURATION Subscreen to change the baud rate.
2.   Press <CLR> to abort programming (no switch parameters changed).
3.   Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

| Key | Label | Function |
|---|---|---|
| S1 | BAUD | Press to cycle to the REMOTE PORT BAUD RATE CONFIGURATION Subscreen. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> to abort programming (no switch parameters changed). |

## 4.3.2.10  MODEM PORT BAUD RATE CONFIGURATION
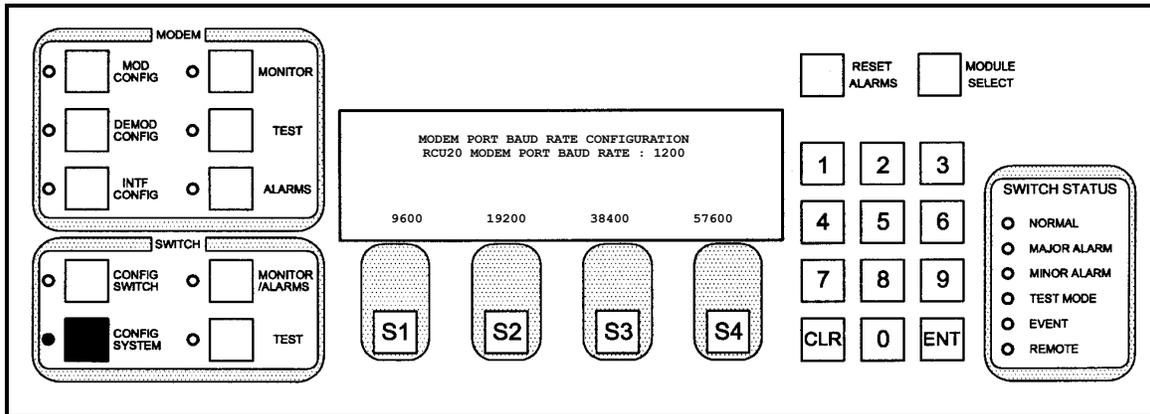


This subscreen allows the user to modify the Modem Port Baud Rate.

### 4.3.2.10.1   Programming steps:

1.   Select either <9600>, <19200>, <38400>, or <57600> to select the baud rate.

2.   Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

3.   Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

| Key | Label | Function |
|---|---|---|
| S1 | 9600 | Press to select 9600 bps. |
| S2 | 19200 | Press to select 19200 bps. |
| S3 | 38400 | Press to select 48400 bps. |
| S4 | 57600 | Press to select 57600 bps. |
| Numeric Keypad | --- | Press <CLR> to abort programming (no switch parameters changed). |

## 4.3.2.11 KEY CLICK CONFIGURATION
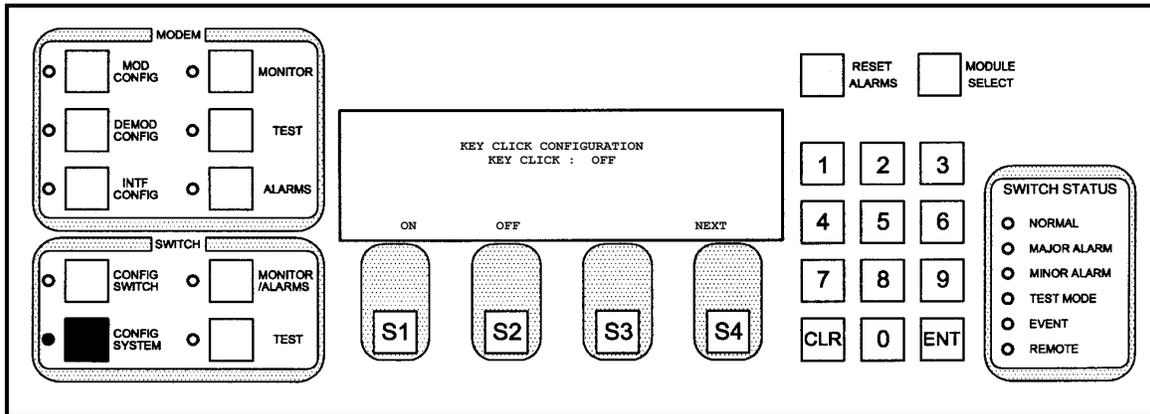


 This screen allows the user to turn on/off the audible key click that is heard with every key press on the front panel.

| Key | Label | Function |
|---|---|---|
| S1 | ON | Press to turn on the key click. |
| S2 | OFF | Press to turn off the key click. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.12 TIME / DATE CONFIGURATION
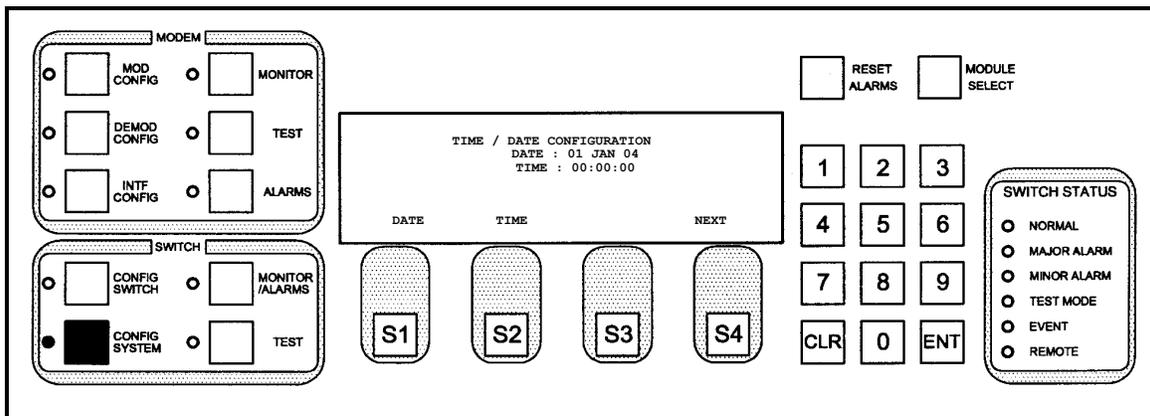


This screen displays the current real-time clock and date. The date and time are in the following format:

- **Date** - DD MMM YY
- **Time** - HH:MM:SS

### 4.3.2.12.1 Programming steps:

1. Press <DATE> to cycle to the SET DATE Subscreen.

2.    Press <TIME> to cycle to the SET TIME Subscreen.

| Key | Label | Function |
|---|---|---|
| S1 | DATE | Press to cycle to the SET DATE Subscreen. |
| S2 | TIME | Press to cycle to the SET TIME Subscreen. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.13  SET DATE
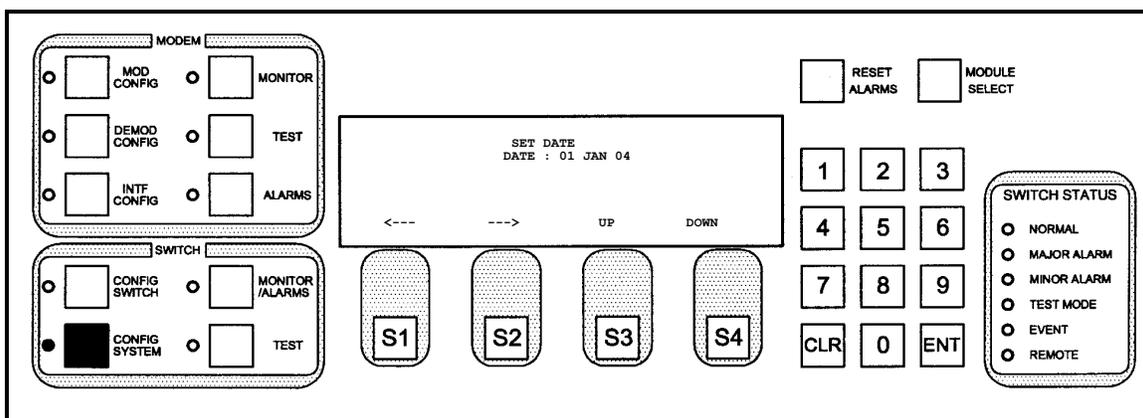


This subscreen allows the user to configure the real-time clock date for the RCS20.

## 4.3.2.13.1   Programming steps:

1.    Press ← or → to move the blinking cursor to the day, month, or year.
2.    Press <UP> to increase the value of the day, month or year (at the location of the blinking cursor), press <DOWN> to decrease the value of the day, month, or year (at the location of the blinking cursor).
3.    Press <CLR> to abort programming (no switch parameters changed).
4.    Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select Year, Month, and/or Day to be changed. |
| S2 | → | Press to move the blinking cursor to the right. Used to select Day, Month, and/or Year to be changed. |
| S3 | UP | Press to increment the selected field. |
| S4 | DOWN | Press to decrement the selected field. |
| Numeric Keypad | --- | Press <CLR> to abort changes and cycle back to the TIME / DATE CONFIGURATION Screen.<br>Press <ENT> to accept the selected date. |

## 4.3.2.14  SET TIME
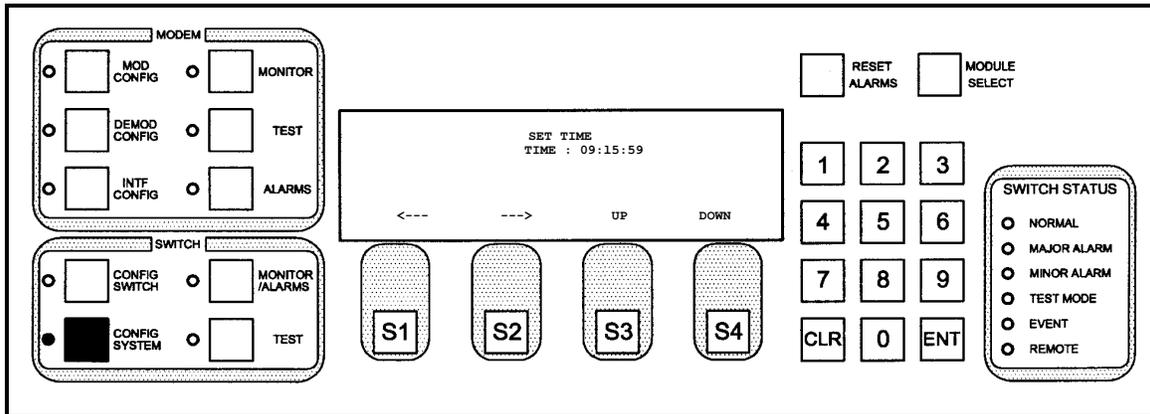


This subscreen allows the user to configure the real-time clock function for the RCS20.

## 4.3.2.14.1   Programming steps:

1.  Press ← or → to move the blinking cursor the hour, minute, or second.
2.  Press <UP> to increase the value of the hour, minute, or second (at the location of the blinking cursor). Press <DOWN> to decrease the value of the hour, minute, or second (at the location of the blinking cursor).
3.  Press <CLR> to abort programming (no switch parameters changed).
4.  Press <ENT> to load the information on the screen into the switch parameter table



**IMPORTANT**

The RCS20 real-time clock functions on 24-hour time.

Example: 13:40 hrs displayed on the unit is 1:40 pm.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select Seconds, Minutes, and/or Hour to be changed. |
| S2 | → | Press to move the blinking cursor to the right. Used to select Hour, Minutes, and/or Seconds to be changed. |
| S3 | UP | Press to increment the selected field. |
| S4 | DOWN | Press to decrement the selected field. |
| Numeric Keypad | --- | Press <CLR> to abort changes and cycle back to the TIME / DATE CONFIGURATION Screen. Press <ENT> to accept the selected date. |

## 4.3.2.15  LCD CONTRAST ADJUSTMENT
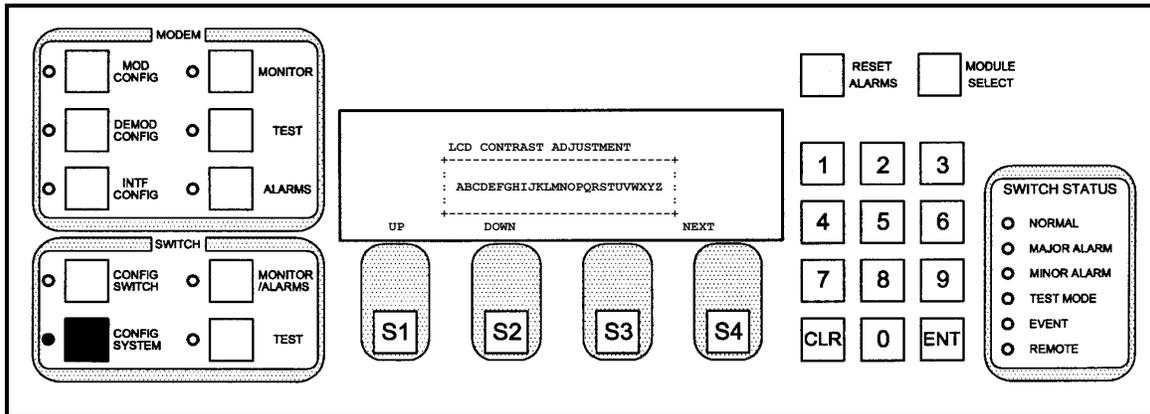


This screen allows the user to adjust the contrast of the characters on the LCD screen. The switch parameter table is immediately updated upon any changes.

| Key | Label | Function |
|---|---|---|
| S1 | UP | Press to increase the contrast value of the LCD screen. |
| S2 | DOWN | Press to decrease the contrast value of the LCD screen. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.16  LCD BACKLIGHT TIMEOUT
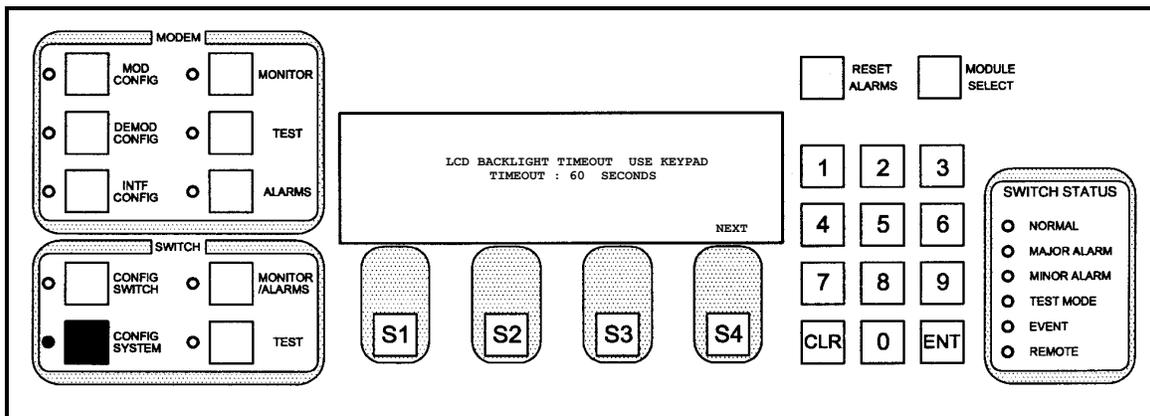


Whenever a button is pressed on the front panel, the LCD backlight illuminates. This screen allows the user to adjust the length of time (in seconds) between the last key press and the LCD backlight extinguishing.

## 4.3.2.16.1    Programming steps:

1.    Use the numeric keypad to enter the desired backlight timeout value in seconds. Valid values are 0 to 255 seconds.

2.    Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

3.    Press <ENT> to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing <ENT>.

| Key | Label | Function |
|---|---|---|
| S1 | --- | N/A |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | A value (in seconds) from 0 to 255 is entered.<br>Press <CLR> to disregard the value entered on the keypad, keep the previous value, and cycle back to the LCD CONTRAST ADJUSTMENT Screen.<br>Press <ENT> to select the value entered on the keypad and cycle to the next screen. |

## 4.3.2.17  BANK CONTROL CONFIGURATION
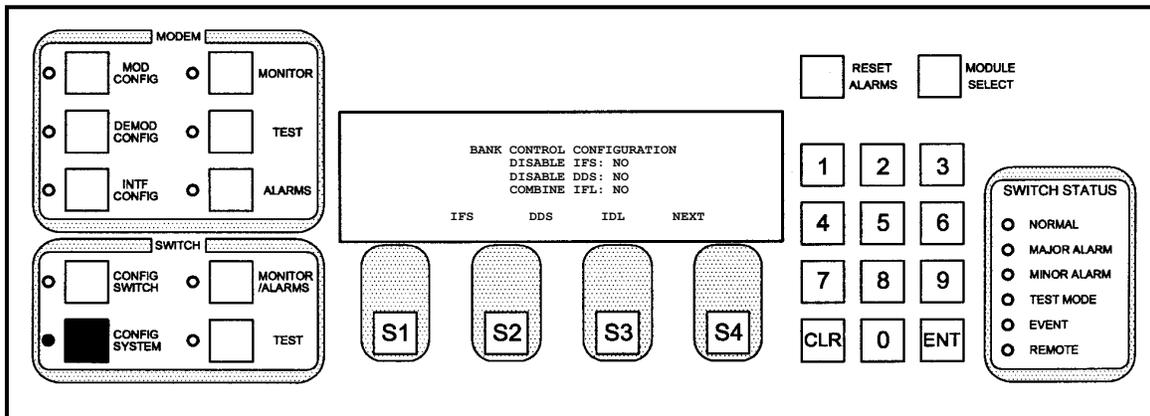


This screen displays disabling of IFS and DDS and combining IFL. To modify parameters, press S1, S2 or S3.

| Key | Label | Function |
|---|---|---|
| S1 | IFS | Press to cycle to the IFS BANK CONTROLLER Screen. |
| S2 | DDS | Press to cycle to the DDS BANK CONTROLLER Screen. |
| S3 | IDL | Press to cycle to the COMBINE IFL Screen. |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.18  IFS BANK CONTROLLER
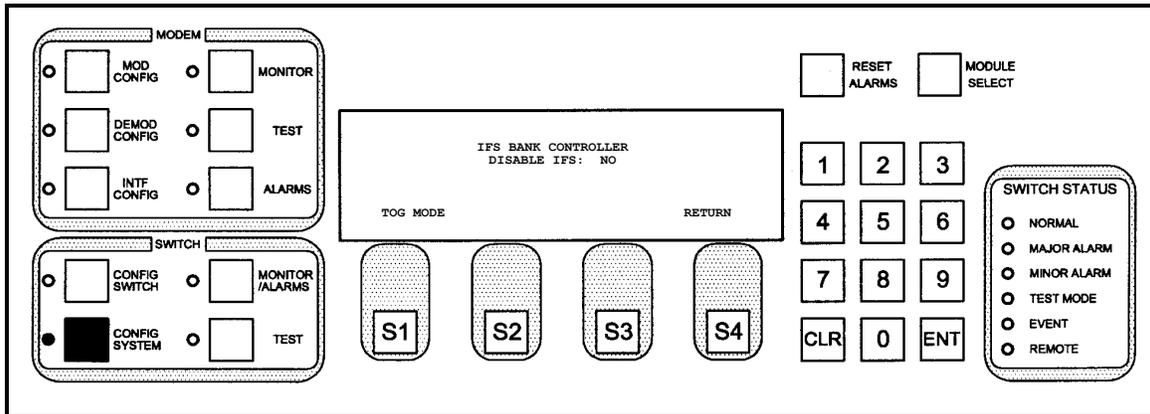


This screen allows the user to disable IFS.

| Key | Label | Function |
|---|---|---|
| S1 | TOG MODE | Press to toggle between NO and YES. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the BANK CONTROL CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <ENT> to accept change. |

## 4.3.2.19  DDS BANK CONTROLLER
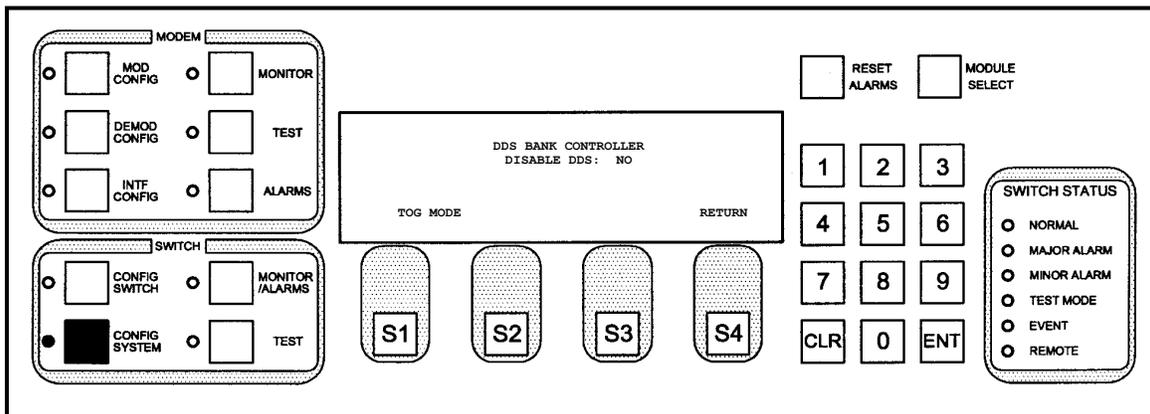


This screen allows the user to disable DDS.

| Key | Label | Function |
|---|---|---|
| S1 | TOG MODE | Press to toggle between NO and YES. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the BANK CONTROL CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <ENT> to accept change. |

## 4.3.2.20  COMBINE IFL (IFS L-Band Demodulator Only)
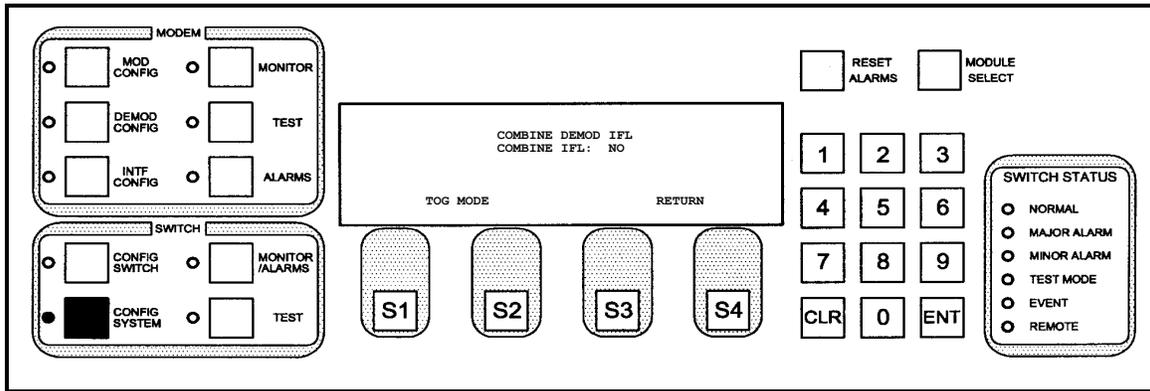


This screen allows the user to combine the IFS L-Band (enable 8-input mode) or return the switch to its original 2x4 (enable 4-input mode) configuration. The 8-input mode configuration is available only in the 1:9 configuration and only for the IFS L-Band Demodulator.

| Key | Label | Function |
|---|---|---|
| S1 | TOG MODE | Press to toggle between NO and YES. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the BANK CONTROL CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <ENT> to accept change. |

## 4.3.2.21  CARRIER-IN-CARRIER MODEMS
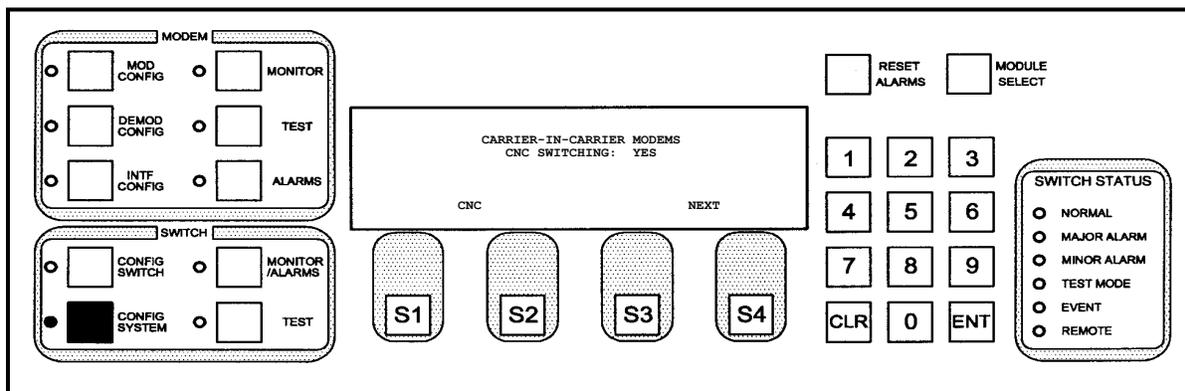


This screen allows the use of the RCS20 redundancy switch with CnC-capable Radyne/ Comtech EF Data modems as listed:

| Modem Model Number | Minimum Level of M&C Firmware needed |
|---|---|
| DMD20 | F05058-CF (9.4) |
| DMD50 | F05585-AF (4.2) |
| DMD2050 | F05280-AF (4.2) |
| DMD2050E | F05280-AH (4.4) |

## 4.3.2.21.1   Programming Steps for setting up the link:

1.    Establish a link from the prime channel to the far end modem using TX IF = RX IF and CnC

2.    Learn Prime Modem

3.    Test Prime Modem

4.    Set BU modem to IF LOOPBACK

5.    Verify no alarms

**IMPORTANT**

In Carrier and Carrier switching mode the RCS20 does NOT support Independent Modulator and demodulator Switching as seen in Section 4.3.1.6 (Modem Switching Style). Also, on the RCS20 you will want to set the Mod and Demod Fault Delay (Sections 4.3.1.9.4 and 4.3.1.9.5) to 5 seconds minimum. You will also need to set the Demod Acquisition Delay (Section 4.3.9.6) to a minimum of 30 seconds. This will account for the time it may take for CnC to properly acquire.

Also note that the modems listed above must be configured to use the Base Band Relays in CnC 1:1 SWITCH mode. This menu entry on the modems listed above can be found under the Menu:  INTERFACE -> GENERAL ->BB RELAYS {CnC 1:1 SWITCH}.

| Key | Label | Function |
|-----|-------|----------|
| S1 | CNC | Press to change CnC Switching Mode. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to next screen. |
| Numeric Keypad | --- | Press <CLR> to abort programming (no switch parameters changed)  and cycle back to the BANK CONTROL CONFIGURATION Screen |

## 4.3.2.22  CnC SWITCHING
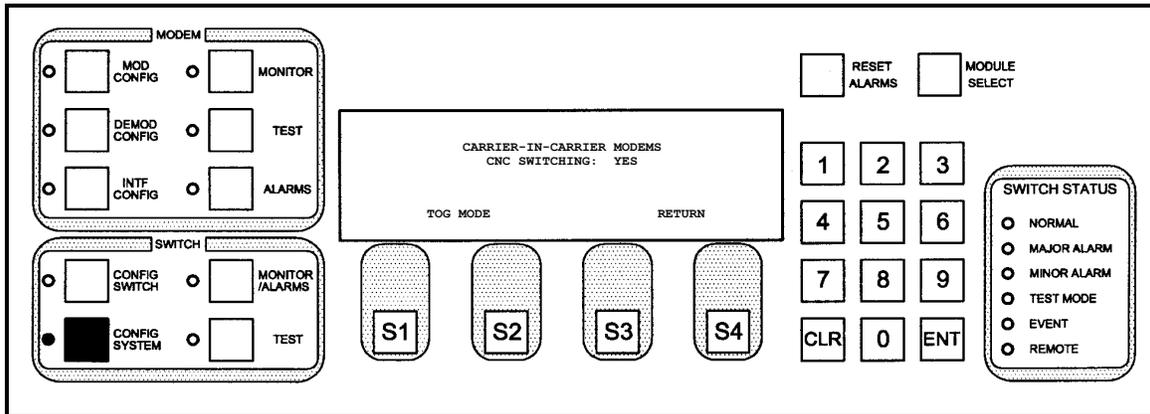


This screen is the actual location where the user can configure the CnC Switching Mode.

| Key | Label | Function |
|---|---|---|
| S1 | TOG MODE | Press to toggle between NO and YES. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to return to the BANK CONTROL CONFIGURATION Screen |
| Numeric Keypad | --- | Press <ENT> to accept change. |

## 4.3.2.23  SOFTWARE/FIRMWARE VERSIONS
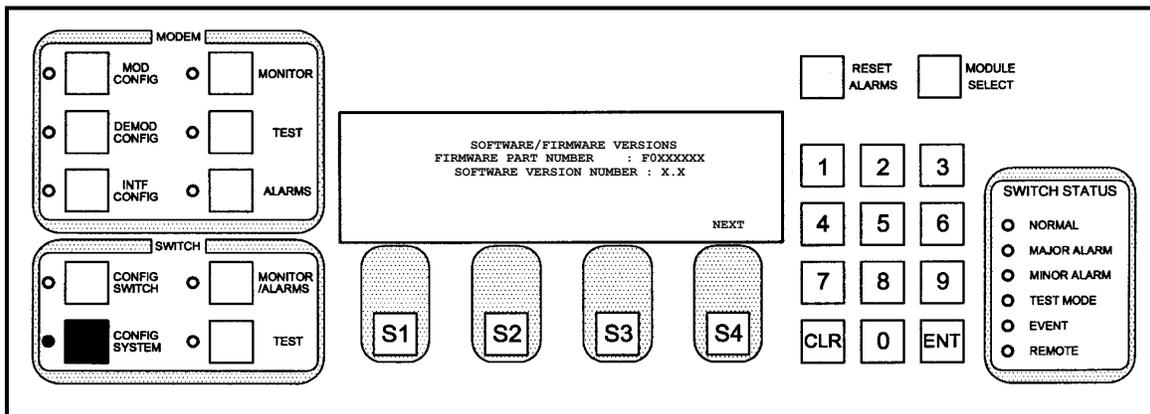


This screen displays the current software version number and firmware part number for the RCS20. No switch parameters are programmed from this screen.

| Key | Label | Function |
|---|---|---|
| S1 | --- | N/A |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.24  REFERENCE DISTRIBUTION CONFIGURATION
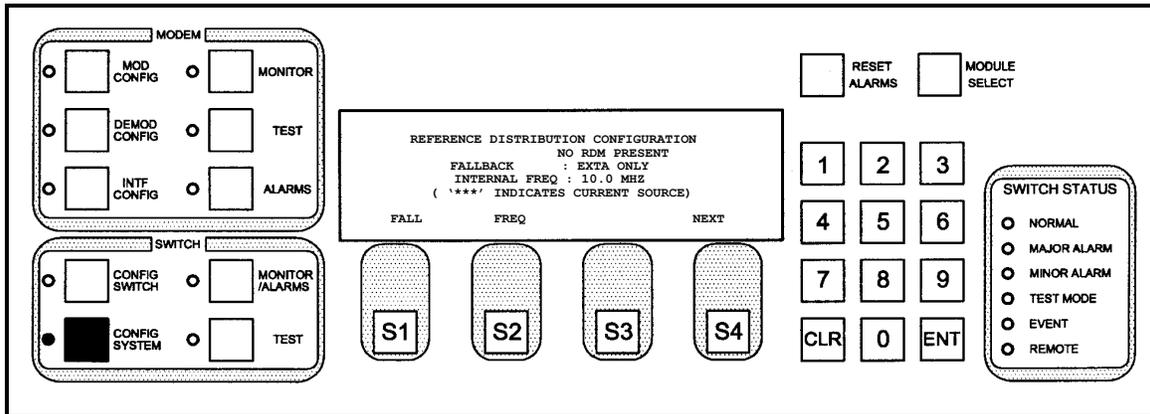


This screen displays the configuration of the optional Reference Distribution Module Expansion Card (RDM), located at the rear of the RCU20. The following are two configuration parameters for the RDM:

**Fallback Programming** - The fallback programming determines how the three frequency sources (External A, External B, Internal) are automatically selected when any of the sources are removed.

**Internal Reference Frequency** - The internal frequency selects the frequency of the internal reference.

The line directly above the FALLBACK Line displays the current source with '***'. This line will display the message NO RDM PRESENT if the RDM is not installed in the RCS20 system.

### 4.3.2.24.1  Programming steps:

1.   Press <FALL> to cycle to the RDM FALLBACK CONFIGURATION Screen for fallback programming configuration.
2.   Press <FREQ> to cycle to the RDM INTERNAL REFERENCE CONFIGURATION Screen for internal frequency reference configuration.

| Key | Label | Function |
|---|---|---|
| S1 | FALL | Press to cycle to the RDM FALLBACK CONFIGURATION Screen. |
| S2 | FREQ | Press to cycle to the RDM INTERNAL REFERENCE CONFIGURATION Screen. |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.25 RDM FALLBACK CONFIGURATION
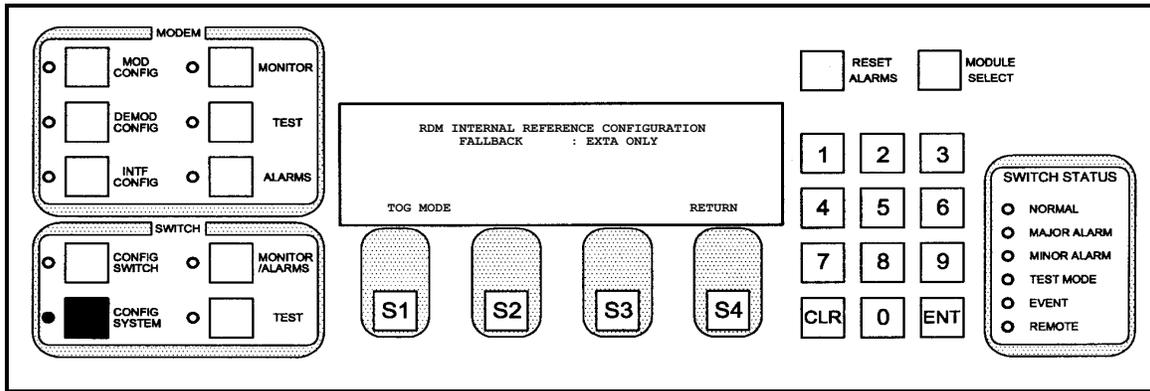


This screen allows the user to configure the fallback programming for the optional Reference Distribution Module (RDM). The RDM has two reference inputs (EXTA, EXTB) and an internal frequency source (INT). The fallback programming allows automatic switching between these three frequency sources. There are clock activity detectors on each frequency source, and automatic switching (fallback) will occur if there is no activity for the current frequency source. The following fallback modes are available:

| | |
|---|---|
| EXTA ONLY | INT ONLY |
| EXTA → INT | INT → EXTA |
| EXTA → EXTB | EXTA → EXTB → INT |
| INT → EXTA → EXTB | |

For these modes, the system will switch to the leftmost source that has clock activity. For example, if the fallback mode is EXTA → EXTB → INT, and there is no activity on EXTA or EXTB, then the INT source will be selected. If activity returns to EXTB, then EXTB will be selected, and if activity returns to EXTA, then EXTA will be selected.

### 4.3.2.25.1   Programming steps:

1.    Press <TOG MODE> to change the displayed fallback mode.
2.    Continue pressing <TOG MODE> until the desired fallback mode is displayed.
3.    Press <CLR> or <RETURN> to abort programming (no switch parameters changed).
4.    Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | TOG MODE | Cycle through the above listed fallback configurations. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Cycle back to the REFERENCE DISTRIBUTION CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <CLR> or <RETURN> to abort programming (no parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.2.26  RDM FALLBACK CONFIGURATION
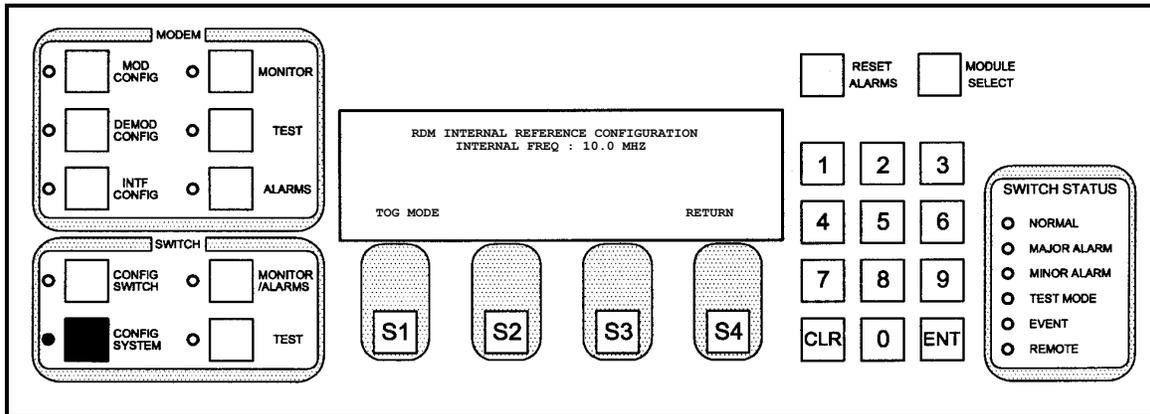


This screen allows the user to configure the RDM Internal Reference Frequency. The internal frequencies may be one of the following:

- MHz
- MHz
- MHz
- 10.0 MHz

## 4.3.2.26.1   Programming steps:

1.   Press <TOG MODE> to change the displayed internal frequency.
2.   Continue pressing <TOG MODE> until the desired frequency is displayed.
3.   Press <CLR> or <RETURN> to abort programming (no switch parameters changed).
4.   Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | TOG MODE | Press to cycle through the above listed internal frequencies. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to cycle back to the REFERENCE DISTRIBUTION CONFIGURATION Screen. |
| Numeric Keypad | --- | Press <CLR> or <RETURN> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.2.27  MODEM SERVICE MODE
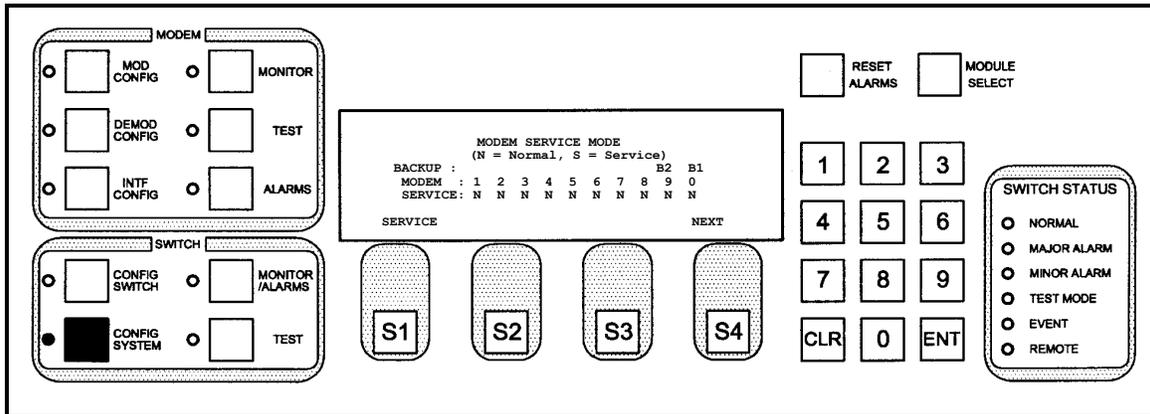


This screen displays the modem service mode:

- **N** - Normal
- **S** - Service

| Key | Label | Function |
|---|---|---|
| S1 | SERVICE | Press to cycle MODEM SERVICE MODE SELECTION Screen. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.2.28  MODEM SERVICE MODE SELECTION
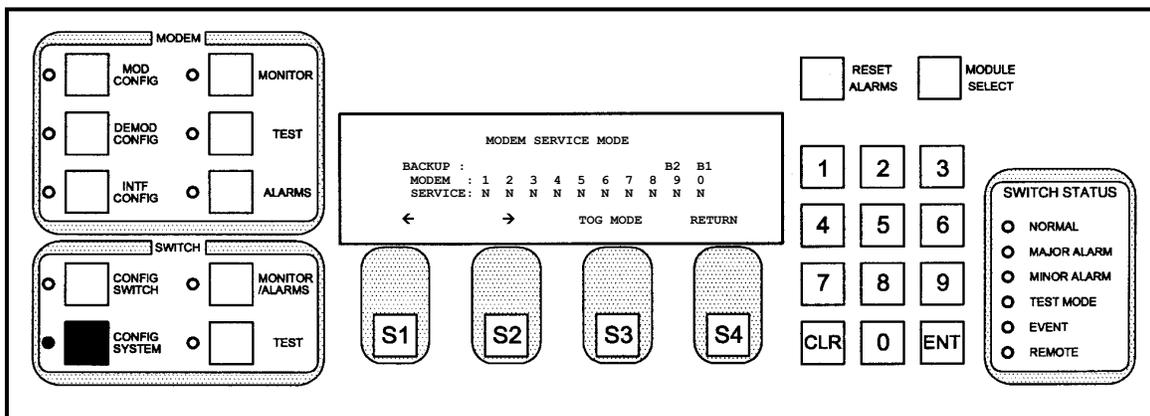


This screen is the actual location where the user can configure the Modem Service Mode.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor to the left. Used to select the modem for the service selection. |

| Key | Label | Function |
|---|---|---|
| S2 | → | Press to move the blinking cursor to the left. Used to select the modem for the service selection. |
| S3 | TOG MODE | Used to toggle between N and S. |
| S4 | RETURN | Press to cycle back to the MODEM SERVICE MODE Screen. |
| Numeric Keypad | --- | Press <ENT> to accept change. |

## 4.3.2.29  IFS20-L DEMOD BKUP Assignment Summary

Go to the CONFIG SWITCH Menu. Toggle to the IFS20L DEMOD BKUP ASSIGNMENT SUMMARY Screen.
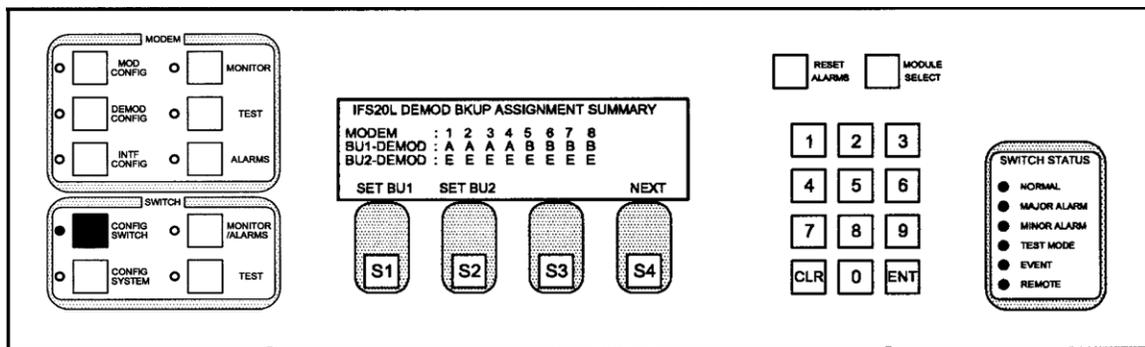


Press the Button S1 (SET BU1) on the Front Panel. The IFS20L DEMOD BKUP ASSIGNMENT PROGRAM Screen will appear.
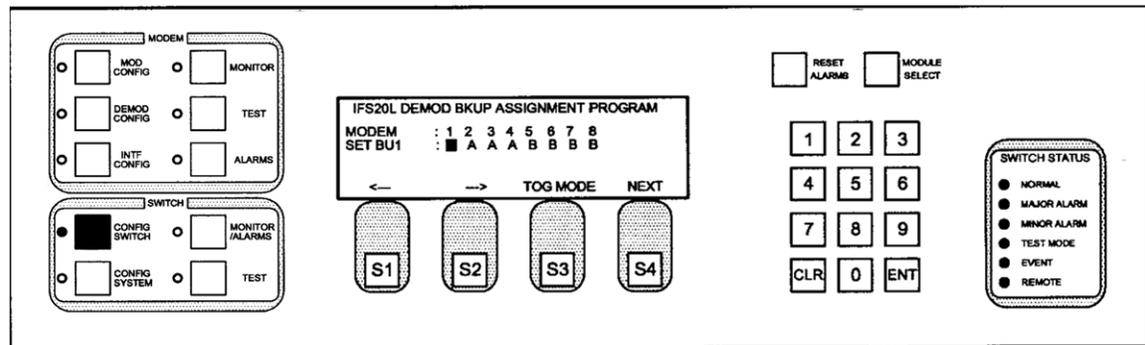


The blinking cursor is on Modem 1. Press S3 (TOG MODE) until Modem 1 is set to "A".

Use the S1 and S2 keys to navigate and set each of the Prime Modems. Modems 1 - 4 should be set to "A" and Modems 5 - 8 should be set to "B".

When each of the Prime Modems is set to the appropriate letter, press the ENT Key.

### 4.3.3  MONITOR/ALARMS Menu Tree

### 4.3.3.1  EXPANSION SLOT MONITOR
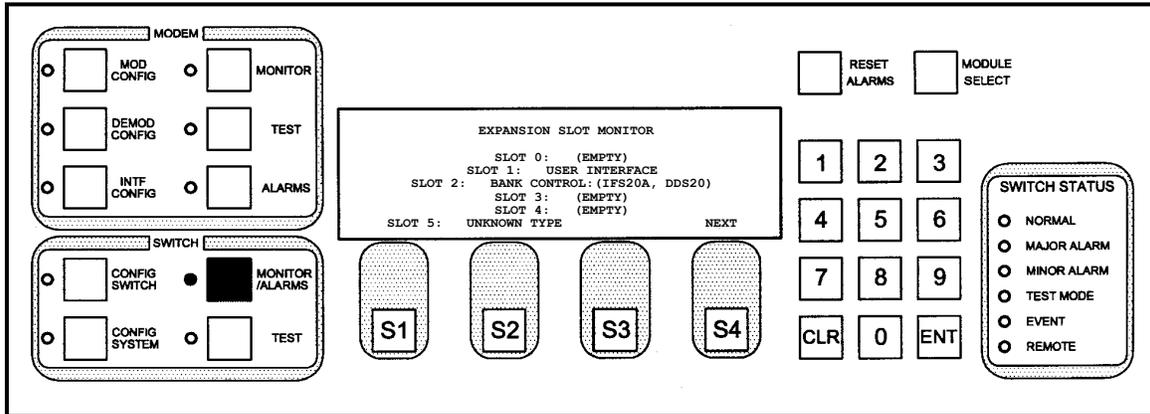


This screen displays the contents of the expansion slots at the rear of the RCU20.

| Key | Label | Function |
|---|---|---|
| S1 | --- | N/A |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

### 4.3.3.2  MOD / DEMOD FAULT MONITOR
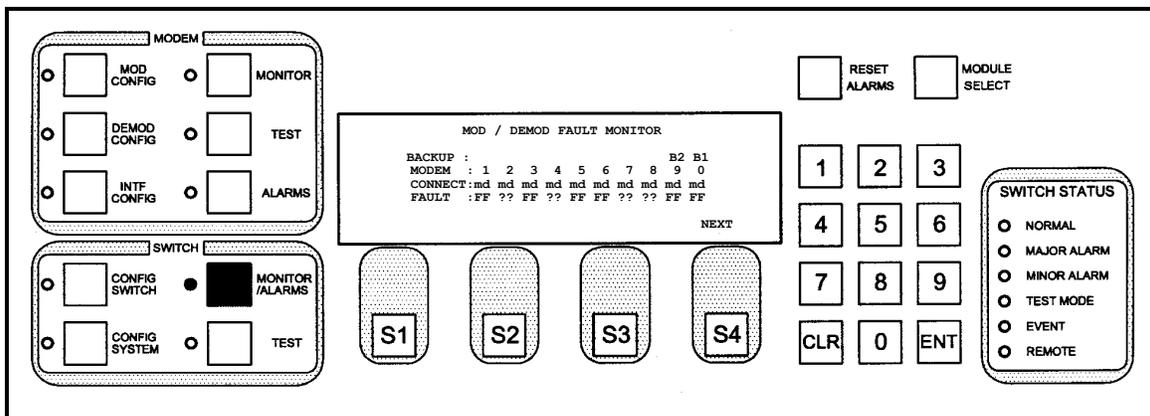


This screen displays the fault status of the all prime and backup channel modulators and demodulators. The fault status each modem is reported to the DDS20 through two open collector connections in the 68-pin cable between each modem and the DDS20. The logic state of these status lines is then reported to the RCU20 through the 15-pin high-density serial cable between the  DDS20 and the RCU20. The following letter codes may be used:

- **"."** - A period indicates that the modulator or demodulator is reporting status normal.
- **F** - Indicates that the modulator or demodulator is reporting failure status.
- **?** - Indicates that the status monitor for a channel on the DDS20 is either missing or malfunctioning. If this symbol appears on one channel, check to see that the Data Switch Module is inserted correctly for that channel. If this symbol appears on all the channels, verify the cable connection between the DDS20 and the RCU20.

> **IMPORTANT**
>
> When a channel is configured for linked switching, either a modulator fault or a demodulator fault will report both modulator and demodulator faults to the RCU20.

| Key | Label | Function |
|---|---|---|
| S1 | --- | N/A |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.3.3  EVENTS
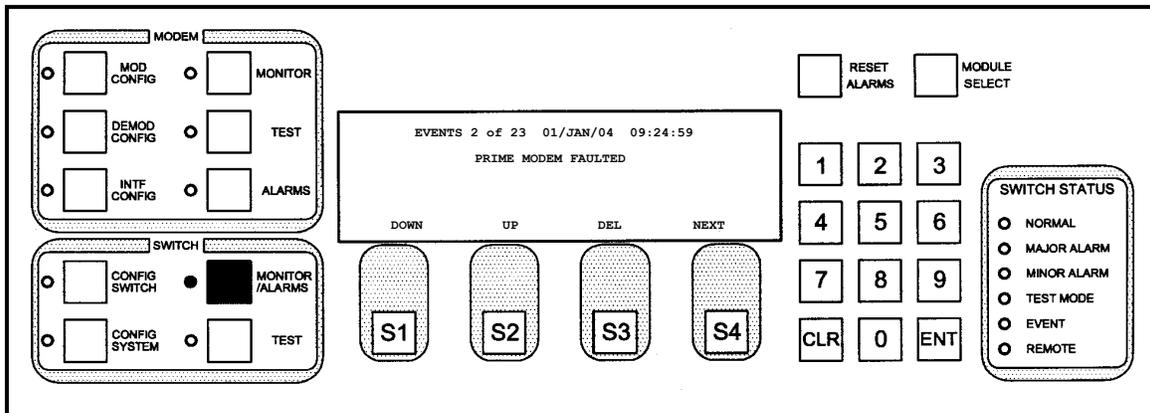


This screen displays the stored events due to manual or automatic backups on the RCS20. Detailed descriptions of the causes of failed backups are also stored. Events are stored and sorted by the time and date of the action causing the event to be stored. The earliest event will be the first stored event, and the latest event will be the last stored event. One event is displayed at a time with the time and date of the event and the total number of stored events. Events are automatically cleared by cycling power on the RCS20.

| Key | Label | Function |
|---|---|---|
| S1 | DOWN | Press to view the previous stored event on the list. |
| S2 | UP | Press to view the next stored event on the list. |
| S3 | DEL | Press to delete the currently displayed event from the list. |

| Key | Label | Function |
|---|---|---|
| S4 | NEXT | Press to cycle to the next Events Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.3.4   NEXT EVENTS SCREEN

| Key | Label | Function |
|---|---|---|
| S1 | DELALL | Press to delete all stored events. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.3.5   SWITCH MAJOR ALARMS 1
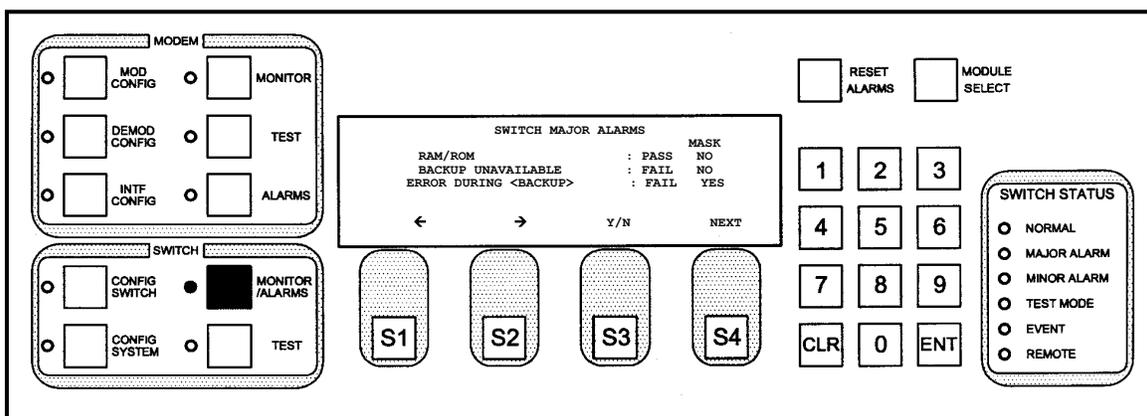


These screens display the RCS20 major alarms, and allow the user to mask these alarms. When an alarm is masked, the error will not be reported on the front panel MAJOR ALARM lamp nor on the ALARM connector at the rear of the RCS20. The RAM/ROM alarm indicates a failure of the RCS20 internal memory. The BACKUP UNAVAILABLE alarm indicates that a prime channel modem has failed, but there was no backup channel modem available for backup, causing prime channel traffic to be dropped. The BACKUP ERROR alarm indicates that the prime channel modem configuration could not be loaded to a backup channel modem, thus a required automatic backup could not take place, causing prime channel traffic to be dropped.

**CAUTION**

Masking alarms may cause undesirable modem performance

### 4.3.3.5.1   Programming steps:

1.   Press ← or → to move the flashing cursor the channel to be programmed

2. Press <TOG MODE> to toggle between YES and NO. 'Y' indicates an alarm is masked, 'N' indicates an alarm is not masked.

3. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).

4. Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor up through the list of faults. |
| S2 | → | Press to move the blinking cursor down through the list of faults. |
| S3 | Y/N | Used to toggle between YES (masked) and NO (not masked). |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.3.6   SWITCH MAJOR ALARMS 2
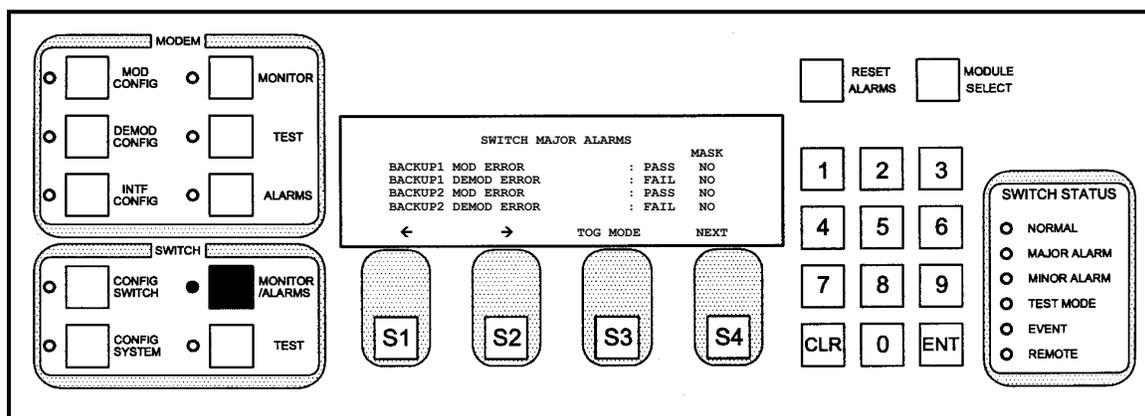


These screens display additional major alarms.

**CAUTION**
Masking alarms may cause undesirable modem performance

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor up through the list of faults. |
| S2 | → | Press to move the blinking cursor down through the list of faults. |
| S3 | TOG MODE | Used to toggle between YES (masked) and NO (not masked). |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.3.7 SWITCH MINOR ALARMS 1
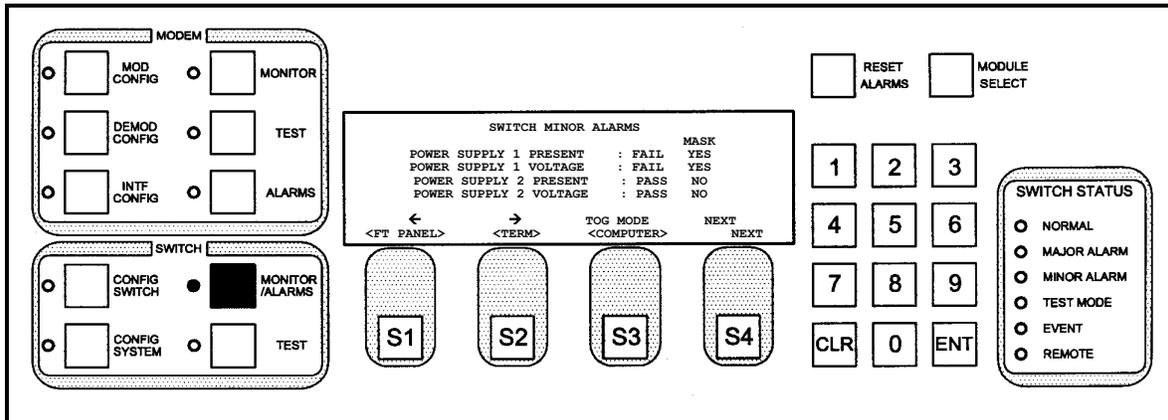


These screens display the RCS20 minor alarms, and allow the user to mask these alarms. When an alarm is masked, the error will not be reported on the front panel MINOR ALARM Lamp or on the ALARM connector at the rear of the RCU20. The POWER SUPPLY 1 PRESENT Alarm indicates that slide-in Power Supply Module 1 is fully seated in the RCU20. The POWER SUPPLY 1 VOLTAGE Alarm indicates a voltage problem with slide-in Power Supply Module 1. The remaining two alarms indicate the same conditions for slide-in Power Supply Module 2.

⚠️ **CAUTION**

Masking alarms may cause undesirable modem performance

### 4.3.3.7.1 Programming steps:

1. Press ← or → to move the flashing cursor the channel to be programmed
2. Press <TOG MODE> to toggle between YES and NO. 'Y' indicates an alarm is masked, 'N' indicates an alarm is not masked.
3. Press <CLR> or <NEXT> to abort programming (no switch parameters changed).
4. Press <ENT> to load the information on the screen into the switch parameter table.

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor up through the list of faults. |
| S2 | → | Press to move the blinking cursor down through the list of faults. |
| S3 | TOG MODE | Used to toggle between YES (masked) and NO (not masked). |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.3.8   SWITCH MINOR ALARMS 2
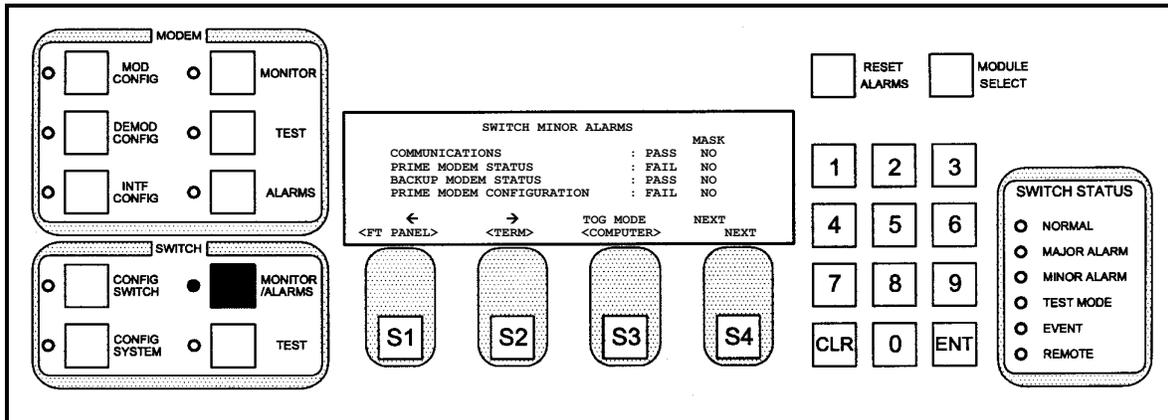


These screens display minor alarms.

⚠️ **CAUTION**

Masking alarms may cause undesirable modem performance

| Key | Label | Function |
|---|---|---|
| S1 | ← | Press to move the blinking cursor up through the list of faults. |
| S2 | → | Press to move the blinking cursor down through the list of faults. |
| S3 | TOG MODE | Used to toggle between YES (masked) and NO (not masked). |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | Press <CLR> or <NEXT> to abort programming (no switch parameters changed). Press <ENT> to load the information on the screen into the switch parameter table. |

## 4.3.4  TEST Menu Tree

## 4.3.4.1   SWITCH SYSTEM TESTS
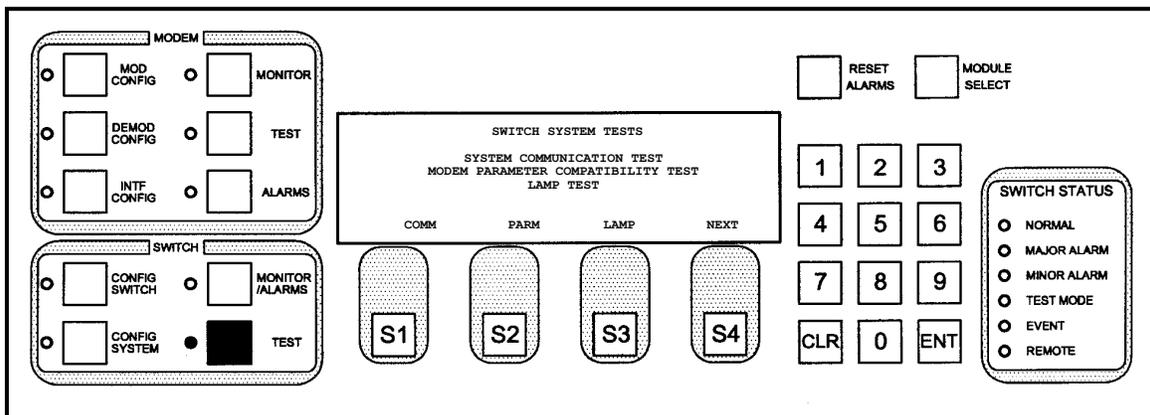


This screen allows execution of the following tests:

- **SYSTEM COMMUNICATION TEST** - tests modem channel connections.
- **MODEM PARAMETER COMPATIBILITY TEST** - tests modem parameter compatibility (this test is currently under development).
- **LAMP TEST** - tests the operation of all LEDs on the front panel.
- **REMOTE PORT TEST** - the unit sends the ASCII characters 'TEST' to the remote port to test communications (refer to Section 4.2.4.2).

| Key | Label | Function |
|---|---|---|
| S1 | COMM | Press to cycle to the MODEM CHANNEL CONNECTION TEST Screen. |
| S2 | PARM | Press to cycle to the MODEM PARAMETER COMPATIBILITY TEST Screen. |
| S3 | LAMP | Press to cycle to the LAMP TEST Screen. |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.4.2   MODEM CHANNEL CONNECTION TEST
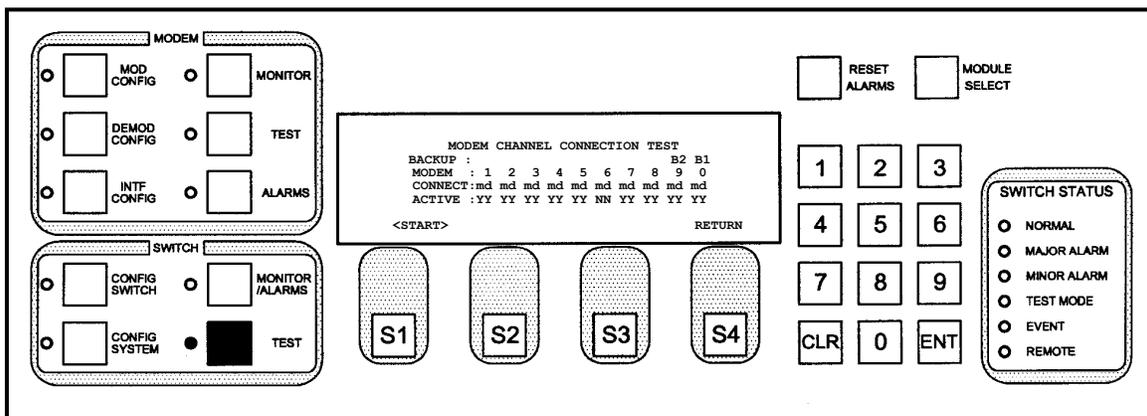


This screen allows the user to test communication channels between the RCS20 and all modems connected to the system. If the test fails for one or more channels, check the parameter entries for screens Config 0 and Config 1. The '*' indicates communication in progress, and will move between all configured channels before the test is complete.

## 4.3.4.2.1   Programming steps:

1. Press <START> to begin the test. The '*' will move from Channel 0 to all channels. 'Y' in the ACTIVE Row indicates normal communication, and 'N' indicates communication failure between the RCS20 and the modems. The MODEM Row lists the communication channels for each modem.

   **IMPORTANT**

   This test is performed approximately every 30 seconds by the RCS20, and the '**' may appear without pressing <START>.

| Key | Label | Function |
|---|---|---|
| S1 | START | Press to start test. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to cycle back to the SWITCH SYSTEM TESTS Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.4.3   MODEM PARAMETER COMPATIBILITY TEST
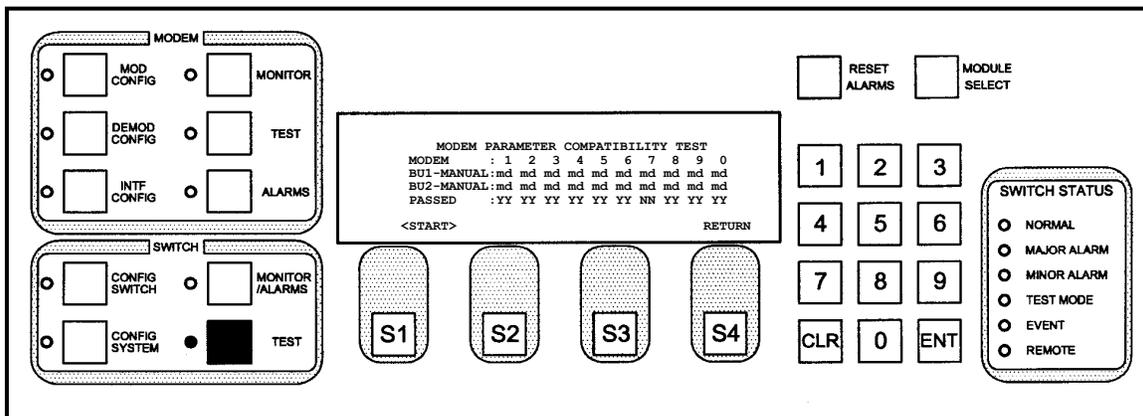


This screen allows the user to test the automatic modem configuration that takes place during backups.

During the test, each prime channel modem configuration is sent to any backup channel modem that is assigned to the prime channel. The '*' indicates communication in progress, and will move between all configured channels before the test is complete. 'Y' indicates that the backup channel modem accepted the prime channel modem configuration, 'N' indicates that the backup channel modem did not accept the prime channel modem configuration. Press <START> to begin the configuration test.

| Key | Label | Function |
|---|---|---|
| S1 | START | Press to start test. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to cycle back to the SWITCH SYSTEM TESTS Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.4.4   LAMP TEST
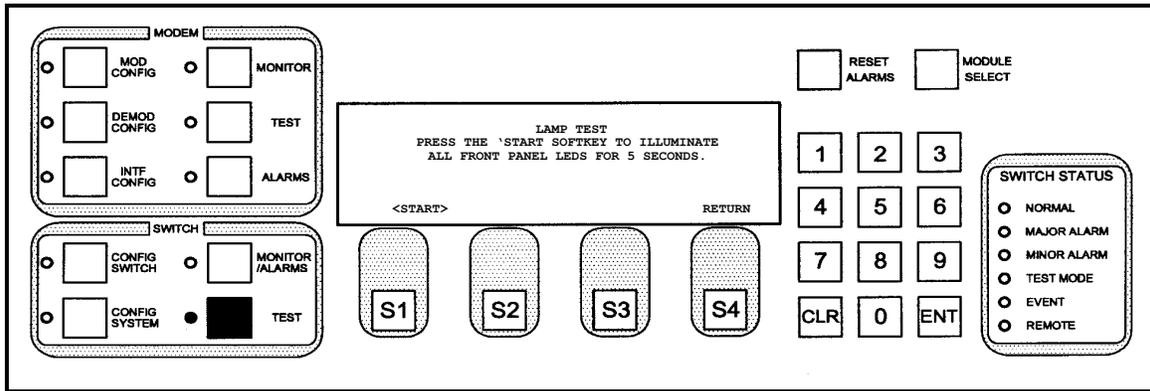


This screen allows the user to test all LED lamps on the front panel of the RCU20 for five seconds.

| Key | Label | Function |
|---|---|---|
| S1 | START | Press to start test. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to cycle back to the SWITCH SYSTEM TESTS Screen. |
| Numeric Keypad | --- | N/A |

## 4.3.4.5   SWITCH SYSTEM TESTS Screen 2
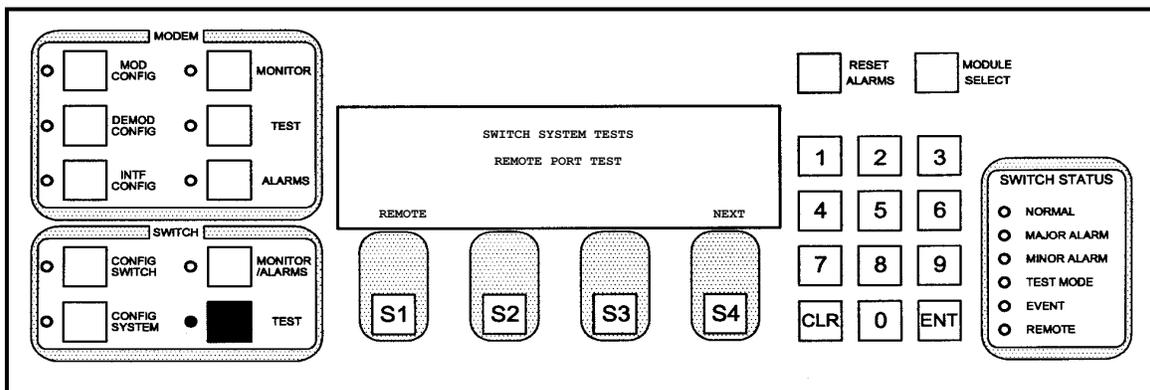


**REMOTE PORT TEST** - the unit sends the ASCII characters 'TEST' to the remote port to test communications.

| Key | Label | Function |
|---|---|---|
| S1 | REMOTE | Press to cycle to the REMOTE PORT TEST Screen. |
| S2 | PARM | N/A |
| S3 | LAMP | N/A |
| S4 | NEXT | Press to cycle to the next screen. |
| Numeric Keypad | --- | N/A |

## 4.3.4.6   REMOTE PORT TEST
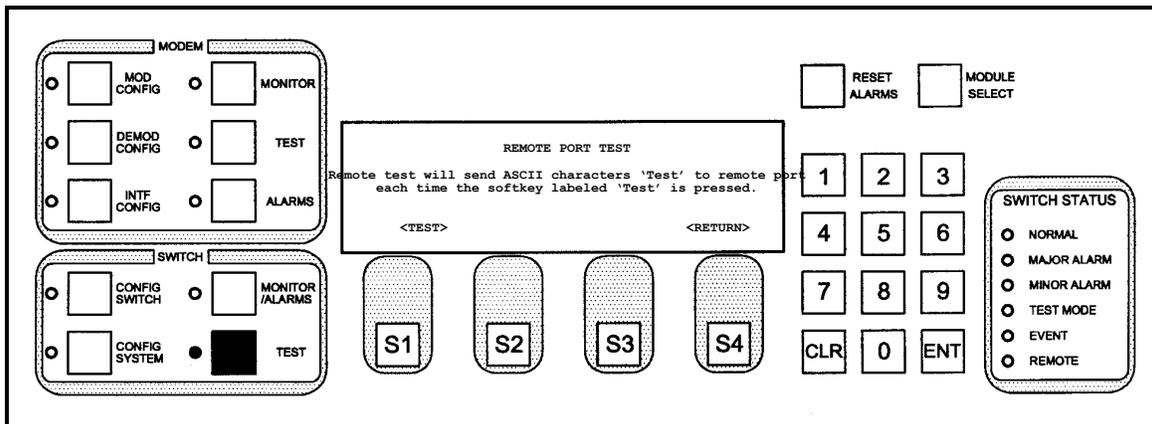


This screen allows the user to send an ASCII test string out of the remote port.

## 4.3.4.6.1   Programming steps:

1.   Press <TEST> to send an ASCII string. The RCS20 will output ASCII characters 'Test' via remote
     port each time <TEST> is pressed.

| Key | Label | Function |
|---|---|---|
| S1 | TEST | Press to send ASCII characters 'Test'. |
| S2 | --- | N/A |
| S3 | --- | N/A |
| S4 | RETURN | Press to cycle back to the SWITCH SYSTEM TESTS Screen 2. |
| Numeric Keypad | --- | N/A |

## 4.4   Remote Interface

## 4.4.1  Host Computer Remote Communications

The RCS20 has a dedicated RS-485 serial control port (Remote Port) for use with computer controlled
remote monitor and control systems. The Remote Port is a 9-Pin female 'D' sub connector J3 located at
the rear of the unit on the Switch Interface plug in module. The pinouts for the remote port are listed in
Section 5.

The Remote Port utilizes a binary protocol called Radyne Link Level Protocol (RLLP). RLLP is a multi-
drop packet-oriented protocol with handshaking, and is completely described in Appendix A. The remote
port supports standard UART asynchronous protocol with 8 data bits, no parity, and 1 stop bit (8N1) at 8
baud rates: 115200, 57600, 38400, 19200, 9600, 4800, 2400, and 1200.

## 4.5    Terminal Port Control

The RCS20 has a dedicated RS-232 serial port (Terminal Port) for use with a separate terminal or computer running a terminal emulation program. The Terminal Port is a 9-Pin female 'D' sub connector J2 located at the rear of the unit on the Switch Interface plug in module. The pinouts for the remote port are listed in Section 5. The terminal port supports standard UART asynchronous protocol with 8 data bits, no parity, and 1 stop bit (8N1) at 4 baud rates: 19200, 9600, and 2400.

### 4.5.1  Terminal Interface

The terminal interface is menu driven and allows complete monitoring and control of all RCS20 parameters. Refer to Figure 4-3 through Figure 4-6 for a complete listing of all terminal interface configuration menus. Three terminal emulation protocols are supported:  DEC VT-100, Wyse-50, and ADDS Viewpoint. The terminal display is a full screen presentation of the current status of the switch modes and variables. The screens will display both status and control variables. The status variables cannot be modified, but the control variables can be.

Each variable that can be modified will have a display number next to the value, and changing the value is accomplished by typing the number of the variable to be changed. Two types of input may then be requested from the user. If the input is multiple choice, the space key must be pressed to cycle the available choices until the desired value is displays. The 'Enter' or carriage return key must then be pressed for the new value to take effect. If the input is numerical, the desired value should be typed using number keys ('0' to '9'), then pressing the 'Enter' key. An input can be aborted at any time by pressing the 'ESC' key. If an invalid value is entered, an error message will be displayed on the terminal. Refer to following terminal screens as illustrated.

```
            +------------¦ Main Menu ¦------------+
            ¦                                      ¦
            ¦                                      ¦
            ¦        1   Switch Controls           ¦
            ¦        2   Switch Status             ¦
            ¦        3   Alarms                     ¦
            ¦        4   Event Buffer              ¦
            ¦                                      ¦
            ¦                                      ¦
            ¦                                      ¦
            ¦                                      ¦
            ¦                                      ¦
            +--------------------------------------+

Enter Selection Number:
```

**Figure 4-2. Terminal Main Menu**

```
1.Main Menu              11.Ch 0 Config   :BACKUP         21.Force Mod
BU1:0
2.Control Mode:FT PANEL   12.Ch 9 Config   :TRAFFIC        22.Force Dmd
BU1:0
3.Remote Mode :RLLP       13.BU1 BU Mode   :MANUAL         23.Force Mod
BU2:0
4.Remote Addr :32         14.BU2 BU Mode   :MANUAL         24.Force Dmd
BU2:0
5.Remote Baud :9600
6.Disable IFS : NO
7.Disable DDS : NO
-------------------------- CHANNEL CONFIGURATION ----------------------
                   +100  +200  +300  +400  +500  +600  +700  +800  +900  +0
                                                                   BU 2  BU 1
                   CH 1  CH 2  CH 3  CH 4  CH 5  CH 6  CH 7  CH 8  CH 9  CH 0
30.Connected    : Y     Y     Y     Y     Y     Y     Y     Y     Y     Y
31.Address      : 101   102   103   104   105   106   107   108   109   110
32.Switch Style : U     U     U     U     U     U     U     U     U     M
33.BU1-Manual   : md    md    md    md    md    md    md    md    md
34.BU2-Traffic  :
35.Mod Priority : 1     2     3     4     5     6     7     8     9

36.Dmd Priority : 1     1     1     1     1     1     1     1     1
37.Mod Fault Dly: 10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0
38.Dmd Fault Dly: 15.0  15.0  15.0  15.0  15.0  15.0  15.0  15.0  15.0
39.Dmd Acq. Dly : 20.0  20.0  20.0  20.0  20.0  20.0  20.0  20.0  20.0
40.Service Mode : N     N     N     N     N     N     N     N     N     N


Enter Selection Number:
```

**Figure 4-3. Terminal Submenu 1**

```
1.Main Menu              Expansion 0:(EMPTY)      Software Release:5.9
2.Control Mode:FT PANEL   Expansion 1:USER I/O     Firmware P/N    :F03469AS
3.Remote Mode :RLLP       Expansion 2:BANK CTL     Date            :03JAN00
4.Remote Addr :32         Expansion 3:(EMPTY)      Time            :04:08:15
5.Remote Baud :9600       Expansion 4:(EMPTY)
                          Expansion 5:(EMPTY)


-------------------------- CHANNEL STATUS -----------------------------
                                                            BU 2  BU 1
                 CH 1  CH 2  CH 3  CH 4  CH 5  CH 6  CH 7  CH 8  CH 9  CH 0

   Communicating: Y     Y     Y     Y     Y     Y     Y     Y     Y     Y
   Mod Fault    : .   .   .   .   .   .   .   .   .   .
   Demod Fault  : .   .   .   .   .   .   .   .   .   .
   BU1-Manual   : md    md    md    md    md    md    md    md    md
   BU2-Traffic  :
   LEARNED      : md    md    md    md    md    md    md    md    md
   BU1-TEST     :
   BU2-TEST     :


Enter Selection Number:
```

**Figure 4-4. Terminal Submenu 2**

```
1.Main Menu                    21.Reset Alarms
2.Control Mode:FT PANEL
3.Remote Mode :RLLP
4.Remote Addr :32
5.Remote Baud :9600


----------------------------- ALARMS -------------------------------------
   MAJOR ALARMS  CUR   MASK LATCH          MINOR ALARMS   CUR   MASK LATCH
30.RAM/ROM        PASS  NO   PASS       40.PS1 Present    PASS   NO   PASS
31.Backup Avail  PASS  NO   PASS       41.PS1 Voltage    PASS   NO   FAIL
32.Backup Error  PASS  NO   PASS       42.PS2 Present    PASS   NO   PASS
33.Bkp1Mod Error PASS  NO   PASS       43.PS2 Voltage    PASS   NO   FAIL
34.Bkp1Dmd Error PASS  NO   PASS       44.Commnicating   FAIL   NO   FAIL
35.Bkp2Mod Error PASS  NO   PASS       45.Prime Status   PASS   NO   FAIL
36.Bkp2Dmd Error PASS  NO   PASS       46.Backup Status  PASS   NO   PASS
                                       47.Prime Config   PASS   NO   PASS
                                       48.CDM Error      PASS   NO   PASS




Enter Selection Number:
```

**Figure 4-5. Terminal Submenu 3**

```
1.Main Menu              11.Delete One Entry     u.Cursor UP
2.Control Mode:FT PANEL  12.Delete All Entries   d.Cursor DOWN
3.Remote Mode :RLLP      13.Clear Event LED      U.Page UP
4.Remote Addr :32                                D.Page DOWN
5.Remote Baud :9600                              h(H).Home
                                                 e(E).End


-------------------------------EVENT BUFFER-------------------------------
---
    TIME     DATE    TYPE  MESSAGE

 04:00:19  03JAN00  I     SET MODEM9 CONFIGURATION FOR TRAFFIC
 04:00:22  03JAN00  A     MODEM 0 COMMUNICATION ERROR
 04:00:22  03JAN00  A     MODEM SUMMARY COMMUNICATION ERROR








Enter Selection Number:
```

**Figure 4-6. Terminal Submenu 4**

# Chapter 5.  Electrical Interfaces

## 5.1    Overview

This chapter describes the interfaces available on the RCS20 M:N Redundancy Switch System (Figure 5-1). All RCS20 connections (including the RCU20 and various configurations of the DDS20 and IFS20) are made to labeled connectors located on the back panel of the RCU (Figure 5-2). Any connection interfacing to the RCS20 must use an appropriate mating connector.
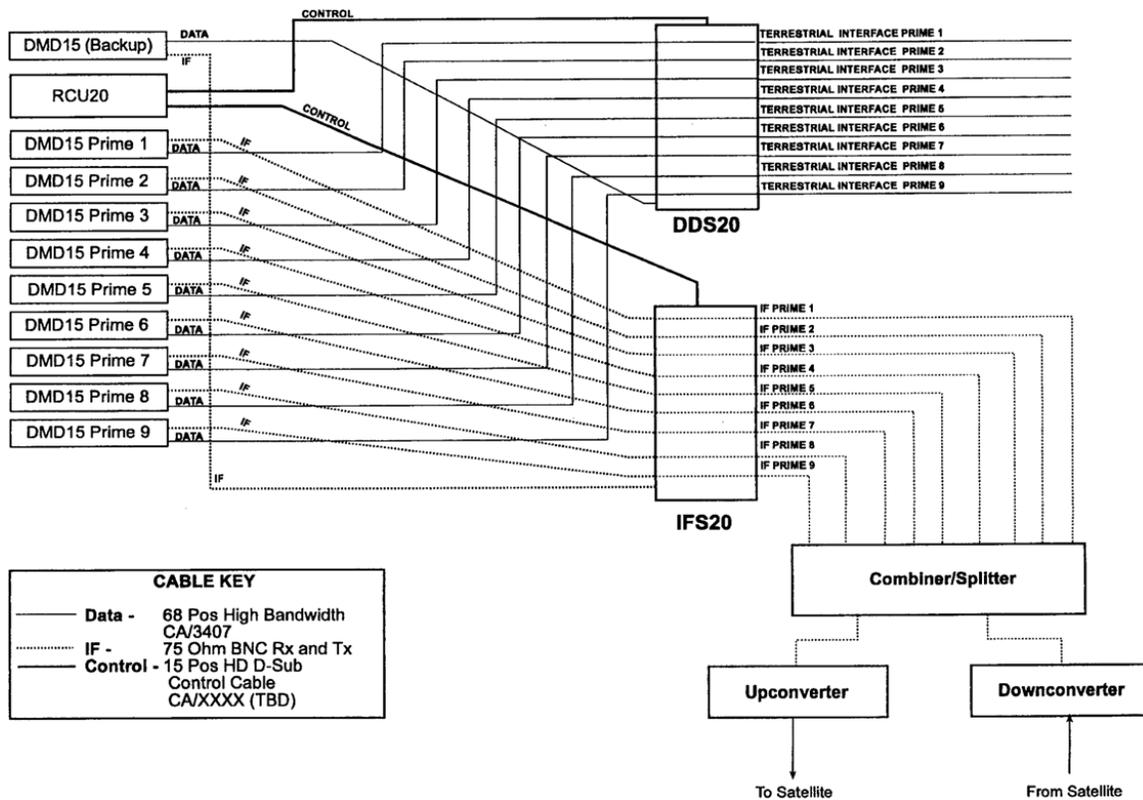


**Figure 5-1  Complete System Interconnection and Cabling Information for System Configuration**

## 5.2    RCU20 Back Panel Connectors
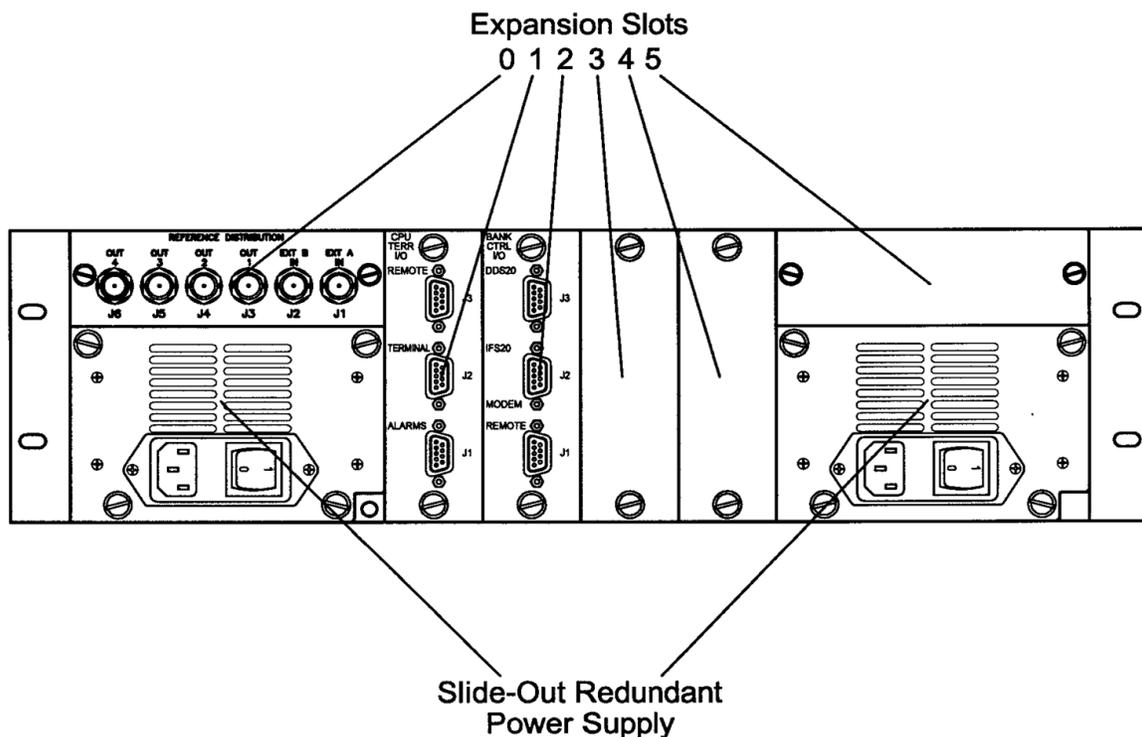


**Figure 5-2  RCS20 Connectors**

## 5.2.1  Slide-Out Redundant Power Supply/Switch Modules

> **WARNING**
>
> Dangerous AC voltages exist inside of the RCS20 when either one of the AC Plug-
> in Switch Modules are enabled or plugged in. Do not remove cover when AC power
> is applied. Remove power cord from AC modules if top cover needs to be removed.

There are two Slide-Out Redundant Power Supply/Switch Modules located on the left and right sides of the unit (as shown in Figure 5-2). Power applied to the port with the supplied power cable is 100-240VAC, 50-60 Hz. Each Power Input Module provides an integrated Power On/Off Rocker Switch. Power consumption for the unit is 1A.

## 5.2.2  Chassis Ground

A #10-32 threaded stud is located to the lower right of the left hand module for the chassis ground connection.

## 5.2.3  Expansion Slots

There are six expansion slots (numbered 0 through 5). The following cards may be inserted into the slots, as shown in Figure 5-2:

- Reference Distribution Module (shown installed in Slot 0)
- CPU Terrestrial I/O Card (shown installed in Slot 1)
- Bank Control I/O Card (shown installed in Slot 2)

The cards that are currently occupying the expansion slots may be viewed from the front menu screen by accessing the EXPANSION SLOT MONITOR Screen (see Chapter 4).

> **WARNING**
>
> The RCU20 <u>MUST</u> be powered down when installing / removing the bank control
> I/O <u>AND</u> when cabling up to the IFS20 or DDS20 with the CA3429 cables. Failure to
> do so can result in damage to the bank control I/O and cause loss of redundancy in
> the system.

## 5.2.3.1    Reference Distribution Module

The Reference Distribution Module RDM (Figure 5-3) is an optional RCU20 expansion card that is used to buffer and distribute earth station frequency reference(s) to the external reference input of modems that are connected to an RCS20. The RDM automatically switches between EXT A, EXT B or Internal References based upon onboard Clock Activity Detect circuits.
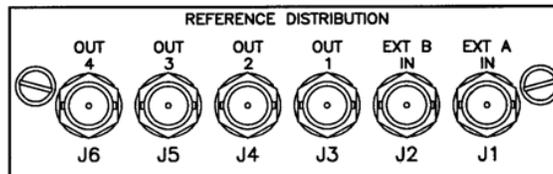


**Figure 5-3  Reference Distribution Module**

Each of the ports on the RDM is a Female BNC Connector. Port function is as follows:

| Ref Des | Signal Name | Description |
|---------|-------------|-------------|
| J1 | EXT A IN | Primary Internal Reference Input |
| J2 | EXT B IN | Secondary Internal Reference Input |
| J3 | OUT 1 | Reference Output 1 |
| J4 | OUT 2 | Reference Output 2 |
| J5 | OUT 3 | Reference Output 3 |
| J6 | OUT 4 | Reference Output 4 |

The Reference Distribution Module must be configured with two jumpers to select the termination impedance. The jumpers, J1 and J2, are shown in Figure 5-4.
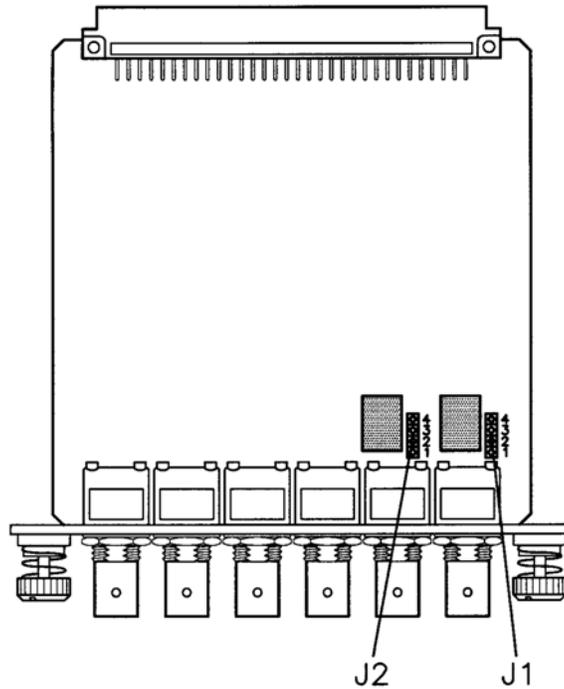


Figure 5-4  Reference Distribution Module Jumper Settings

Set the jumpers according to the following table to get the required termination impedance:

| Termination Impedance (Ohms) | J1 | J2 |
|---|---|---|
| 50Ω | Pins 1 and 2 Shorted<br>Pins 3 and 4 Open | Pins 1 and 2 Shorted<br>Pins 3 and 4 Open |
| 75Ω | Pins 1 and 2 Open<br>Pins 3 and 4 Shorted | Pins 1 and 2 Open<br>Pins 3 and 4 Shorted |
| 510Ω | All Pins Open | All Pins Open |

The RDM also contains an internal reference in two options – high-stability or normal. These options and the specifications for the module connectors follow.

## 5.2.3.1.1    J1 | EXT A IN (External Input A)

| Impedance | 50, 75, 510 Ohms (Jumper-Selectable) |
|---|---|
| Frequency | 1.25, 2.5, 5.0 and 10.0 MHz |
| Input Level | High-Level 2 to 5 Volt |
| Specification | Low-Level 0 to 0.8 Volts |

## 5.2.3.1.2    J2 | EXT B IN (External Input B)

| Impedance | 50, 75, 510 Ohms (Jumper-Selectable) |
|---|---|
| Frequency | 1.25, 2.5, 5.0 and 10.0 MHz |
| Input Level | High-Level 2 to 5 Volt |
| Specification | Low-Level 0 to 0.8 Volts |

## 5.2.3.1.3    Internal Reference (Option 1)

| Stability | $1 \times 10^{-5}$ |
|---|---|
| Output Frequency | 1.25, 2.5, 5.0 and 10.0 MHz (Program-Selectable to Match External Input) |

## 5.2.3.1.4    Internal Reference (Option 2)

| Stability | $1 \times 10^{-8}$ |
|---|---|
| Aging (day) | $1 \times 10^{-8}$ |
| Aging (year) | $1 \times 10^{-8}$ |
| Output Frequency | 1.25, 2.5, 5.0 and 10.0 MHz (Program-Selectable to Match External Input) |

## 5.2.3.1.5    Reference Outputs (J3 | OUT 1, J4 | OUT 2, J5 | OUT 3, J6 | OUT 4)

| Output Level | TTL |
|---|---|
| Output Current Drive | 48 mA Maximum – Sufficient to drive:<br>(5) DMD20s, DM240s, or DMD2401s<br>(3) DMD2400s |
| Output Frequency | 1.25, 2.5, 5.0 and 10.0 MHz (Program-Selectable to Match External Input) |
| Output Impedance | 50 Ohms |
| Short Circuit Resistant | |

## 5.2.3.1.6    Microprocessor Interface

- External 1/External 2/Internal Reference Select

- External Input Activity Detectors

- Internal Reference Activity Detector

## 5.2.3.1.7    Board Outline

- RCS20 Option Card Slot/DIN Connector

## 5.2.3.2    CPU Terrestrial I/O Card
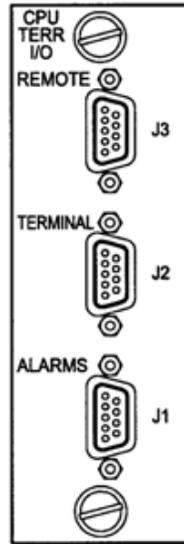


**Figure 5-5  CPU Terrestrial I/O Card**

## 5.2.3.2.1     J1 | ALARMS

The J1 | ALARMS port is a 9-Pin Type D Female Connector. This port has relay contacts that trigger various switch faults. This could be used to trigger an audio alarm.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Major Alarm - NC | MJA-NC | --- |
| 2 | Major Alarm - C | MJA-C | --- |
| 3 | Major Alarm - NO | MJA-NO | --- |
| 4 | No Connection | N/C | --- |
| 5 | No Connection | N/C | --- |
| 6 | No Connection | N/C | --- |
| 7 | Minor Alarm - NC | MNA-NC | --- |
| 8 | Minor Alarm - C | MNA-C | --- |
| 9 | Minor Alarm - NO | MNA-NO | --- |

## 5.2.3.2.2     J2 | TERMINAL

The J2 | TERMINAL RS-232 Terminal Interface port is a 9-Pin Type D Female Connector. It can be used to access switch functions via a dumb terminal or a user PC running a terminal emulator program (e.g., HyperTerminal, Tera Term, etc.) Modems cannot be accessed via this port.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | No Connection | N/C | --- |
| 2 | Receive Data | RxD | Input |
| 3 | Transmit Data | TxD | Output |
| 4 | No Connection | N/C | --- |

| 5 | Ground | GND | --- |
| 6 | No Connection | N/C | --- |
| 7 | RTS | N/C | Output |
| 8 | CTS | N/C | Input |
| 9 | No Connection | N/C | --- |

## 5.2.3.2.3    J3 | REMOTE

The J3 | REMOTE EIA-485 Remote Interface port is a 9-Pin Type D Female Connector. It is used to monitor and control switch functions and modems via an M&C designed based on the RLLP.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Transmit Data B (+) | TxD-B | Output |
| 2 | No Connection | N/C | --- |
| 3 | No Connection | N/C | --- |
| 4 | No Connection | N/C | --- |
| 5 | Signal Common | COMMON | --- |
| 6 | Transmit Data A (-) | TxD-A | Output |
| 7 | No Connection | N/C | --- |
| 8 | Receive Data B (+) | RxD-B | Input |
| 9 | Receive Data A (-) | RxD-A | Input |
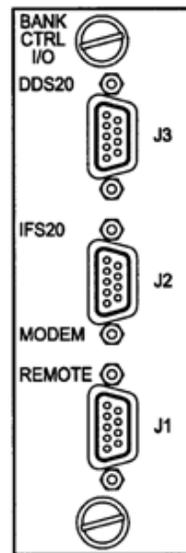


**Figure 5-6  Bank Control I/O Card**

## 5.2.3.2.4    J1 | MODEM REMOTE

The J1 | MODEM REMOTE EIA-485 Control port is a 9-Pin Type D Female Connector. It is used as an RS485 bus to interface to the modems remote ports

| Pin No. | Signal Name | Signal | Direction |
|---|---|---|---|
| 1 | EIA-485/HDLC Receive Data B (+) | TxD-B | Input |
| 2 | HDLC Receive Clock A (-) | TCLK-A | Input |
| 3 | HDLC Receive Clock B (+) | TCLK-B | Input |
| 4 | HDLC Transmit Clock A (-) | RCLK-A | Output |
| 5 | Signal Common | COMMON | --- |
| 6 | EIA-485/HDLC Receive Data A (-) | TxD-A | Output |
| 7 | HDLC Transmit Clock B (+) | RCLK-B | Output |
| 8 | EIA-485/HDLC Transmit Data     B (+) | RxD-B | Output |
| 9 | EIA-485/HDLC Transmit Data A (-) | RxD-A | Output |

## 5.2.3.2.5    J2 | IFS20

The J2 | IFS20 Control and Power port is a 15-Pin High-Density Type HD Female Connector.

| Pin No. | Signal Name | Signal | Direction |
|---|---|---|---|
| 1 | Serial Control Clock | IFS_LCLK | Output |
| 2 | No Connection | N/C | --- |
| 3 | No Connection | N/C | --- |
| 4 | Ground | GND | --- |
| 5 | Ground | GND | --- |
| 6 | Logic +5 Volts | VCC | Output |
| 7 | Relay +6 Volts | VCC_RELAY | Output |
| 8 | No Connection | N/C | --- |
| 9 | No Connection | N/C | --- |
| 10 | Ground | GND | --- |
| 11 | Relay +6 Volts | VCC_RELAY | Output |
| 12 | Serial Control Data 1 | IFS_LDAT1 | Bidirectional |
| 13 | No Connection | N/C | --- |
| 14 | No Connection | N/C | --- |
| 15 | No Connection | N/C | --- |

## 5.2.3.2.6    J3 | DDS20

The J3 | DDS20 Control and Power port is a 15-Pin High-Density Type D Female Connector.

| Pin No. | Signal Name | Signal | Direction |
|---|---|---|---|
| 1 | Serial Control Clock | DDS_LCLK | Output |

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 2 | Relay +6 Volts | VCC_RELAY | Output |
| 3 | Serial Control Data 2 | DDS_LDAT2 | Bidirectional |
| 4 | Ground | GND | --- |
| 5 | Ground | GND | --- |
| 6 | Logic +5 Volts | VCC | Output |
| 7 | Relay +6 Volts | VCC_RELAY | Output |
| 8 | Relay +6 Volts | VCC_RELAY | Output |
| 9 | Ground | GND | --- |
| 10 | Ground | GND | --- |
| 11 | Relay +6 Volts | VCC_RELAY | Output |
| 12 | Serial Control Data 1 | DDS_LDAT1 | Bidirectional |
| 13 | Ground | GND | --- |
| 14 | Serial Control Data 3 | DDS_LDAT3 | Bidirectional |
| 15 | DDS20 Interrupt | INT | Input |

## 5.3    DDS20 Universal Modem Data Switch

### 5.3.1  DDS20 – Universal Switch Front Panel Interface



Figure 5-7  DDS20 Universal Switch – Front Panel Data Switch Modules

## 5.3.1.1    DDS20 Data Switch Module
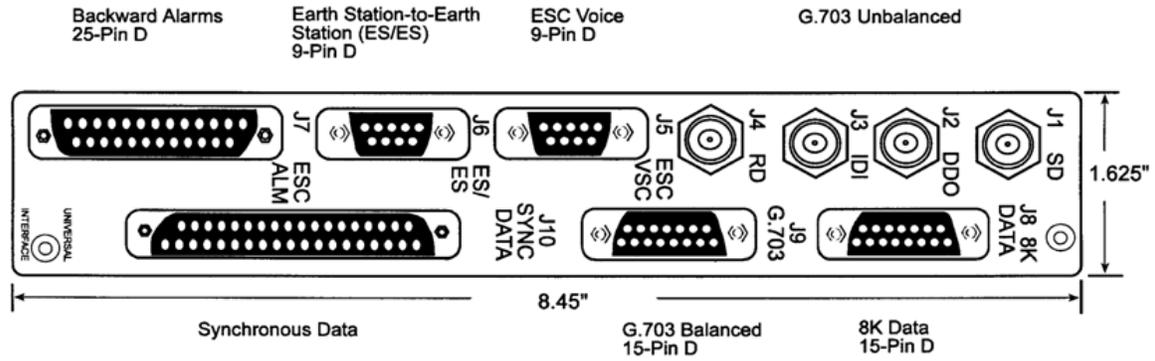


**Figure 5-8 Front Panel Interface – DDS20 Data Switch Module**

Two part numbers exist for Data Switch Modules on the DDS20: AS/3356 (Figure 5-9) and AS/3478 (Figure 5-10 for the 6-position DIP Switch version, and Figure 5-11 for the 8-position DIP Switch version). The AS/3356 Modules were shipped with older models of the DDS20. See Table 5-1 through Table 5-8 for the various DIP Switch configurations on these assemblies.

## 5.3.1.1.1    Configuring Data Switch Module DIP Switches
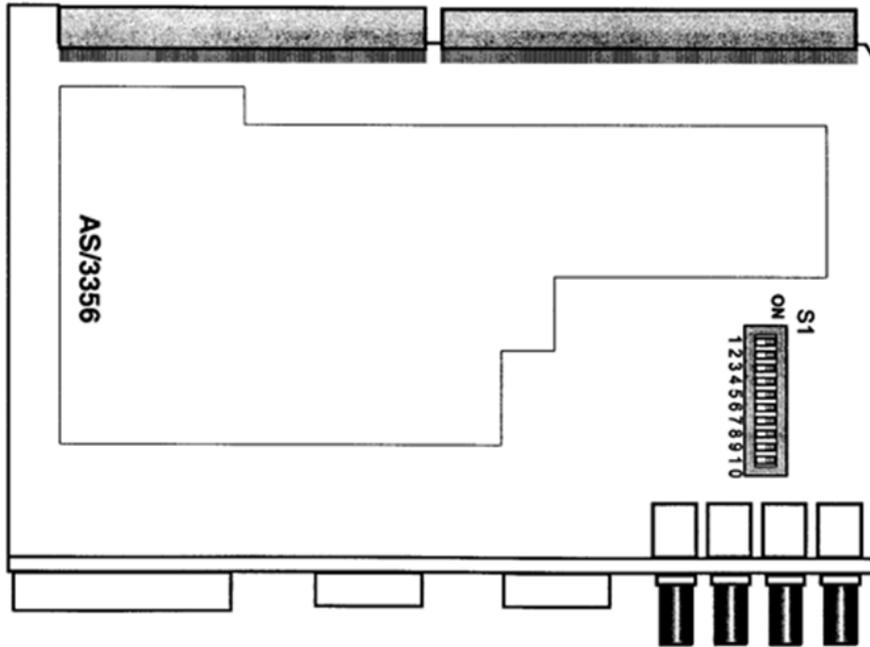


**Figure 5-9  AS/3356 Data Switch Module**

**Table 5-1.** AS/3356 G.703 Unbalanced DIP Switch Settings

| Pin | Setting |
|-----|---------|
| 1 | ON |
| 2 | ON |
| 3 | ON |
| 4 | ON |
| 5 | ON |
| 6 | ON |
| 7 | ON |
| 8 | ON |
| 9 | ON |

**Table 5-2** AS/3356 G.703 Balanced DIP Switch Settings

| Pin | Setting |
|-----|---------|
| 1 | ON |
| 2 | ON |
| 3 | OFF |
| 4 | OFF |
| 5 | OFF |
| 6 | OFF |

| Pin | Setting |
|-----|---------|
| 7   | ON      |
| 8   | ON      |
| 9   | OFF     |
| 10  | OFF     |

**Table 5-3 AS/3356 ALL SYNC (EIA-422/V.35) DIP Switch Settings**

| Pin | Setting |
|-----|---------|
| 1   | OFF     |
| 2   | OFF     |
| 3   | OFF     |
| 4   | OFF     |
| 5   | OFF     |
| 6   | OFF     |
| 7   | OFF     |
| 8   | OFF     |
| 9   | OFF     |
| 10  | OFF     |
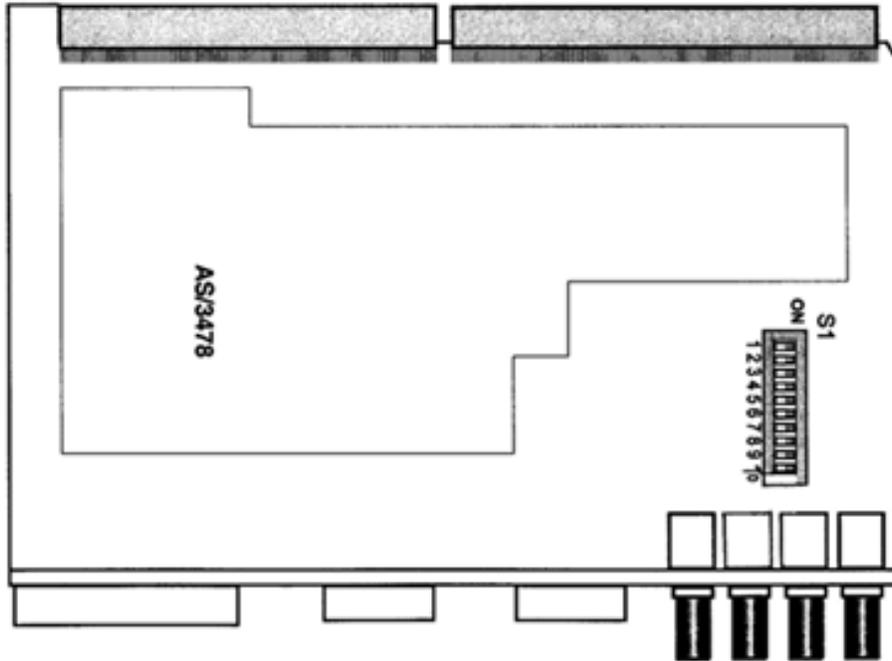
**Figure 5-10  AS/3478 Data Switch Module**

**Table 5-4.** AS/3478 G.703 Balanced DIP Switch Settings

| Pin | Setting |
|-----|---------|
| 1   | ON      |
| 2   | ON      |
| 3   | ON      |
| 4   | ON      |
| 5   | ON      |
| 6   | ON      |

**Table 5-5.** AS/3478 G.703 Balanced DIP Switch Settings

| Pin | Setting |
|-----|---------|
| 1   | OFF     |
| 2   | OFF     |
| 3   | OFF     |
| 4   | OFF     |
| 5   | OFF     |
| 6   | OFF     |
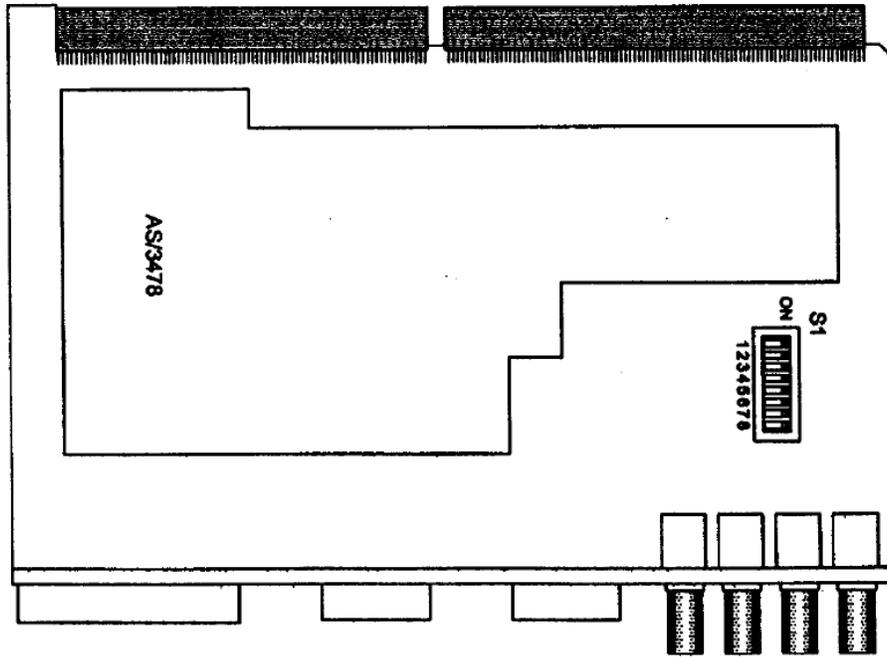
**Figure 5-11  AS/3478 Data Switch Module (for A2 Forward Only)**

**Table 5-6.** AS/3356 G.703 Unbalanced DIP Switch Settings

| Pin | Setting |
|-----|---------|
| 1   | ON      |
| 2   | ON      |
| 3   | ON      |
| 4   | ON      |
| 5   | ON      |
| 6   | ON      |
| 7   | OFF     |
| 8   | OFF     |

**Table 5-7.** AS/3356 G.703 Balanced DIP Switch Settings

| Pin | Setting |
|-----|---------|
| 1   | OFF     |
| 2   | OFF     |
| 3   | OFF     |
| 4   | OFF     |
| 5   | OFF     |
| 6   | OFF     |
| 7   | OFF     |
| 8   | OFF     |

**Table 5-8. AS/3356 EIA-422/V.35 DIP Switch Settings**

| Pin | Setting |
|-----|---------|
| 1 | OFF |
| 2 | OFF |
| 3 | OFF |
| 4 | OFF |
| 5 | OFF |
| 6 | OFF |
| 7 | ON |
| 8 | ON |

## 5.3.1.1.2    DDS20 Data Switch Module Connectors

### 5.3.1.1.2.1   J1 | SD (Send Data)

The J1 | SD G.703 Unbalanced Send Data port is a 75 Ohm female BNC Connector.

### 5.3.1.1.2.2   J2 | DDO (Drop Data Out)

The J2 | DDO Unbalanced Drop Data Out port is a 75 Ohm female BNC Connector.

### 5.3.1.1.2.3   J3 | IDI (Insert Data In)

The J2 | IDI Unbalanced Insert Data In port is a 75 Ohm female BNC Connector.

### 5.3.1.1.2.4   J4 | RD (Receive Data)

The J4 | RD Unbalanced Receive Data port is a 75 Ohm female BNC Connector.

### 5.3.1.1.2.5   J5 | ESC VSC (Escape Audio)

The J5 | ESC VSC Audio Channel/64K Data port is a 9-Pin Type D Female Connector.

| Pin No. | Signal | Description | Direction | 64K | |
|---------|--------|-------------|-----------|-----|-----|
| | | | | Description | Direction |
| 1 | ESCAUDTX 1A | Tx Audio 1A | Input | Tx Data 64K A | Input |
| 2 | ESCAUDRX 1A | Rx Audio 1A | Output | Rx Data 64K A | Output |
| 3 | GND | Ground | | Ground | |
| 4 | ESCAUDTX 2B | Tx Audio 2B | Input | Tx Clock 64B | Output |
| 5 | ESCAUDRX 2B | Rx Audio 2B | Output | Rx Clock 64B | Output |
| 6 | ESCAUDTX 1B | Tx Audio 1B | Input | Tx Data 64K B | Input |
| 7 | ESCAUDRX 1B | Rx Audio 1B | Output | Rx Data 64K B | Output |
| 8 | ESCAUDTX 2A | Tx Audio 2A | Input | Tx Clock 64K A | Output |

| Pin No. | Signal | Description | Direction | 64K | |
| --- | --- | --- | --- | --- | --- |
| | | | | Description | Direction |
| 9 | ESCAUDRX 2A | Rx Audio 2A | Output | Rx Clock 64K A | Output |

## 5.3.1.1.2.6  J9 | ES/ES (Earth Station-to-Earth Station)

The J9 | ES/ES Earth-Station-to-Earth-Station port is a 9-Pin Type D Female Asynchronous Data Connector.

| Pin No. | Signal | Description | Direction |
| --- | --- | --- | --- |
| 1 | RXD_B (485) | Receive Data B | Output |
| 2 | RXD_A (232/485) | Receive Data A | Output |
| 3 | TXD_B (485) | Transmit Data B | Input |
| 4 | TXD_A (232/485) | Transmit Data A | Input |
| 5 | GND | Signal Ground | --- |
| 6 | DSR | Data Set Ready | Output |
| 7 | RTS | Request to Send | Input |
| 8 | CTS | Clear to Send | Output |
| 9 | NC | No Connection | |

### Table 5-9. J6 | ES/ES 9-Pin Type D Female Connector (For use with DMD20/DMD50)

| Pin No. | Signal | Description | Direction |
| --- | --- | --- | --- |
| 1 | RXD_B (485) | Receive Data B | Input |
| 2 | RXD_A (232/485) | Receive Data A | Input |
| 3 | TXD_B (485) | Transmit Data B | Output |
| 4 | TXD_A (232/485) | Transmit Data A | Output |
| 5 | GND | Signal Ground | --- |
| 6 | DSR | No Connection | --- |
| 7 | RTS | No Connection | --- |
| 8 | CTS | No Connection | --- |
| 9 | NC | No Connection | --- |

## 5.3.1.1.2.7  J7 | ESC ALM (Engineering Service Circuits Alarm Interface)

The J7 | ESC ALM port is a 25-Pin Type D Female Connector.

| Pin No. | Signal Name | Signal | Direction |
| --- | --- | --- | --- |
| 1 | Ground | GND | --- |
| 2 | Backward Alarm Out-1 NO | ESCBWO 1 NO | --- |
| 3 | No Connection | N/C | --- |
| 4 | Backward Alarm Out-2 NO | ESCBWO 1 NO | --- |

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 5 | No Connection | N/C | --- |
| 6 | Backward Alarm Out-4 NO | ESCBWO 4 NO | --- |
| 7 | Ground | GND | --- |
| 8 | Backward Alarm Out-4 NO | ESCBWO 4 NO | --- |
| 9 | No Connection | N/C | --- |
| 10 | Backward Alarm In 2 | ESCBWI 2 | Input |
| 11 | Backward Alarm In 4 | ESCBWI 4 | Input |
| 12 | No Connection | N/C | --- |
| 13 | No Connection | N/C | --- |
| 14 | Backward Alarm Out 1-C | ESCBWO 1C | --- |
| 15 | Backward Alarm Out 1-NC | ESCBWO 1-NC | --- |
| 16 | Backward Alarm Out 2-C | ESCBWO 2-C | --- |
| 17 | Backward Alarm Out 2-NC | ESCBWO 2-NC | --- |
| 18 | Backward Alarm Out 3-C | ESCBWO 3-C | --- |
| 19 | Backward Alarm Out 3-NC | ESCBWO 3-NC | --- |
| 20 | Backward Alarm Out 4-C | ESCBWO 4-C | --- |
| 21 | Backward Alarm Out 4-NC | ESCBWO 4-NC | --- |
| 22 | Backward Alarm In 1 | ESCBWI 1 | Input |
| 23 | Backward Alarm In 3 | ESCBWI 1 | Input |
| 24 | No Connection | N/C | --- |
| 25 | No Connection | N/C | --- |

## 5.3.1.1.2.8   J8 | 8K DATA (ESC 8K Data Interface)

The J8 | 8K DATA ESC IDR 8 Kbit Overhead Data Connector is a 15-Pin Type D Female Connector.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Rx Octet-B (+) | ESCRXO-B | Output |
| 2 | Rx Clock-B (+) | ESCRXC-B | Output |
| 3 | Rx Data-B (+) | ESCRXD-B | Output |
| 4 | No Connection | N/C | --- |
| 5 | No Connection | N/C | --- |
| 6 | Tx Data-A (-) | ESCTXD-A | Output |
| 7 | Tx Clock-A (-) | ESCTXC-A | Output |
| 8 | Tx Octet-A (-) | ESCTXO-A | Output |
| 9 | Rx Octet-A (-) | ESCRXO-A | Output |
| 10 | Rx Clock-A (-) | ESCRXC-A | Output |
| 11 | Rx Data-A (-) | ESCRXD-A | Output |
| 12 | Ground | GND | --- |
| 13 | Tx Data-B (+) | ESCTXD-B | Input |

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 14 | Tx Clock-B (+) | ESCTXC-B | Output |
| 15 | Tx Octet-B (+) | ESCTXO-B | Output |

## 5.3.1.1.2.9   J9 | G.703 (G.703 Balanced)

The J9 | G.703 Balanced Interface port is a 15-Pin Type D Female Connector

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Send Data A (-) | SD-A | Input |
| 2 | No Connection | N/C | --- |
| 3 | Receive Data A (-) | RD-A | Output |
| 4 | No Connection | N/C | --- |
| 5 | Drop Data Out B (+) | DDO-B | Output |
| 6 | Insert Data In B (+)/ESC B (+) | IDI-B | Input |
| 7 | External Clock A (-) | BAL EXC-A | Input |
| 8 | External Clock B (+) | BAL EXC-B | Input |
| 9 | Send Data B (+) | SD-B | Input |
| 10 | No Connection | N/C | --- |
| 11 | Receive Data B (+) | RD-B | Output |
| 12 | Drop Data Out A (-) | DDO-A | Output |
| 13 | Insert Data In A (-)/EXC A (-) | IDI-A | Input |
| 14 | No Connection | N/C | --- |
| 15 | No Connection | N/C | --- |

## 5.3.1.1.2.10 J10 | SYNC DATA (Synchronous Data)

The J10 | SYNC DATA Synchronous Data port is an EIA-422/EIA-485/V.35 Connection. It is a 37-Pin Type D Female Connector located on the Universal Interface Module.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Signal Ground | GND | --- |
| 2 | No Connection | N/C | --- |
| 3 | Transmit Octet A (-) | TXO-A | Input |
| 4 | Send Data A (-) | SD-A | Input |
| 5 | Send Timing A (-) | ST-A | Output |
| 6 | Receive Data A (-) | RD-A | Output |
| 7 | Request to Send A (-) | RS-A | Input |
| 8 | Receive Timing A (-) | RT-A | Output |
| 9 | Clear to Send A (-) | CS-A | Output |
| 10 | Mod Fault - Open Collector | MF | Output |
| 11 | Data Mode A (-) | DM-A | Output |

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 12 | No Connection | N/C | --- |
| 13 | Receiver Ready A (-) | RR-A | Output |
| 14 | No Connection | N/C | --- |
| 15 | External Clock A (-) | BAL EXC-A | Input |
| 16 | Receive Octet A (-) | RX-0-A | Output |
| 17 | Terminal Timing A (-) | TT-A | Input |
| 18 | No Connection | N/C | --- |
| 19 | Signal Ground | GND | --- |
| 20 | Signal Ground | GND | --- |
| 21 | Transmit Octet B (+) | TXO-B | Input |
| 22 | Send Data B (+) | SD-B | Input |
| 23 | Send Timing B (+) | ST-B | Output |
| 24 | Receive Data B (+) | RD-B | Output |
| 25 | Request to Send B (+) | RS-B | Input |
| 26 | Receive Timing B (+) | RT-B | Output |
| 27 | Clear to Send B (+) | CS-B | Output |
| 28 | Demod Fault - Open Collector | DF | Output |
| 29 | Data Mode B (+) | DM-B | Output |
| 30 | No Connection | N/C | --- |
| 31 | Receiver Ready B (+) | RR-B | Output |
| 32 | No Connection | N/C | --- |
| 33 | External Clock B (+) | BAL EXC-B | Input |
| 34 | Receive Octet B (+) | RX-0 B | Output |
| 35 | Terminal Timing B (+) | TT-B | Input |
| 36 | No Connection | N/C | --- |
| 37 | Signal Ground | GND | --- |

## 5.3.2  DDS20 – Universal Switch Back Panel Connectors
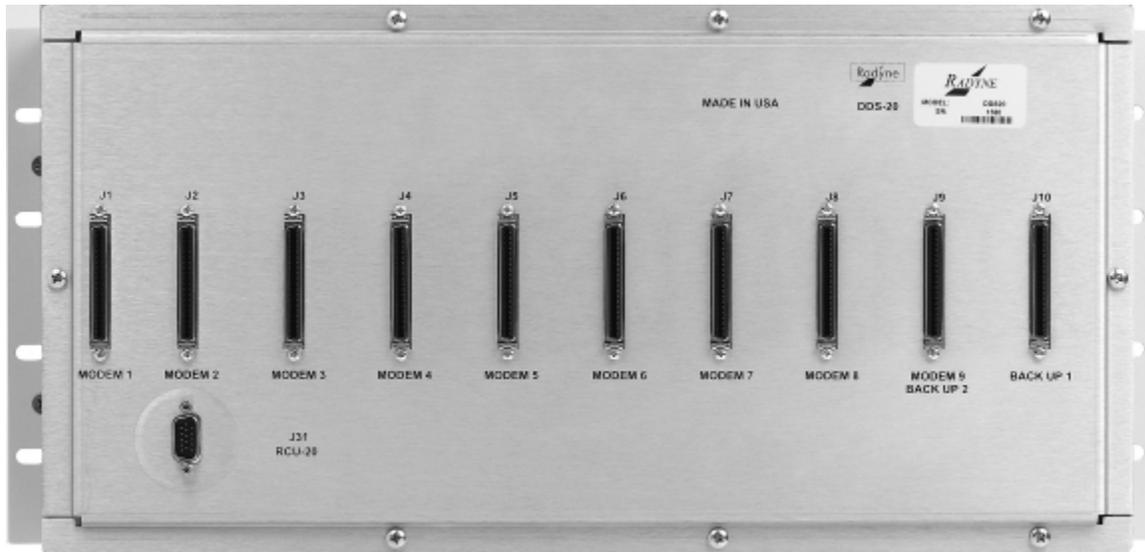


Figure 5-12  DDS20 Universal Switch – Back Panel Connectors

## 5.3.2.1    J1 | MODEM 1 through J8 | MODEM 8 68-Pin High Density Min DSUB Female Connectors

Each connector, J1 | MODEM 1 through J8 | MODEM 8, connects to each prime modem. If a prime channel is unused, then its corresponding connects should be left unconnected.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | G.703 Send Data Input A (-) | G.703B SD-A | Input |
| 2 | Synchronous Data Send Data Input -A (-) | SYNC SD-A | Input |
| 3 | IDR ESC Backward Alarm Out - 1 Common | ESCBWO 1C | --- |
| 4 | G.703 Insert Data Input - A (-) | G.703B IDI-A | Input |
| 5 | G.703 Drop Data Out A  -  Synchronous Data Send Timing Output - A | G.703B DDO-A SYNC ST-A | Output |
| 6 | IDR ESC Backward Alarm Out - 1 Normally Open | ESCBWO 1NO | --- |
| 7 | Synchronous Data Terminal Timing Input A | SYNC TT-A | Input |
| 8 | IDR ESC Backward Alarm Out - 2 Normally Closed | ESCBWO 2NC | --- |
| 9 | Synchronous Data Receive Timing  Output - A | SYNC RT-A | Output |
| 10 | IDR ESC Backward Alarm Output - 3 Common | ESCBWO 3C | --- |
| 11 | G.703 Insert  Data Out A  -  Synchronous Data Receive Data A | IDO-A RD-A | Output |
| 12 | IDR ESC Backward Alarm Output - 3 Normally Open | ESCBWO 3NO | --- |
| 13 | External Clock Input - A | BAL EXC-A | Input |
| 14 | Ground | GND | --- |
| 15 | IDR ESC Audio Input Channel 1A | ESCAUDTX 1A | Input |
| 16 | IDR ESC Audio Input Channel 2A | ESCAUDTX 2A | Input |
| 17 | IDR ESC Audio Output Channel 1A | ESCAUD RX 1A | Output |
| 18 | IDR ESC Audio Output Channel 2A | ESCAUD RX 2A | Output |

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 19 | IDR ESC Backward Alarm Input - 3 | ESCBWI 3 | --- |
| 20 | IBS ES Transmit Data A   IDR ESC Backward Alarm    Input 1 | TXD-A BWI 1 | Input |
| 21 | Mod Fault Open Collector Output | MOD FLT | Output |
| 22 | IBS ES Receive Data Output A | ES RXD-A | Output |
| 23 | IBS ES Data Set Ready   (RS-232 Only) | ES DSR | Output |
| 24 | IDR ESC Transmit  8 Kbps Output Clock | ESCTXC-A | Output |
| 25 | IDR ESC Transmit 8 Kbps  Output Data | ESCTXD-A | Input |
| 26 | IDR ESC Receive  8 Kbps  Output Clock | ESCRXC-A | Output |
| 27 | IDR ESC Receive 8 Kbps   Output Data | ESCRXD-A | Output |
| 28 | IDR ESC Backward Alarm  Output 4    Normally Closed | ESCBWO 4NC | --- |
| 29 | IBS Transmit Octet Input A | TXO-A | Input |
| 30 | Synchronous Data Mode A | SYNC DM-A | Output |
| 31 | Synchronous Data Clear to    Send A | SYNC CS-A | Output |
| 32 | IBS Receive Octet Output A | RXO-A | Output |
| 33 | Synchronous Data Request to Send A | SYNC RS-A | Input |
| 34 | Synchronous Data Receiver Ready A | SYNC RR-A | Output |
| 35 | G.703 Send Data Input B | G703B SD-B | Input |
| 36 | Synchronous Data Send Data Input B | SYNC SD-B | Input |
| 37 | IDR ESC Backward Alarm Out 1 Normally Closed | ESCBWO 1 NC | --- |
| 38 | G.703 Insert Data Input B | G703B IDI-B | Input |
| 39 | G.703 Drop Data Out B Synchronous Data Send Timing Output B | G.703B DDO-B SYNC ST-B | Output |
| 40 | IDR ESC Backward Alarm Out 2 Common | ESCBWO 2C | --- |
| 41 | Synchronous Data Terminal Timing B | SYNC TT-B | Input |
| 42 | IDR ESC Backward Alarm  Output 2    Normally Open | ESCBWO 2NO | --- |
| 43 | Synchronous Data Receive Timing B | SYNC RT-B | Output |
| 44 | IDR ESC Backward Alarm Out 3 Normally Closed | ESCBWO 3NC | --- |
| 45 | G.703 Insert Data Out Synchronous Data | IDO-B RD-B | Output |
| 46 | IDR ESC Backward Alarm Out 4 Common | ESCBWO 4C | --- |
| 47 | External Clock Input B | BAL EXC-B | Input |
| 48 | Ground | GND | --- |
| 49 | IDR ESC Audio Input Channel 1B | ESCAUDTX 1B | Input |
| 50 | IDR ESC Audio Input Channel 2B | ESCAUDTX 2B | Input |
| 51 | IDR ESC Audio Output Channel 1B | ESCAUDRX 1B | Output |
| 52 | IDR ESC Audio Output Channel 2B | ESCAUDRX 2B | Output |
| 53 | IDR ESC Backward Alarm Input 4 | ESCBWI 4 | --- |
| 54 | IBS ES Transmit Data B    IDR ESC Backward Alarm Input 2 | TX-B BWI 2 | Input |
| 55 | Demod Fault Open Collector Output | DMD FLT | Output |
| 56 | IBS ES Receive Data Input B | ES RXD-B | Output |
| 57 | Ground | GND | --- |
| 58 | IDR ESC Transmit 8 Kbps Output Clock B | ESCTXC-B | Output |

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 59 | IDR ESC Transmit 8 Kbps Output Data B | ESCTXD-B | Input |
| 60 | IDR ESC Receive 8 Kbps Clock Output B | ESCRXC-B | Output |
| 61 | IDR ESC Receive 8 Kbps Data Output B | ESCRXD-B | Output |
| 62 | IDR ESC Backward Alarm Out 4 Normally Open | ESCBWO 4NO | --- |
| 63 | IBS Transmit Octet Input B | TXO-B | Input |
| 64 | Synchronous Data    Data Mode Out B | SYNC DM-B | Output |
| 65 | Synchronous Data    Clear to Send B | SYNC CS-B | Input |
| 66 | IBS Receive Octet Output B | RXO-B | Output |
| 67 | Synchronous Data Request to Send B | SYNC RS-B | Input |
| 68 | Synchronous Data Receiver Ready B | SYNC RR-B | Output |

## 5.3.2.2    J9 | MODEM 9 | BACK UP 2 68-Pin High Density Min DSUB Connector

J9 | MODEM 9 | BACK UP 2 connects to Backup Modem 2 in a 2:N configuration, or to the prime modem 9 in a 1:9 configuration. See section 5.3.2.1for pinout table.

## 5.3.2.3    J10 | BACK UP 1 68-Pin High Density Min DSUB Connector

J10 | BACK UP 1 always connects to backup modem 1 since there is always at least one backup modem in a redundancy system. See section 5.3.2.1for pinout table.

## 5.3.2.4    J31 | RCU-20 15-pin High-Density DSUB Connector

J31 | RCU-20 connects the DDS20 to the RCU20 providing power, ground, and serial control.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Serial Control Clock | DDS_LCLK | IN |
| 2 | Relay +6 Volts | VCC_RELAY | IN |
| 3 | Serial Control Data 2 | DDS_LDAT2 | Bidirectional |
| 4 | Ground | GND | --- |
| 5 | Ground | GND | --- |
| 6 | Logic +5 Volts | VCC | IN |
| 7 | Relay +6 Volts | VCC_RELAY | IN |
| 8 | Relay +6 Volts | VCC_RELAY | IN |
| 9 | Ground | GND | --- |
| 10 | Ground | GND | --- |
| 11 | Relay +6 Volts | VCC_RELAY | IN |
| 12 | Serial Control Data 1 | DDS_LDAT1 | Bidirectional |
| 13 | Ground | GND | --- |
| 14 | Serial Control Data 3 | DDS_LDAT3 | Bidirectional |
| 15 | DDS20 Interrupt | INT | OUT |

## 5.4    DDS-20 GigE (10/100/1000 Ethernet) Backup Switch

### 5.4.1  DDS-20 – GigE Switch Front Panel Connectors
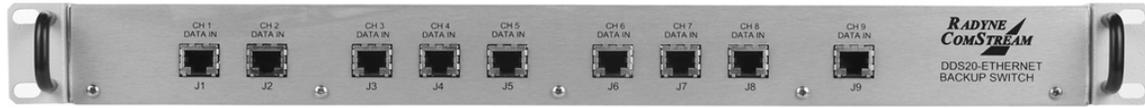


Figure 5-13  DDS GigE Switch – Front Panel Connectors

#### 5.4.1.1    J1 | CH1 DATA IN through J9 | CH 9 DATA IN

The J1 | CH1 DATA IN through J9 | CH9 DATA IN ports are RJ-45, 10/100/1000 Ethernet Data ports for connecting channels 1 through 9.

### 5.4.2  DDS-20 – GigE Switch Back Panel Connectors
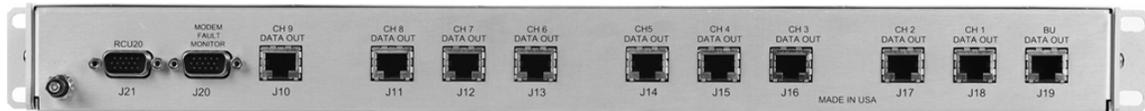


Figure 5-14  DDS GigE Switch – Back Panel Connectors

#### 5.4.2.1    J10 | CH 9 DATA OUT through J18 | CH1 DATA OUT

The J10 | CH 9 DATA OUT through J18 | CH1 DATA OUT ports are RJ-45, 10/100/1000 Ethernet Data ports for connecting to the prime modem 1 through 9 Ethernet data ports.

#### 5.4.2.2    J19 | BU DATA OUT

The J19 | BU DATA OUT port is a RJ-45, 10/100/1000 Ethernet Data port for connecting to Backup 1 Ethernet Data port.

#### 5.4.2.3    J20 | MODEM FAULT MONITOR

The J20 | MODEM FAULT MONITOR port is a 15-pin High-Density Female Type D Connector for connecting prime modems 1 through 9 and backup modem 1 alarm ports for fault monitoring.

| Pin Number | Signal Name | Direction |
|------------|-------------|-----------|
| 1 | Prime Modem 1 Fault | --- |
| 2 | Prime Modem 2 Fault | --- |
| 3 | Prime Modem 3 Fault | --- |
| 4 | Prime Modem 4 Fault | --- |

| | | |
|---|---|---|
| 5 | Prime Modem 5 Fault | --- |
| 6 | Prime Modem 6 Fault | --- |
| 7 | Prime Modem 7 Fault | --- |
| 8 | Prime Modem 8 Fault | --- |
| 9 | Prime Modem 9 Fault | --- |
| 10 | Backup Modem 1 Fault | --- |
| 11 | No Connection | --- |
| 12 | No Connection | --- |
| 13 | No Connection | --- |
| 14 | No Connection | --- |
| 15 | Ground | --- |

## 5.4.2.4   J21 | RCU20

The J21 | RCU20 port is a 15-Pin High-Density Type D Female Connector used for connecting the GigE (10/100/1000) Ethernet DDS-20 Backup Switch to the RCU20 control unit.

| Pin No. | Signal Name | Signal | Direction |
|---|---|---|---|
| 1 | Serial Control Clock | IFS_LCLK | Input |
| 2 | No Connection | N/C | --- |
| 3 | No Connection | N/C | --- |
| 4 | Ground | GND | --- |
| 5 | Ground | GND | --- |
| 6 | Logic +5 Volts | VCC | Input |
| 7 | Relay +6 Volts | VCC_RELAY | Input |
| 8 | No Connection | N/C | --- |
| 9 | No Connection | N/C | --- |
| 10 | Ground | GND | --- |
| 11 | Relay +6 Volts | VCC_RELAY | Output |
| 12 | Serial Control Data 1 | IFS_LDAT1 | Bidirectional |
| 13 | No Connection | N/C | --- |
| 14 | No Connection | N/C | --- |
| 15 | No Connection | N/C | --- |

## 5.5    IFS20 Intermediate Frequency Switch Units

## 5.5.1  IFS20 70/140 MHz Unit

### 5.5.1.1    IFS20 70/140 MHz Unit Connectors – Front Panel

The IFS20 has connections to both the front and back panels (Figures 5-15 and 5-16). Unless otherwise indicated, all IF connectors are 75 Ohm Female BNC connectors.
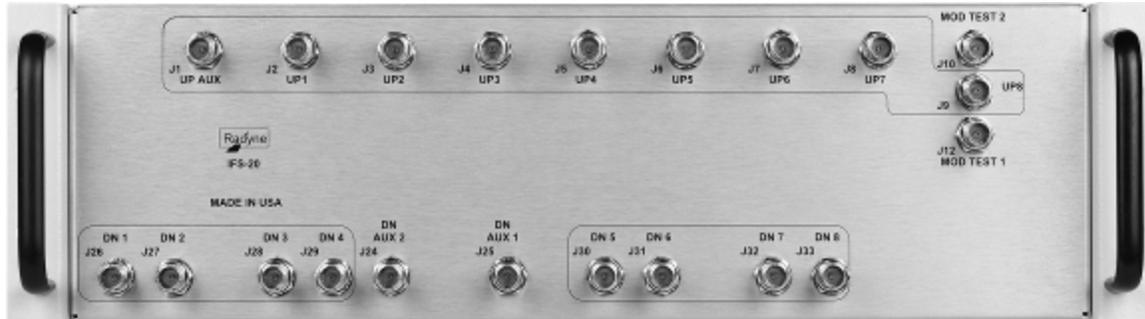


Figure 5-15  IFS20 Front Panel Connectors

### 5.5.1.1.1    J1 | UP AUX

The J1 | UP AUX External Output port is used for connecting satellite transmission channel 9 to an up converter or combiner in a 1:9 system.

### 5.5.1.1.2    J2 | UP1

The J2 | UP1 port is used for connecting satellite transmission channel 1 to an up converter or combiner.

### 5.5.1.1.3    J3 | UP2

The J4 | UP2 port is used for connecting satellite transmission channel 2 to an up converter or combiner.

### 5.5.1.1.4    J4 | UP3

The J4 | UP3 port is used for connecting satellite transmission channel 3 to an up converter or combiner.

### 5.5.1.1.5    J5 | UP4

The J5 | UP4 port is used for connecting satellite transmission channel 4 to an up converter or combiner.

### 5.5.1.1.6    J6 | UP5

The J6 | UP5 port is used for connecting satellite transmission channel 5 to an up converter or combiner.

## 5.5.1.1.7    J7 | UP6

The J7 | UP6 port is used for connecting satellite transmission channel 6 to an up converter or combiner.

## 5.5.1.1.8    J8 | UP7

The J8 | UP7 port is used for connecting satellite transmission channel 7 to an up converter or combiner.

## 5.5.1.1.9    J9 | UP8

The J9 | UP8 port is used for connecting satellite transmission channel 8 to an up converter or combiner.

## 5.5.1.1.10   J10 | MOD TEST 2

The J10 | MOD TEST (Modulator Test) 2 port is a troubleshooting utility port used to inspect the output of a failed prime that is being backed up by channel 1.

## 5.5.1.1.11   J12 | MOD TEST 1

The J12 | MOD TEST (Modulator Test) 1 port is a troubleshooting utility port used to inspect the output of a failed prime that is being backed up by channel 1.

## 5.5.1.1.12   J24 | DN AUX 2

The J24 | DN AUX 2 port is used for factory test only.

## 5.5.1.1.13   J25 | DN AUX 1

The J25 | DN AUX 1 port is used for connecting a down converter or splitter for satellite receive channel 9 in a 1:9 system.

## 5.5.1.1.14   J26 | DN 1

The J26 | DN1 port is used for connecting a down converter or splitter for satellite receive channel 1.

## 5.5.1.1.15   J27 | DN2

The J27 | DN2 port is used for connecting a down converter or splitter for satellite receive channel 2.

## 5.5.1.1.16   J28 | DN3

The DN3 port is used for connecting a down converter or splitter for satellite receive channel 3.

## 5.5.1.1.17   J29 | DN4

The J29 | DN4 port is used for connecting a down converter or splitter for satellite receive channel 4.

## 5.5.1.1.18   J30 | DN5

The J30 | DN5 port is used for connecting a down converter or splitter for satellite receive channel 5.

## 5.5.1.1.19   J31 | DN6

The J31 | DN6 port is used for connecting a down converter or splitter for satellite receive channel 6.

## 5.5.1.1.20   J32 | DN7

The J32 | DN7 port is used for connecting a down converter or splitter for satellite receive channel 7.

## 5.5.1.1.21   J33 | DN8

The J33 | DN8 port is used for connecting a down converter or splitter for satellite receive channel 8.

## 5.5.1.2   IFS20 70/140 MHz Unit Connectors – Back Panel
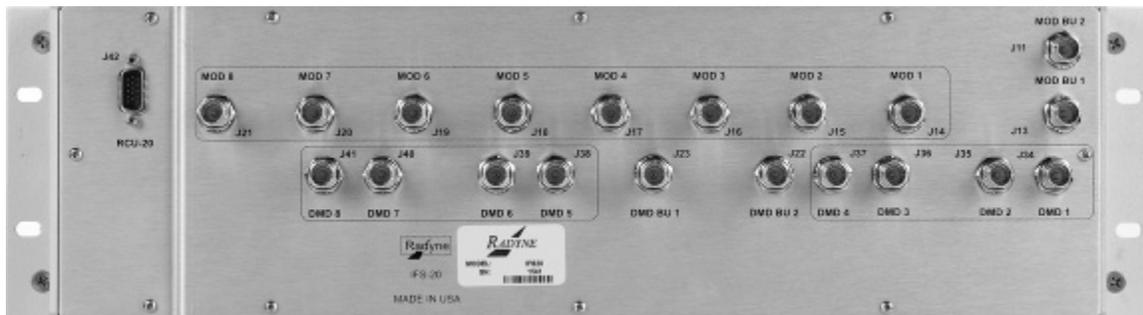


Figure 5-16  IFS20 Back Panel Connectors

## 5.5.1.2.1     J11 | MOD BU2

The J11 | MOD BU Input port is used for connecting to backup modem 2 transmit IF in a 2:n system or to the prime modem 9 transmit IF in a 1:9 system.

## 5.5.1.2.2     J13 | MOD BU1

The J13 | MOD BU Input port is used for connecting to backup modem 1 transmit IF.

## 5.5.1.2.3     J14 | MOD 1

The J14 | MOD 1 Input port is used for connecting to the prime modem 1 transmit IF.

## 5.5.1.2.4    J15 | MOD 2

The J15 | MOD 2 Input port is used for connecting to the prime modem 2 transmit IF.

## 5.5.1.2.5    J16 | MOD 3

The J16 | MOD 3 Input port is used for connecting to the prime modem 3 transmit IF.

## 5.5.1.2.6    J17 | MOD 4

The J17 | MOD 4 Input port is used for connecting to the prime modem 4 transmit IF.

## 5.5.1.2.7    J18 | MOD 5

The J18 | MOD 5 Input port is used for connecting to the prime modem 5 transmit IF.

## 5.5.1.2.8    J19 | MOD 6

The J19 | MOD 6 Input port is used for connecting to the prime modem 6 transmit IF.

## 5.5.1.2.9    J20 | MOD 7

The J20 | MOD 7 Input port is used for connecting to the prime modem 7 transmit IF.

## 5.5.1.2.10    J21 | MOD 8

The J21 | MOD 8 Input port is used for connecting to the prime modem 8 transmit IF.

## 5.5.1.2.11    J22 | DMD BU 2

The J22 | DMD BU2 port is used for connecting to backup modem 2 receive IF in a 2:N system or to prime 9 modem receive if in a 1:9 system.

## 5.5.1.2.12    J23 | DMD BU1

The J23 | DMD BU1 port is used for connecting to backup modem 1 receive IF.

## 5.5.1.2.13    J34 | DMD1

The J34 | DMD1 port is used for connecting to the prime modem 1 receiver IF.

## 5.5.1.2.14    J35 | DMD2

The J35 | DMD2 port is used for connecting to the prime modem 2 receive IF

## 5.5.1.2.15    J36 | DMD3

The J36 | DMD3 port is used for connecting to the prime modem 3 receive IF.

## 5.5.1.2.16    J37 | DMD4

The J37 | DMD4 port is used for connecting to the prime modem 4 receive IF.

## 5.5.1.2.17    J38 | DMD5

The J38 | DMD5 port is used for connecting to the prime modem 5 receive IF.

## 5.5.1.2.18    J39 | DMD6

The J39 | DMD6 port is used for connecting to the prime modem 6 receive IF.

## 5.5.1.2.19    J40 | DMD7

The J40 | DMD7 port is used for connecting to the prime modem 7 receive IF.

## 5.5.1.2.20    J41 | DMD8

The J41 | DMD8 port is used for connecting to the prime modem 8 receive IF.

## 5.5.1.2.21    J42 | MCU-20

The J42 | MCU-20 (IFS20 Control and Power) port is a 15-Pin High-Density Type D Female Connector.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Serial Control Clock | IFS_LCLK | Input |
| 2 | No Connection | N/C | --- |
| 3 | No Connection | N/C | --- |
| 4 | Ground | GND | --- |
| 5 | Ground | GND | --- |
| 6 | Logic +5 Volts | VCC | Input |
| 7 | Relay +6 Volts | VCC_RELAY | Input |
| 8 | No Connection | N/C | --- |
| 9 | No Connection | N/C | --- |
| 10 | Ground | GND | --- |
| 11 | Relay +6 Volts | VCC_RELAY | Output |
| 12 | Serial Control Data 1 | IFS_LDAT1 | Bidirectional |
| 13 | No Connection | N/C | --- |
| 14 | No Connection | N/C | --- |
| 15 | No Connection | N/C | --- |

## 5.5.2  IFS20L L-Band Unit

The IFS20L has connections to both the front and back panels (shown in Figures 5-17 and 5-18). Unless otherwise indicated, all L-Band connectors are 50 Ohm Female SMA connectors.

### 5.5.2.1    IFS20L L-Band Unit Connectors – Front Panel
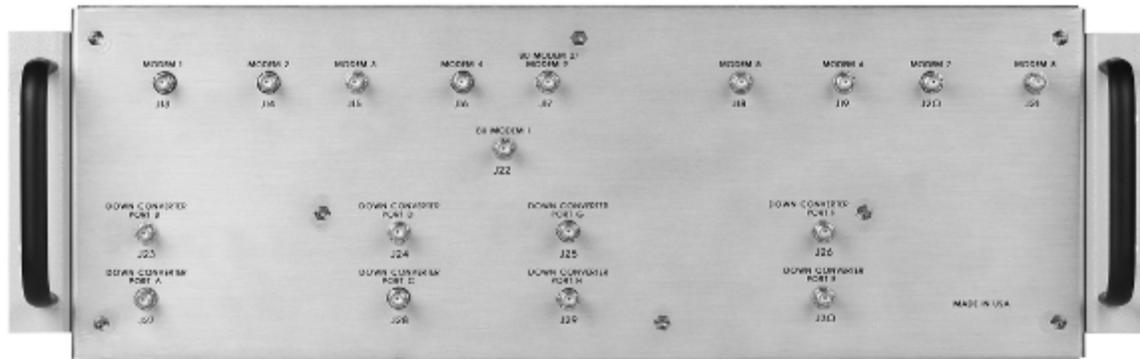


Figure 5-17  IFS20L Front Panel Connectors

### 5.5.2.1.1    J13 | MODEM 1

The J13 | MODEM 1 port is used connecting to the prime modem 1 L-Band transmit port.

### 5.5.2.1.2    J14 | MODEM 2

The J14 | MODEM 2 port is used for connecting to the prime modem 2 L-Band transmit port.

### 5.5.2.1.3    J15 | MODEM 3

The J15 | MODEM 3 port is used for connecting to the prime modem 3 L-Band transmit port.

### 5.5.2.1.4    J16 | MODEM 4

The J16 | MODEM 4 port is used for connecting to the prime modem 4 L-Band transmit port.

### 5.5.2.1.5    J17 | BU MODEM 2 | MODEM 9

The J17 | BU MODEM 2 | MODEM 9 port is used for connecting to backup modem 2 L-Band transmit port in a 2:N system or to a prime modem 9 L-Band transmit port in a 1:9 system.

### 5.5.2.1.6    J18 | MODEM 5

The J18 | MODEM 5 port is used for connecting to the prime modem 5 L-Band transmit port.

### 5.5.2.1.7     J19 | MODEM 6

The J19 | MODEM 6 port is used for connecting to the prime modem 6 L-Band transmit port.

### 5.5.2.1.8     J20 | MODEM 7

The J20 | MODEM 7 port is used for connecting to the prime modem 7 L-Band transmit port.

### 5.5.2.1.9     J21 | MODEM 8

The J21 | MODEM 8 port is used for connecting to the prime modem 8 L-Band transmit port.

### 5.5.2.1.10    J22 | BU MODEM 1

The J22 | BU Modem 1 port is used for connecting to backup modem 1 L-Band transmit port.

### 5.5.2.1.11    J23 | DOWN CONVERTER PORT B

J23 | DOWN CONVERTER PORT B is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.12    J24 | DOWN CONVERTER PORT D

J24 | DOWN CONVERTER PORT D is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.13    J25 | DOWN CONVERTER PORT G

J25 | DOWN CONVERTER PORT G is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.14    J26 | DOWN CONVERTER PORT F

J26 | DOWN CONVERTER PORT F is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.15    J27 | DOWN CONVERTER PORT A

J27 | DOWN CONVERTER PORT A is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.16    J28 | DOWN CONVERTER PORT C

J28 | DOWN CONVERTER PORT C is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.17    J29 | DOWN CONVERTER PORT H

J29 | DOWN CONVERTER PORT H is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.1.18    J30 | DOWN CONVERTER PORT E

J30 | DOWN CONVERTER PORT E is used for connecting to a downlink feed for mapped satellite receive channels 1 thru 8.

### 5.5.2.2    IFS20L L-Band Unit Connectors – Back Panel
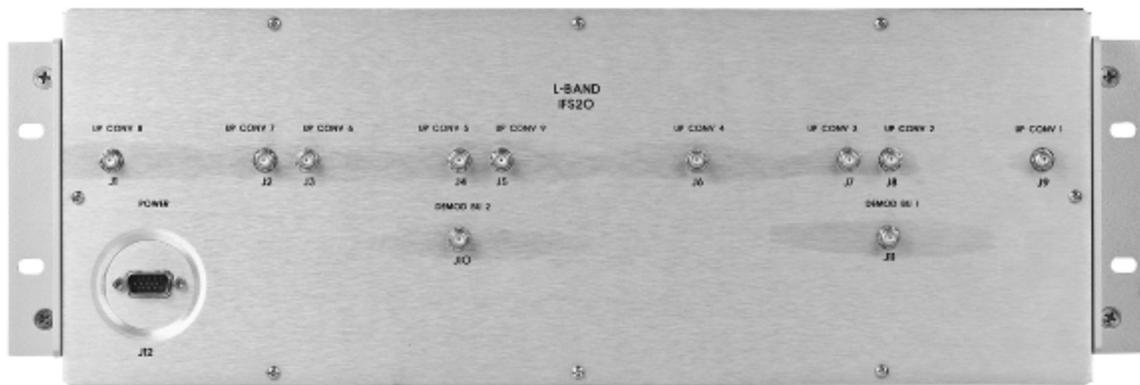


Figure 5-18  IFS20L Back Panel Connectors

### 5.5.2.2.1    J1 | UPCONV 8

The J2 | UPCONV 8 port is used for connecting satellite transmit channel 8 to uplink.

### 5.5.2.2.2    J2 | UPCONV 7

The J2 | UPCONV 7 port is used for connecting satellite transmit channel 7 to uplink.

### 5.5.2.2.3    J3 | UPCONV 6

The J3 | UPCONV 6 port is used for connecting satellite transmit channel 6 to uplink.

### 5.5.2.2.4    J4 | UPCONV 5

The J4 | UPCONV 5 port is used for connecting satellite transmit channel 5 to uplink.

### 5.5.2.2.5    J5 | UPCONV 9

The J5 | UPCONV 9 port is used for connecting satellite transmit channel 9 to uplink (not used when channel 9 is used as backup 2).

## 5.5.2.2.6    J6 | UPCONV4

The J6 | UPCONV 4 port is used for connecting satellite transmit channel 4 to uplink.

## 5.5.2.2.7    J7 | UPCONV3

The J7 | UPCONV 3 port is used for connecting satellite transmit channel 3 to uplink.

## 5.5.2.2.8    J8 | UPCONV2

The J8 | UPCONV 2 port is used for connecting satellite transmit channel 2 to uplink

## 5.5.2.2.9    J9 | UPCONV1

The J9 | UPCONV 1 port is used for connecting satellite transmit channel 1 to uplink

## 5.5.2.2.10   J10 | DEMOD BU2

The J10 | DEMOD BU2 port is used for connecting to backup modem 2 receive L-Band.

## 5.5.2.2.11   J11 | DEMOD BU1

The J11 | DEMOD BU1 port is used for connecting to backup modem 1 receive L-Band.

## 5.5.2.2.12   J12 | POWER (IFS20 L-Band Control and Power)

The J12 | POWER port is a 15-Pin High-Density Type D Female Connector.

| Pin No. | Signal Name | Signal | Direction |
|---------|-------------|--------|-----------|
| 1 | Serial Control Clock | IFS_LCLK | Input |
| 2 | No Connection | N/C | --- |
| 3 | No Connection | N/C | --- |
| 4 | Ground | GND | --- |
| 5 | Ground | GND | --- |
| 6 | Logic +5 Volts | VCC | Input |
| 7 | Relay +6 Volts | VCC_RELAY | Input |
| 8 | No Connection | N/C | --- |
| 9 | No Connection | N/C | --- |
| 10 | Ground | GND | --- |
| 11 | Relay +6 Volts | VCC_RELAY | Output |
| 12 | Serial Control Data 1 | IFS_LDAT1 | Bidirectional |
| 13 | No Connection | N/C | --- |
| 14 | No Connection | N/C | --- |
| 15 | No Connection | N/C | --- |

BLANK PAGE

# Chapter 6.  Maintenance and Troubleshooting

## 6.1    Periodic Maintenance

There are two external fuses in each power supply module located in a slide out drawer just to the left of the power switch. The fuses are rated at 3.15A, 250V.

> ⚠️ **CAUTION**
>
> For personal safety, always replace the fuses with the correct type and rating.

## 6.2    Alarm Masks

The RCS20 performs a high degree of self-monitoring and fault isolation.

A feature exists that allows the user to 'Mask' out certain alarms as explained below. Alarms that are recorded in the event buffer are the same as the alarm buffer.

> ⚠️ **CAUTION**
>
> Masked alarms can cause undesirable performance.

When an alarm is masked, the Front Panel LEDs and the Fault Relays do not get asserted, but the Alarm will still be displayed. This feature is very helpful during debugging or to lock out a failure of which the user is already aware.

## 6.3    Active Major Alarms

Major Alarms indicate that failure conditions that result in loss of service on one or more primary satellite channels. A major alarm may be caused by an internal switch hardware failure, by failure of one or more modems under redundancy protection, or by an incorrect configuration. A Major Alarm condition is indicated by illumination of the MAJOR ALARM LED on the front panel and by relay closure on the real panel Alarm connector. All conditions resulting in an RCS20 Major Alarm are described in Table 6-1 and a Major Alarm matrix is shown in Figure 6-1. The alarm matrix shows all possible alarm conditions, and any actions taken by the RCS20 in response to the alarm.

### Table 6-1. RCS20 Major Alarms

| Alarm | Description |
|---|---|
| RAM/ROM | The RCS20 has detected a failure in either the internal Random Access Memory, or the Read Only Memory. If this alarm persists, the unit must be returned to Radyne Corporation for repair. |
| BACKUP UNAVAILABLE | The RCS20 attempted to backup a failed prime channel modem, but no backup channel modem was available because all backup modem channels are currently in use. |
| ERROR DURING BACKUP | The RCS20 attempted to backup a failed prime channel modem, but there was an error during the backup process that prevented the backup from going on-line. |



Figure 6-1. Major Alarm Matrix

## 6.4    Active Minor Alarms

Minor Alarms mean a failure condition exists that does not immediately result in loss of service on one or more primary satellite channels. However, a minor alarm may mean that there is a loss of redundancy protection for one or more channels. The RCS20 shows a Minor Alarm by lighting the MINOR ALARM LED on the front panel, and closing a relay on the rear panel ALARM connector. Conditions resulting in an RCS20 Minor Alarm are listed in Table 6-2 and a Minor Alarm matrix is shown in Figure 6-2. The alarm matrix shows all possible alarm conditions and the actions taken by the RCS20 in response to the alarm.

### Table 6-2. RCS20 Minor Alarms

| Alarm | Description |
|---|---|
| PS 1 PRESENT | The slide in power supply module in position PS1 is missing or not fully-seated. |
| PS 1 VOLTAGE | The slide in power supply module in position PS1 is supplying the incorrect voltage. |
| PS 2 PRESENT | The slide in power supply module in position PS1 is missing or not fully seated. |
| PS 2 VOLTAGE | The slide in power supply module in position PS1 is supplying the incorrect voltage. |
| COMMUNICATIONS | One or more of the modems connected to the RCS20 have stopped responding to remote communications from the switch. |
| FAULTED PRIME | One or more of the modems connected to the RCS20 that are designated as prime channels have failed. |
| FAULTED BACKUP | One or more of the modems connected to the RCS20 that are designated as backup channels have failed. |
| CONFIGURATION CHANGE | One or more of the modems connected to the RCS20 that are designated as prime channels have modem configurations that have changed while the RCS20 is in automatic switch mode. |
| CDM CLOCK SLIP | One or more of the clock outputs on a Clock Distribution Module have lost lock with the external reference. |



Figure 6-2. Minor Alarm Matrix

BLANK PAGE

# Chapter 7. Technical Specifications

## 7.1    General Specifications

| | |
|---|---|
| Configurations: | 1:9, 2:8, 1:4/1:4, 1:2/1:6, 1:3/1:5 |
| Online Modulators: | 1 to 9 |
| Online Demodulators: | 1 to 9 |
| Backup Modulators: | 1 to 2 |
| Backup Demodulators: | 1 to 2 |
| Uplink Transponders: | 1 to 9 |
| Downlink Transponders: | 1 to 9 |
| Modes of Operation: | Manual, Automatic Revertive, Automatic Non-Revertive and Pre-emptive |
| Modulator Switch Time: | 250 ms Maximum (Hot-Standby), 2 sec Maximum (No Hot-Standby) |
| Demodulator Switch Time: | 250 ms Maximum (Hot-Standby), 2 sec Maximum + Demod Lock Time (No Hot-Standby) |
| Modulator Switch Delay Time: | 0.0 sec to 299.9 sec, 0.1 sec Intervals |
| Demodulator Switch Delay Time: | 0.0 sec to 299.9 sec, 0.1 sec Intervals |

## 7.2    IFS20 (70/140 MHz)

| | |
|---|---|
| Uplink Transponders: | 1 to 9 |
| Downlink Transponders: | 1 to 9 |
| Return Loss: | 20 dB Minimum |
| Tx Insertion Loss: | 1 dB Nominal |
| Rx Insertion Loss: | 3.5 dB Nominal |
| IF Connection: | Coaxial, 75 Ohm (50 Ohm Optional) |

## 7.3    IFS20 (L-Band)

Uplink Transponders:                      1 to 9

Downlink Transponders:                    1 to 8

Return Loss                               20 dB Minimum

Tx Insertion Loss                         2 dB Nominal

IFL Connection                            SMA, 50 Ohm

## 7.4    Terrestrial Interfaces

DDS20 Universal I/O (UIO)

Data Switch:

                RS-449, V.35, RS-232 (DCE), G.703

                T1:    1.544 Mbps 100 Ohm Balanced AMI or

                          B8ZS Line Codes

                E1:    2.048 Mbps, 120 Ohm Balanced,

                          or 75 Ohm Unbalanced HDB3 Line Code

                T2:    6.312 Mbps, 110 Ohm Balanced,

                          B6ZS Line Code or 75 Ohm Unbalanced B8ZS

                E2:    8.448 Mbps, 75 Ohm BNC Unbalanced

                          HDB3 Line Code

DDS20-DVB/M2P:        Serial Parallel Interface Data Switch

                M2P, RS-422, DB-25 Connector[1]

                DVB, RS-422, DB-25 Connector[1]

                DVB, Differential LVDS, DB25 connector[1]

DDS20-ASI-M:          ASI Modulator Data Switch

DDS20-ASI-D:          ASI Demodulator Data Switch[1]

DDS20-HSSI:           HSSI Data Switch[1]

DDS20-G.703:          T3, E3, STS-1 Modulator Data Switch[1]

---

[1] Contact Product Support for availability

DDS20-Ethernet:          GigE (10/100/1000) Ethernet Data Switch

## 7.5    Options

Cable Sets:                        DMD2401

                                   DMD15

                                   DMD20/DMD50

ESC Cable Sets

Clock Distribution Modules[1]

Ethernet Module[1]

## 7.6    Power and Environmental

Prime Power:                       100 to 240 VAC, 50 to 60 Hz, 65 Watts

Operating Temperature:             0 to 50°C, 95% Humidity, Non-Condensing

Storage Temperature:               -20 to 70°C, 99% Humidity, Non-Condensing

## 7.7    Physical Characteristics

### Table 7-1. RCS20 M:N Redundant Switch System – Physical Characteristics

| Unit | Chassis Size | Weight |
|---|---|---|
| RCU20 | 19 x 19 x 5.25 inches<br>(48.26 x 48.26 x 13.34 cm) | 16 pounds<br>(7.2 Kg)<br>Fully-Equipped |
| DDS20-UIO | 19 x 5 x 8.75 inches<br>(48.26 x 12.7 x 22.23 cm) | |
| DDS20-DVB/M2P | | 20 pounds<br>(9.1 Kg) |
| DDS Ethernet | 19 x 1.25 x 3.5 inches<br>(48.26 x 3.18 x 8.89 cm) | 1.8 pounds<br>(.82 Kg) |
| IFS20 | 19 x 2 x 5.25 inches<br>(48.26 x 5.08 x 13.34 cm) | 5 pounds<br>(2.3 Kg) |
| IFS20L | 19 x 2 x 5.25 inches<br>(48.26 x 5.08 x 13.34 cm) | 5 pounds<br>(2.3 Kg) |

## 7.8    Complementary Products

DMD2401                            VSAT/SCPC Satellite Modem

DMD15                              Universal IBS/IDR Satellite Modem

DMD20/DMD50                        Universal Satellite Modem

DM240/DM240 XR                     Digital Video Broadcast Modulator

DD240/DD240 XR                     Digital Video Broadcast Demodulator

DD2401                             Satellite Demodulator

# Appendix A.  Remote Operations

## A.1    Host Computer Remote Communications

Control and status messages are conveyed between the RCS20 and the subsidiary modems and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol 'wrapper' for the RM&C data. Complete information on monitor and control software is contained in the following sections.

## A.1.1  Protocol Structure

**WARNINGS**

When new features are added to Radyne equipment, the control parameters are appended to the end of the Non-Volatile Section of the Remote Communications Specification, and status of the features, if any, are added at the end of the Volatile Section. If a remote M & C queries two pieces of Radyne equipment with different revision software, they could respond with two different sized packets. The remote M & C <u>must</u> make use of the non-volatile count value to index to the start of the Volatile Section. If the remote M & C is not aware of the newly added features to the product, it should disregard the parameters at the end of the Non-Volatile Section and index to the start of the Volatile Section.

Before creating any software based on the information contained in this document, contact the Radyne Customer Service Department at (480) 333-4357 to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex 9600-baud multi-drop control buses that conform to EIA Standard RS-485. Each piece of earth station equipment on a control bus has a unique physical address, which is assigned during station setup/configuration or prior to shipment. Valid decimal addresses on one control bus range from 32 through 255, for a total of up to 224 devices per bus. Address 255 of each control bus is usually reserved for the M&C computer.

## A.1.2  Protocol Wrapper

The Radyne COMMSPEC is byte-oriented, with the Least Significant Bit (LSB) issued first. Each data byte is conveyed as mark/space information with one mark comprising the stop data. When the last byte of data is transmitted, a hold comprises one steady mark (the last stop bit). To begin or resume data transfer, a space (00h) substitutes this mark. This handling scheme is controlled by the hardware and is transparent to the user. A pictorial representation of the data and its surrounding overhead may be shown as follows:

| S1 | S2 | $B_0$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_7$ | S1 | S2, etc |
|----|----|----|----|----|----|----|----|----|----|----|----|
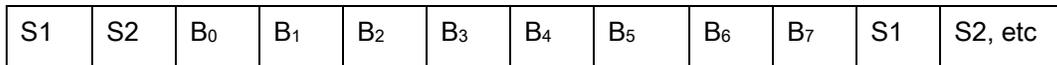
The stop bits, S1 and S2 are each a mark. Data flow remains in a hold mode until S2 is replaced by a space. If S2 is followed by a space, it is considered a start bit for the data byte and not part of the actual data ($B_0$ - $B_7$).

The above byte-oriented protocol is standard for UART based serial communication ports such as Workstation or Personal Computer (PC) COM ports. COM ports should be configured for 8 data bits, no parity, and one stop bit. For example, for 9600-baud operation, COM ports should be configured as **9600, 8, N, 1.**

The COMMSPEC developed for use with the Radyne Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or 'protocol wrapper', that surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case h suffix and binary values have a lower case b suffix. Thus, 22 = 16h = 00010110b. The principal elements of a data frame, in order of occurrence, are summarized as follows:

**<SYNC>** - the message format header character, or ASCII sync character, that defines the beginning of a message. The <SYNC> character value is always 16h, (1 byte).

**<BYTE COUNT>** - the Byte Count is the number of bytes in the <DATA> field, ranging from 0 through TBD, (2 bytes).

**<SOURCE ID>** - the Source Identifier defines the message originator's multi-drop address, (1 byte).

> **IMPORTANT**
>
> All nodes on a given control bus have a unique address that must be defined.

**<DESTINATION ID>** - The Destination Identifier specifies the multi-drop address of the device(s) to which the message is sent, (1 byte).

**<FRAME SEQUENCE NUMBER>** -the FSN is a tag with a value from 0 through 255 that is sent with each message. It assures sequential information framing and correct equipment acknowledgment and data transfers, (1 byte).

**<OPCODE>** - the Operation Code field contains a number that identifies the message type associated with the data that follows it. Equipment under MCS control recognizes these bytes via firmware identification and subsequently steers the DATA accordingly to perform a specific function or series of functions. Acknowledgment and error codes are returned in this field, (2 bytes).

**<...DATA...>** - the Data field contains the binary, bi-directional data bytes associated with the command indicated by the <Opcode> field. The number of bytes in this field is indicated by the <BYTE COUNT> value.

**<CHECKSUM>** - the checksum is the module 256 sum of all preceding message bytes excluding the <SYNC> character, (1 byte). The checksum determines the presence or absence of errors within the message. In a message block with the following parameters, the checksum is computed as shown in Table A-1.

**Table A-1. Checksum Calculation Example**

| BYTE FIELD | DATA CONTENT | RUNNING CHECKSUM |
|---|---|---|
| <BYTE COUNT> (Byte 1) | 00h = 00000000b | 00000000b |
| <BYTE COUNT> (Byte 2) | 02h = 00000010b | 00000010b |
| <SOURCEID> | F0h = 11110000b | 11110010b |
| <DESTINATION ID> | 2Ah = 00101010b | 00011100b |
| <FSN> | 09h = 00001001b | 00100101b |
| <OPCODE> (Byte 1) | 00h = 00000000b | 00100101b |
| <OPCODE> (Byte 2) | 03h = 00000011b | 00101000b |
| <DATA> (Byte 1) | DFh = 11011111b | 00000111b |
| <DATA> (Byte 2) | FEh = 11111110b | 00000101b |

Thus, the checksum is 00000101b; which is 05h or 5 decimal. Alternative methods of calculating the checksum for the same message frame are:

00h + 02h + F0h + 2Ah + 09h + 00 + 03h + DFh + FEh = 305h.

Since the only concern is the modulo 256 (modulo 1 00h) equivalent (values that can be represented by a single 8-bit byte), the checksum is 05h.

For a decimal checksum calculation, the equivalent values for each information field are:

$$0 + 2 + 240 + 42 + 9 + 3 + 223 + 254 = 773;$$

$$773/256 = 3 \text{ with a remainder of } 5.$$

This remainder is the checksum for the frame.

$$5 \text{ (decimal)} = 05h = 0101b = <CHECKSUM>$$

## A.1.3 Frame Description and Bus Handshaking

In a Monitor and Control environment, every message frame on a control bus port executes as a packet in a loop beginning with a wait-for-SYNC-character mode. The remaining message format header information is then loaded, either by the M&C computer or by a subordinate piece of equipment (such as the RCS20) requesting access to the bus. Data is processed in accordance with the OPCODE, and the checksum for the frame is calculated. If the anticipated checksum does not match then a checksum error response is returned to the message frame originator.

The entire message frame is discarded and the wait-for-SYNC mode goes back into effect.

If the OPCODE resides within a command message, it defines the class of action that denotes an instruction, which is specific to the device type, and is a prefix to the DATA field if data is required. If the OPCODE resides within a query message packet, then it defines the query code, and can serve as a prefix to query code DATA.

The Frame Sequence Number (FSN) is included in every message packet, and increments sequentially. When the M&C computer or bus-linked equipment initiates a message, it assigns the FSN as a tag for error control and handshaking. A different FSN is produced for each new message from the FSN originator to a specific device on the control bus. If a command packet is sent and not received at its intended destination, then an appropriate response message is not received by the packet originator. The original command packet is then re-transmitted with the same FSN. If the repeated message is received correctly at this point, it is considered a new message and is executed and acknowledged as such.

If the command packet is received at its intended destination but the response message (acknowledgment) is lost, then the message originator (usually the M&C computer) re-transmits the original command packet with the same FSN. The destination device detects the same FSN and recognizes that the message is a duplicate, so the associated commands within the packet are not executed a second time. However, the response packet is again sent back to the source, as an acknowledgment in order to preclude undesired multiple executions of the same command.

To reiterate, valid equipment responses to a message require the FSN tag in the command packet; this serves as part of the handshake/acknowledge routine. If a valid response message is absent, then the command is re-transmitted with the same FSN. For a repeat of the same command involving iterative processes, the FSN is incremented after each message packet. When the FSN value reaches 255, it

overflows and begins again at zero. The FSN tag is a powerful tool that assures sequential information framing, and is especially useful where commands require more than one message packet. The full handshake/acknowledgment involves a reversal of source and destination ID codes in the next message frame, followed by a response code in the <OPCODE> field of the message packet from the equipment under control.

If a command packet is sent and not received at its intended destination, a timeout condition can occur because the packet originator does not receive a response message. On receiving devices slaved to an M&C computer, the timeout delay parameters may be programmed into the equipment in accordance with site requirements by Radyne Corp. prior to shipment, or altered by qualified personnel. The FSN handshake routines must account for timeout delays and be able to introduce them as well.

## A.1.4  Global Response Operational Codes

In acknowledgment (response) packets, the operational code <OPCODE> field of the message packet is set to 0 by the receiving devices when the message intended for the device is evaluated as valid. The device that receives the valid message then exchanges the <SOURCE ID> with the <DESTINATION ID>, sets the <OPCODE> to zero in order to indicate that a good message was received, and returns the packet to the originator. This "GOOD MESSAGE" Opcode is one of nine global responses. Global response Opcodes are common responses issued to the M&C computer or to another device that can originate from and are interpreted by all Radyne equipment in the same manner. These are summarized as follows (all Opcode values are expressed in decimal form) in Table A-2:

### Table A-2. Response OPCODES

| Response OPCODE Description | OPCODE |
|---|---|
| Good Message | 000d = 0000h |
| Bad Parameter | 255d = 00FFh |
| Bad Opcode | 254d = 00FEh |
| Bad Checksum | 253d = 00FDh |
| Command Not Allowed in LOCAL Mode | 252d = 00FCh |
| Command Not Allowed in AUTO Mode | 251d = 00FBh |
| Bad Destination | 250d = 00FAh |
| Unable to Process Command | 249d = 00F9h |
| Packet Too Long | 248d = 00F8h |
| Incomplete Parameter | 247d = 00F7h |

Table A-3 summarizes the response error codes tht are specific to the RCS20:

**Table A-3. RCS20 Response Error Codes**

| RCS20 RESPONSE ERROR CODES | OPCODE | DESCRIPTION |
|---|---|---|
| SPARM_DATACOUNT_ERROR | 0201 | Invalid number of data bytes |
| SPARM_CHANNELNUM_ERROR | 0202 | Invalid number of M for N channels |
| SPARM_CHANNELBYTES_ERROR | 0203 | Invalid number of bytes per channel |
| SPARM_MODBACKUPDELAY_ERROR | 020A | Invalid modulator backup delay |
| SPARM_DEMODBACKUPDELAY_ERROR | 020B | Invalid demodulator backup delay |
| SPARM_BACKUPMODE_ERROR | 020C | Backup channel 1 |
| SPARM_CHAN0CONFIG_ERROR | 0213 | Channel 0 Hardware Configuration |
| SPARM_BACKUPCHANNEL_ERROR | 0214 | Backup Channel |
| SPARM_MODEMNUMBER_ERROR | 0217 | Invalid prime to backup |
| SPARM_NOMODEMINSLOT_ERROR | 0218 | Prime is not present |
| SPARM_BACKUP_NOT_PRESENT_ERROR | 02B3 | Backup is not present |
| SPARM_BACKUP_IN_AUTO_MODE_ERROR | 02B5 | Backup is in automatic mode |
| SPARM_MODEM9_IN_TRAFFIC_MODE_ERROR | 02B6 | Modem is in traffic mode |
| SPARM_MOD_AUTOBACKEDUP_ERROR | 02BC | Modulator is already auto backed up |
| SPARM_DEMOD_AUTOBACKEDUP_ERROR | 02BD | Demodulator is already auto backed up |
| SPARM_PRIME_IN_SERVICE_MODE_ERROR | 02BE | Prime is in service mode |
| SPARM_BACKUP_IN_SERVICE_MODE_ERROR | 02BF | Backup is in service mode |
| SPARM_PRIME_BACKEDUP_TRAFFIC_ERROR | 02C1 | Prime backed up |
| SPARM_PRIME_HS_TRAFFIC_ERROR | 02C2 | Is in Hot Standby |
| SPARM_MODEM9_IN_BACKUP_MODE_ERROR | 02C3 | Modem is in backup mode |
| SPARM_NOBACKUPASSIGNED_ERROR | 02C5 | No backups assigned for this mod |
| SPARM_MODEMNOTLEARNED_ERROR | 02C6 | Modem is not learned |
| SPARM_COPYDESTINATION_ERROR | 02CB | Invalid copy destination |

## A.1.5 Collision Avoidance

When properly implemented, the physical and logical devices and ID addressing scheme of the COMMSPEC normally precludes message packet contention on the control bus. The importance of designating unique IDs for each device during station configuration cannot be overemphasized. One

pitfall, which is often overlooked, concerns multi-drop override IDs. All too often, multiple devices of the same type are assigned in a direct-linked ("single-thread") configuration accessible to the M&C computer directly. For example, if two DMD15 Modems with different addresses (DESTINATION IDs) are linked to the same control bus at the same hierarchical level, both will attempt to respond to the M&C computer when the computer generates a multi-drop override ID of 22. If their actual setup parameters, status, or internal timing differs, they will both attempt to respond to the override simultaneously with different information or asynchronously in their respective message packets and response packets, causing a collision on the serial control bus.

To preclude control bus data contention, different IDs must always be assigned to the equipment. If two or more devices are configured for direct-linked operation, then the M&C computer and all other devices configured in the same manner must be programmed to inhibit broadcast of the corresponding multi-drop override ID.

The multi-drop override ID is always accepted by devices of the same type on a common control bus, independent of the actual DESTINATION ID. These override IDs with the exception of "BROADCAST" are responded to by all directly-linked devices of the same type causing contention on the bus. The "BROADCAST" ID, on the other hand, is accepted by all equipment, but none of them returns a response packet to the remote M&C.

The following multi-drop override IDs are device-type specific, with the exception of "BROADCAST". These are summarized in Table A-4 below with ID values expressed in decimal notation:

### Table A-4. Broadcast IDs

| DIRECTLY-ADDRESSED EQUIPMENT | MULTI-DROP OVERRIDE ID |
|---|---|
| Broadcast (all directly-linked devices) | 00 |
| DMD-3000/4000, 4500 or 5000 Mod Section, DMD15 | 01 |
| DMD-3000/4000, 4500 or 5000 Demod Section, DMD15 | 02 |
| RCU-340 1:1 Switch | 03 |
| RCS-780 1:N Switch | 04 |
| RMUX-340 Cross-Connect Multiplexer | 05 |
| CDS-780 Clock Distribution System | 06 |
| SOM-340 Second Order Multiplexer | 07 |
| DMD-4500/5000 Modulator Section | 08 |
| DMD-4500/5000 Demodulator Section | 09 |
| RCU-5000 M:N Switch | 10 |
| DMD15 Modulator | 20 |

| DIRECTLY-ADDRESSED EQUIPMENT | MULTI-DROP OVERRIDE ID |
|---|---|
| DMD15 Demodulator | 21 |
| DMD15 Modem | 22 |
| DVB3000/DVB3030/DM45 Video Modulator | 23 |
| RCS20 M: N Switch | 24 |
| RCS10 M: N Switch | 25 |
| RCS11 1:1 Switch | 26 |
| DMD2401/VHS-101/VME2401 Modem | 27 |
| Reserved for future equipment types | 28-31 |

**IMPORTANT**

Multi-drop override IDs 01 or 02 can be used interchangeably to broadcast a message to a DMD-3000/4000 Modem, DMD-4500/5000, or a DMD20 Modem. Comtech EF Data recommends that the multi-drop override IDs be issued only during system configuration as a bus test tool by experienced programmers, and that they not be included in run-time software. It is also advantageous to consider the use of multiple bus systems where warranted by a moderate to large equipment complement. Therefore, if an RCS20 switch is queried for its equipment type identifier, it will return a "24."

## A.1.6  Software Compatibility

The COMMSPEC, operating in conjunction within the RLLP shell, provides for full forward and backward software compatibility independent of the software version in use. New features are appended to the end of the DATA field without OPCODE changes. Older software simply discards the data as extraneous information without functional impairment for backward compatibility.

If new device-resident or M&C software receives a message related to an old software version, new information and processes are not damaged or affected by the omission of data.

The implementation of forward and backward software compatibility often, but not always, requires the addition of new Opcodes. Each new function requires a new Opcode assignment if forward and backward compatibility cannot be attained by other means.

When Radyne equipment is queried for bulk information (Query Mod, Query Demod, etc.) it responds by sending back two blocks of data; a non-volatile section (parameters that can be modified by the user) and a volatile section (status information). It also returns a count value that indicates how large the Non-

Volatile Section is. This count is used by M&C developers to index into the start of the volatile section use this count.

When new features are added to Radyne equipment, the control parameters are appended to the end of the non-volatile section, and status of the features, if any, are added at the end of the volatile section. If a remote M&C queries two pieces of Radyne equipment with different revision software, they may respond with two different sized packets. The remote M&C MUST make use of the non-volatile count value to index to the start of the volatile section. If the remote M&C is not aware of the newly added features to the Radyne product, it should disregard the parameters at the end of the non-volatile section and index to the start of the volatile section.

If packets are handled in this fashion, there will also be backward-compatibility between Radyne equipment and M&C systems. Remote M&C systems need not be modified every time a feature is added unless the user needs access to that feature.

## A.1.7 Flow Control and Task Processing

The original packet sender (the M&C computer) relies on accurate timeout information with regard to each piece of equipment under its control. This provides for efficient bus communication without unnecessary handshake overhead timing. One critical value is designated the Inter-Frame Space (FS). The Inter-Frame Space provides a period of time in which the packet receiver and medium (control bus and M&C computer interface) fully recover from the packet transmission/reception process and the receiver is ready to accept a new message. The programmed value of the Inter-Frame Space should be greater than the sum of the "turnaround time" and the round-trip (sender/receiver/bus) propagation time, including handshake overhead. The term "turnaround time" refers to the amount of time required for a receiver to be re-enabled and ready to receive a packet after having just received a packet. In flow control programming, the Inter-Frame Space may be determined empirically in accord with the system configuration, or calculated based on established maximum equipment task processing times.

Each piece of supported equipment on the control bus executes a Radyne Link Level Task (RLLT) in accordance with its internal hardware and fixed program structure. In a flow control example, the RLLT issues an internal "message in" system call to invoke an I/0 wait condition that persists until the task receives a command from the M & C computer. The RLLT has the option of setting a timeout on the incoming message. Thus, if the equipment does not receive an information/command packet within a given time period, the associated RLLT exits the I/0 wait state and takes appropriate action.

Radyne equipment is logically linked to the control bus via an Internal I/O Processing Task (IOPT) to handle frame sequencing, error checking, and handshaking. The IOPT is essentially a link between the equipment RLLT and the control bus. Each time the M&C computer sends a message packet, the IOPT receives the message and performs error checking. If errors are absent, the IOPT passes the message to the equipment's RLLT. If the IOPT detects errors, it appends error messages to the packet. Whenever an error occurs, the IOPT notes it and discards the message; but it keeps track of the incoming packet. Once

the packet is complete, the IOPT conveys the appropriate message to the RLLT and invokes an I/0 wait state (wait for next <SYNC> character).

If the RLLT receives the packetized message from the sender before it times out, it checks for any error messages appended by the IOPT. In the absence of errors, the RLLT processes the received command sent via the transmitted packet and issues a "message out" system call to ultimately acknowledge the received packet. This call generates the response packet conveyed to the sender. If the IOPT sensed errors in the received packet and an RLLT timeout has not occurred, the RLLT causes the equipment to issue the appropriate error message(s) in the pending equipment response frame.

To maintain frame synchronization, the IOPT keeps track of error-laden packets and packets intended for other equipment for the duration of each received packet. Once the packet is complete, the IOPT invokes an I/0 wait state and searches for the next <SYNC> character.

When transmitting a packet, the Remote M&C should ensure that the timeout value between characters does not exceed the time it takes to transmit 200 characters ($\approx$ 200 msec). If this timeout value is exceeded, the equipment will timeout.

## A.1.8 RLLP Summary

The RLLP is a simple send-and-wait protocol that automatically re-transmits a packet whenever an error is detected, or when an acknowledgment (response) packet is absent.

During transmission, the protocol wrapper surrounds the actual data to form information packets. Each transmitted packet is subject to timeout and frame sequence control parameters, after which the packet sender waits for the receiver to convey its response. Once a receiver verifies that a packet sent to it is in the correct sequence relative to the previously received packet, it computes a local checksum on all information within the packet excluding the <SYNC> character and the <CHECKSUM> fields. If this checksum matches the packet <CHECKSUM>, the receiver processes the packet and responds to the packet sender with a valid response (acknowledgment) packet. If the checksum values do not match, the receiver replies with a negative acknowledgment (NAK) in its response frame.

The response packet is therefore either an acknowledgment that the message was received correctly, or some form of a packetized NAK frame. If the sender receives a valid acknowledgment (response) packet from the receiver, the <FSN> increments and the next packet is transmitted as required by the sender. However, if a NAK response packet is returned the sender re-transmits the original information packet with the same embedded <FSN>.

If an acknowledgment (response) packet or a NAK packet is lost, corrupted, or not issued due to an error and is thereby not returned to the sender, the sender re-transmits the original information packet; but with

the same <FSN>. When the intended receiver detects a duplicate packet, the packet is acknowledged with a response packet and internally discarded to preclude undesired repetitive executions. If the M&C computer sends a command packet and the

corresponding response packet is lost due to a system or internal error, the computer times out and re-transmits the same command packet with the same <FSN> to the same receiver and waits once again for an acknowledgment or a NAK packet.

To reiterate, the format of the message block is shown in Table A-5, Link Level Protocol Message Block.

### Table A-5. Link Level Protocol Message Block

| SYNC | COUNT | SOURCE ADDRESS | DESTINATION ADDRESS | FSN | OPCODE | DATA BYTES | CHECKSUM |
|---|---|---|---|---|---|---|---|
| 1 byte | 2 bytes | 1 byte | 1 byte | 1 byte | 2 bytes | (count) bytes | 1 byte |

## A.2    Remote Port Packet Structure:

The RLLP Remote Port Packet structure is as follows:

<SYNC> = Message format header character that defines the beginning of a message. The <SYNC> character value is always 0x16, (1 byte).

<BYTE COUNT> = Number of bytes in the <DATA> field, (2 bytes).

<SOURCE ID> = Identifies the address of the equipment from where the message originated, (1 byte).

<DEST ID> = Identifies the address of the equipment where the message is to be sent, (1 byte).

<FSN> = Frame sequence number ensures correct packet acknowledgment and data transfers, (1 byte).

<OPCODE> = This byte identifies the message type associated with the information data. The equipment processes the data according to the value in this field. Return error codes and acknowledgment are also included in this field, (2 bytes).

<...DATA...> = Information data. The number of data bytes in this field is indicated by the <BYTE COUNT> value.

<CHECKSUM> = The modulo 256 sum of all preceding message bytes excluding the <SYNC> character, (1 byte).

## A.2.1 RCS20 Channel Definitions

The RCS20 organized the modems connected to the switch according to satellite communications channels. These channels are labeled on the DDS20 and IFS20 panels, and are defined as follows:

- Channel 0 - Backup 1

- Channel 1 - Modem 1

- Channel 2 - Modem 2

- Channel 3 - Modem 3

- Channel 4 - Modem 4

- Channel 5 - Modem 5

- Channel 6 - Modem 6

- Channel 7 - Modem 7

- Channel 8 - Modem 8

- Channel 9 - Modem 9/Backup 2

## A.2.2 RCS20 Switch Command Set



CAUTION

When new features are added to Radyne equipment, the control parameters are appended to the end of the Non-Volatile Section of the Remote Communications Specification, and status of the features, if any, are added at the end of the Volatile Section. If a remote M & C queries two pieces of Radyne equipment with different revision software, they could respond with two different sized packets. The remote M & C MUST make use of the non-volatile count value to index to the start of the Volatile Section. If the remote M & C is not aware of the newly added features to the product, it should disregard the parameters at the end of the Non-Volatile Section and index to the start of the Volatile Section.

Before creating any software based on the information contained in this document, contact the Product Suport to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

## A.2.3 RCS20 Opcode Command Set

| Command | Opcode |
|---|---|
| Query Switch Status | 2001h |
| Query Switch Configuration | 2002h |
| Query Switch Modem Remote Addresses | 2003h |
| Query Switch Backup Mode | 2004h |
| Query Switch Expansion Module Config | 2005h |
| Query Reference Distribution Configuration | 2010h |
| Command Switch Relay Modem Packet | 2200h |
| Command Switch Configuration | 2202h |
| Command Switch Backup Mode | 2204h |
| Command Switch Clear Alarms | 2205h |
| Command Switch Force Manual Backup | 2206h |
| Command Reference Distribution Configuration | 2210h |
| Command Switch Learn Modem Configuration | 2216h |
| Command Switch Learn All Modem Configuration | 2217h |
| Command Switch Copy Modem Configuration | 2218h |
| Command Switch Backup Test Modem Configuration | 2219h |
| Command Switch Backup Test All Modem's Configuration | 221Ah |
| Query Identification | 2403h |
| Query Control Mode | 2404h |
| Query Switch Time | 240Eh |
| Query Switch Date | 240Fh |
| Query Switch Time and Date | 2410h |
| Command Control Mode | 2600h |
| Command Switch Set Time | 2C04h |
| Command Switch Set Date | 2C05h |
| Command Switch Set Time and Date | 2C06h |

## A.3    DETAILED OPCODE DESCRIPTIONS

## A.3.1  Opcode <2001h>  Query RCS20 Switch Status

### Query Response Data Field (44 bytes) (64 bytes release 4.0)

<1>      Control Mode            0 = Front Panel, 1 = Terminal Mode, 2 = Remote Port (Computer RLLP)

<1>      Software Revision       Binary number, decimal point implied

<1>      Number of Channels      10 decimal for RCS20

<1>      Number of Status        3 as of release 1.0, 5 as of release 4.
         Bytes Per Channel

> *This number of bytes per channel might change with newer release numbers. It is set to 3 up to release 3.9, and 5 bytes as of release 4.0.
>
> **Remote M&C developers must make use of this value to find out how many bytes per channel are being transmitted.

<1>      *Channel 0 Status       Bit 0 = modulator failure flag (0 = no failure, 1 = failure)

                                 Bit 1 = demodulator failure flag (0 = no failure, 1 = failure)

                                 Bit 2 = switch communication in process (0 = no communication in process, 1 = communication in process)

                                 Bit 3 = modem communication fault (0 = no failure, 1 = failure)

                                 Bit 4 = modulator present (0= not present, 1= present)

                                 Bit 5 = demodulator present (0= not present, 1= present)

<1>      *Backed up Modulator    0 = This channel not a backup channel, or this channel is a backup channel but currently not backing up a mod, 1-9 = This channel currently backing up a mod, channel number as indicated.

<1>      *Backed up              0 = This channel not a backup channel, or this channel is a backup
         Demodulator             channel but currently not backing up a demod, 1-9 = This channel currently backing up a demod, channel number as indicated.

<1>      *Module 0 Alarms 2      Bit 0 = Mod learned (0 = Mod is not learned, 1 = Mod is learned)
         Status
                                 Bit 1 = Demod learned (0 = Demod is not learned, 1 =   Demod is learned)

                                 Bit 2 = Mod configuration changed (0 = Mod configuration has not changed, 1 = Mod configuration is changed)

                                 Bit 3 = Demod configuration changed (0 = Demod configuration has not changed, 1 = Demod configuration is changed)

                                 Bits 4 through 7 = Spares

| <1> | *Module 0 Alarms 3 Status | Bits 0 and 1 = Mod backup 1 test status (0 = No Mod backup 1 test performed, 1 = Mod backup 1 test pass, 2 = Mod backup 1 test fail) |
|---|---|---|
| | | Bits 2 and 3 = Demod backup 1 test status (0 = No Demod backup 1 test performed, 1 = Demod backup 1 test pass, 2 = Demod backup 1 test fail) |
| | | Bits 4 and 5 = Mod backup 2 test status (0 = No Mod backup 2 test performed, 1 = Mod backup 2 test pass, 2 = Mod backup 2 test fail) |
| | | Bits 6 and 7 = Demod backup 2 test status (0 = No Demod backup 2 test performed, 1 = Demod backup 2 test pass, 2 = Demod backup 2 test fail) |

These 3 bytes repeat for channels 1 - 9 (5 bytes as of release 4.0) 27 additional bytes (45 additional bytes as of release 4.0)

| <1> | Switch Major Alarms | Bit 0 = RAM/ROM fault |
|---|---|---|
| | | Bit 1 = No Backup for Faulted Prime |
| | | Bit 2 = Error During Backup |
| | | Bit 3 = Backup 1 Mod Error |
| | | Bit 4 = Backup 1 Demod Error |
| | | Bit 5 = Backup 2 Mod Error |
| | | Bit 6 = Backup 2 Demod Error |
| | | Bit 7 = Spare |
| | | (0 = no alarm, 1 = alarm) |
| <1> | Switch Minor Alarms 1 | Bit 0 = Power Supply #1 Present |
| | | Bit 1 = Power Supply #1 Voltage |
| | | Bit 2 = Power Supply #2 Present |
| | | Bit 3 = Power Supply #2 Voltage |
| | | Bit 4 = Communications Error |
| | | Bit 5 = Faulted Prime Modem |
| | | Bit 6 = Faulted Backup Modem |
| | | Bit 7 = Modem Configuration Change |
| | | (0 = no alarm, 1 = alarm) |

| <1> | Switch Minor Alarms 2 | Bit 0 = CDM Error |
|-----|------------------------|-------------------|
|     |                        | Bit 1 = Reserved (RCS10 only) |
|     |                        | Bit 2 = Reserved (RCS10 only) |
|     |                        | Bit 3 = Reserved (RCS10 only) |
|     |                        | Bit 4 = Backup 1 Test Fault |
|     |                        | Bit 5 = Backup 2 Test Fault |
|     |                        | Bit 6 = Reserved (RCS10 only) |
|     |                        | Bit 7 = Spare |
|     |                        | (0 = no alarm, 1 = alarm) |
| <1> | Latched Switch Major Alarms | Bit 0 = RAM/ROM fault |
|     |                        | Bit 1 = No Backup for Faulted Prime |
|     |                        | Bit 2 = Error During Backup |
|     |                        | Bit 3 = Backup 1 Mod Error |
|     |                        | Bit 4 = Backup 1 Demod Error |
|     |                        | Bit 5 = Backup 2 Mod Error |
|     |                        | Bit 6 = Backup 2 Demod Error |
|     |                        | Bit 7 = Spare |
|     |                        | 0 = no alarm, 1 = alarm |
| <1> | Latched Switch Minor Alarms 1 | Bit 0 = Power Supply #1 Present |
|     |                        | Bit 1 = Power Supply #1 Voltage |
|     |                        | Bit 2 = Power Supply #2 Present |
|     |                        | Bit 3 = Power Supply #2 Voltage |
|     |                        | Bit 4 = Communications Error |
|     |                        | Bit 5 = Faulted Prime Modem |
|     |                        | Bit 6 = Faulted Backup Modem |
|     |                        | Bit 7 = Modem Configuration Change |
|     |                        | (0 = no alarm, 1 = alarm) |

| <1> | Latched Switch Minor Alarms 2 | Bit 0 = CDM Error |
| | | Bit 1 = Reserved (RCS10 only) |
| | | Bit 2 = Reserved (RCS10 only) |
| | | Bit 3 = Reserved (RCS10 only) |
| | | Bit 4 = Backup 1 Test Fault |
| | | Bit 5 = Backup 2 Test Fault |
| | | Bit 6 = Reserved (RCS10 only) |
| | | Bit 7 = Spare |
| | | (0 = no alarm, 1 = alarm) |
| <1> | Backup 1 Mod Hot Standby Channel | Channel number (1 to 9) (0 = No hot standby for backup 1 mod) |
| <1> | Backup 1 Demod Hot Standby Channel | Channel number (1 to 9) (0 = No hot standby for backup 1 Demod) |
| <1> | Backup 2 Mod Hot Standby Channel | Channel number (1 to 8) (0 = No hot standby for backup 2 mod, or channel 9 not configured as backup) |
| <1> | Backup 2 Demod Hot Standby Channel | Channel number (1 to 8) (0 = No hot standby for backup 2 Demod, or Channel 9 not configured as backup |

## A.3.2  Opcode <2002h>  Query RCS20 Switch Configuration

**Query Response Data Field (285 bytes)**

**Configuration Bytes**

| <2> | Nonvolatile Bytes | Number of nonvolatile RCS20 configuration memory bytes, including these 2 bytes (221 decimal for RCS20) |
| <1> | Number of Channels | Maximum number of prime and backup channels available to the RCS20 switch. (10 decimal for RCS20 as of Release 1.0) |
| <1> | Nonvolatile Bytes per Channel | Number of nonvolatile memory bytes per channel. This number may vary with the release number. (10 bytes for RCS20 as of release 1.0 and 13 bytes as of release 4.0) |

**\*\*Remote M&C developers must make use of this value to find out how many bytes per channel are being transmitted.**

| <1> | *Channel 0 Configuration | Bit 0 = Modulator present |
| | | Bit 1 = Demodulator present |
| | | (0 = not present, 1 = present) |

| <2> | *Channel 0 Mod Backup Delay | 0h - BB7h in tenths of a second; decimal point implied |
|---|---|---|
| <2> | *Channel 0 Demod Backup Delay | 0h - BB7h in tenths of a second; decimal point implied |
| <1> | *Channel 0 Mod Backup Configuration | Bit 0 = Backup 1 assigned to this modulator<br>Bit 1 = Backup 2 assigned to this modulator<br>(0 = not assigned, 1 = assigned) |
| <1> | *Channel 0 Demod Backup Configuration | Bit 0 = Backup 1 assigned to this demodulator<br>Bit 1 = Backup 2 assigned to this demodulator<br>(0 = not assigned, 1 = assigned) |
| <1> | *Channel 0 Mod Priority | Channel 0 Modulator backup priority (0-9) |
| <1> | *Channel 0 Demod Priority | Channel 0 Demodulator backup priority (0-9) |
| <1> | *Channel 0 Switch Style | 0 = Switch Mod and Demod separately, 1 = Switch Mod and Demod together |
| <2> | *Channel 0 Demod Acquisition Delay | 0h-BB7h in tenths of a second; decimal point implied. For example, a value of 100 means 10.0 sec. |
| <1> | *Channel 0 Service Mode | 0 = Normal, 1 = Service |

These 10 bytes (13 bytes as of release 4.0) repeat for channels 1 – 9 (uses 90 additional bytes) (uses 117 additional bytes as of release 4.0).

The Backup Delays and Demod Acquisition Delay applies only to channels 1 - 9 (the four channel 0 bytes are ignored). If channel 9 is configured as backup 2, then the four channel 0 Backup Delay bytes and the two Demod Acquisition Delay bytes are ignored.

| <1> | Switch Major Alarm Mask | Bit 0 = RAM/ROM fault |
|---|---|---|
| | | Bit 1 = No Backup for Faulted Prime |
| | | Bit 2 = Error During Backup |
| | | Bit 3 = Backup 1 Mod Error |
| | | Bit 4 = Backup 1 Demod Error |
| | | Bit 5 = Backup 2 Mod Error |
| | | Bit 6 = Backup 2 Demod Error |
| | | Bit 7 = Spare |
| | | (0 = mask, 1 = allow) |
| <1> | Switch Minor Alarm 1 Mask | Bit 0 = Power Supply #1 Present |
| | | Bit 1 = Power Supply #1 Voltage |
| | | Bit 2 = Power Supply #2 Present |
| | | Bit 3 = Power Supply #2 Voltage |
| | | Bit 4 = Communications Error |
| | | Bit 5 = Faulted Prime Modem |
| | | Bit 6 = Faulted Backup Modem |
| | | Bit 7 = Modem Configuration Change |
| | | (0 = mask, 1 = allow) |
| <1> | Switch Minor Alarm 2 Mask | Bit 0 = CDM Error |
| | | Bit 1 = Reserved (RCS10 only) |
| | | Bit 2 = Reserved (RCS10 only) |
| | | Bit 3 = Reserved (RCS10 only) |
| | | Bit 4 = Backup 1 Test Fault |
| | | Bit 5 = Backup 2 Test Fault |
| | | Bit 6 = Reserved (RCS10 only) |
| | | Bit 7 = Spare |
| | | (0 = Mask, 1 = Allow) |
| <1> | Maximum Number of Backup Channels | 2 for RCS20 |
| <1> | Nonvolatile bytes per Backup Channel | 4 for RCS20 |
| <1> | Backup 1 (Channel 0) Configuration | 0 = Backup modem |

| <1> | Backup 1 (Channel 0) Backup Mode | 0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive |
|---|---|---|
| <1> | Backup 1 (Channel 0) Force Manual Modulator Backup | Channel number for manual backup (1 to 9) (ignored if in automatic mode) |
| <1> | Backup 1 (Channel 0) Force Manual Demodulator Backup | Channel number for manual backup (1 to 9) (ignored if in automatic mode) |
| <1> | Backup 2 (Channel 9) Configuration | 0 = Backup modem, 1 = Preempt able prime modem, 2 = Prime Modem |
| <1> | Backup 2 (Channel 9) Backup Mode | 0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive |
| <1> | Backup 2 (Channel 9) Force Manual Modulator Backup | Channel number for manual backup (1 to 8) (ignored if in automatic mode or if channel 9 is configured as prime) |
| <1> | Backup 2 (Channel 9) Force Manual Demodulator Backup | Channel number for manual backup (1 to 8) (ignored if in automatic mode or if channel 9 is configured as prime) |
| <4> | Reserved | (Reserved for RCS10, set to zero) |
| <4> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Learn Modem | 0 = Modem 0, 1 = Modem 1, 2 = Modem 2, 3 = Modem 3, 4 = Modem 4, 5 = Modem 5, 6 = Modem 6, 7 = Modem 7, 8 = Modem 8, 9 = Modem 9, 10 = All Modems |
| <1> | Test Modem | 0 = Modem 1, 1 = Modem 2, 2 = Modem 3, 3 = Modem 4, 4 = Modem 5, 5 = Modem 6, 6 = Modem 7, 7 = Modem 8, 8 = Modem 9, 9 = All Modems, , 10 = None |

This byte should be forced to 10 if no tests are desired, failure to do so may result in momentary loss of link on selected modem(s).

| <1> | Additional Bytes per Channel | 6 bytes as of release 4.0 |
|---|---|---|

<1>    \*Channel 0 Alarm 2    Bit 0 = Mod learned

        Mask                 Bit 1 = Demod learned

                                 Bit 2 = Mod configuration changed

                                 Bit 3 = Demod configuration changed

                                 Bits 4 through 7 = Spares

                                 (0 =Mask, 1 = Allow)

<1>    \*Channel 0 Alarm 3    Bits 0 and 1 = Mod Backup 1 Test Status Mask

        Mask                 Bits 2 and 3 = Demod Backup 1 Test Status Mask

                                 Bits 4 and 5 = Mod Backup 2 Test Status Mask

                                 Bits 6 and 7 = Demod Backup 2 Test Status Mask

                                 (0 = Mask, 1 = Allow)

<1>    \*Channel 0 Backup1    0 = A, 1 = B, 2 = C, 3 = D

        IFS20L Demod Port

        Assignment

<1>    \*Channel 0 Backup2    0 = E, 1 = F, 2 = G, 3 = H

        IFS20L Demod Port

        Assignment

<2>    \*Spares for Channel 0    Spare Bytes

These 6 bytes will repeat for channels 1 through 9 (54 additional bytes used).

### Status Bytes

<1>    Control Mode          0 = Front Panel, 1 = Terminal Mode, 2 = Remote Port (Computer RLLP)

<1>    Software Revision      Binary number, decimal point implied

<1>    Number of Channels    10 decimal for RCS20

<1>    Number of Status       3 as of release 1.0, 5 as of release 4.0

        Bytes Per Channel

\*This number of bytes per channel might change with newer release numbers. It is set to 3 up to release 3.9, and 5 bytes as of release 4.0.

\*\*Remote M&C developers must make use of this value to find out how many bytes per channel are being transmitted.

| <1> | *Channel 0 Status | Bit 0 = modulator failure flag (0 = no failure, 1 = failure) |
|---|---|---|
| | | Bit 1 = demodulator failure flag (0 = no failure, 1 = failure) |
| | | Bit 2 = switch communication in process (0 = no communication in process, 1 = communication in process) |
| | | Bit 3 = modem communication fault (0 = no failure, 1 = failure) |
| | | Bit 4 = modulator present (0= not present, 1= present) |
| | | Bit 5 = demodulator present (0= not present, 1= present) |
| <1> | *Backed up Modulator | 0 = This channel not a backup channel, or this channel is a backup channel but currently not backing up a mod, 1-9 = This channel currently backing up a mod, channel number as indicated. |
| <1> | *Backed up Demodulator | 0 = This channel not a backup channel, or this channel is a backup channel but currently not backing up a demod, 1-9 = This channel currently backing up a demod, channel number as indicated.) |
| <1> | *Module 0 Alarms 2 Status | Bit 0 = Mod learned (0 = Mod is not learned, 1 = Mod is learned) |
| | | Bit 1 = Demod learned (0 = Demod is not learned, 1 = Demod is learned) |
| | | Bit 2 = Mod configuration changed (0 = Mod configuration has not changed, 1 = Mod configuration is changed) |
| | | Bit 3 = Demod configuration changed (0 = Demod configuration has not changed, 1 = Demod configuration is changed) |
| | | Bits 4 through 7 = Spares |
| <1> | *Module 0 Alarms 3 Status | Bits 0 and 1 = Mod backup 1 test status (0 = No Mod backup 1 test performed, 1 = Mod backup 1 test pass, 2 = Mod backup 1 test fail) |
| | | Bits 2 and 3 = Demod backup 1 test status (0 = No Demod backup 1 test performed, 1 = Demod backup 1 test pass, 2 = Demod backup 1 test fail) |
| | | Bits 4 and 5 = Mod backup 2 test status (0 = No Mod backup 2 test performed, 1 = Mod backup 2 test pass, 2 = Mod backup 2 test fail) |
| | | Bits 6 and 7 = Demod backup 2 test status (0 = No Demod backup 2 test performed, 1 = Demod backup 2 test pass, 2 = Demod backup 2 test fail) |

These 3 bytes repeat for channels 1 - 9 (5 bytes as of release 4.0) 27 additional bytes (45 additional bytes as of release 4.0)

| <1> | Switch Major Alarms | Bit 0 = RAM/ROM fault |
|---|---|---|
| | | Bit 1 = No Backup for Faulted Prime |
| | | Bit 2 = Error During Backup |
| | | Bit 3 = Backup 1 Mod Error |
| | | Bit 4 = Backup 1 Demod Error |
| | | Bit 5 = Backup 2 Mod Error |
| | | Bit 6 = Backup 2 Demod Error |
| | | Bit 7 = Spare |
| | | (0 = no alarm, 1 = alarm) |
| <1> | Switch Minor Alarms 1 | Bit 0 = Power Supply #1 Present |
| | | Bit 1 = Power Supply #1 Voltage |
| | | Bit 2 = Power Supply #2 Present |
| | | Bit 3 = Power Supply #2 Voltage |
| | | Bit 4 = Communications Error |
| | | Bit 5 = Faulted Prime Modem |
| | | Bit 6 = Faulted Backup Modem |
| | | Bit 7 = Modem Configuration Change |
| | | (0 = no alarm, 1 = alarm) |
| <1> | Switch Minor Alarms 2 | Bit 0 = CDM Error |
| | | Bit 1 = Reserved (RCS10 only) |
| | | Bit 2 = Reserved (RCS10 only) |
| | | Bit 3 = Reserved (RCS10 only) |
| | | Bit 4 = Backup 1 Test Fault |
| | | Bit 5 = Backup 2 Test Fault |
| | | Bit 6 = Reserved (RCS10 only) |
| | | Bit 7 = Spare |
| | | (0 = no alarm, 1 = alarm) |

| <1> | Latched Switch Major Alarms | Bit 0 = RAM/ROM fault |
|---|---|---|
| | | Bit 1 = No Backup for Faulted Prime |
| | | Bit 2 = Error During Backup |
| | | Bit 3 = Backup 1 Mod Error |
| | | Bit 4 = Backup 1 Demod Error |
| | | Bit 5 = Backup 2 Mod Error |
| | | Bit 6 = Backup 2 Demod Error |
| | | Bit 7 = Spare |
| | | 0 = no alarm, 1 = alarm |
| <1> | Latched Switch Minor Alarms 1 | Bit 0 = Power Supply #1 Present |
| | | Bit 1 = Power Supply #1 Voltage |
| | | Bit 2 = Power Supply #2 Present |
| | | Bit 3 = Power Supply #2 Voltage |
| | | Bit 4 = Communications Error |
| | | Bit 5 = Faulted Prime Modem |
| | | Bit 6 = Faulted Backup Modem |
| | | Bit 7 = Modem Configuration Change |
| | | (0 = no alarm, 1 = alarm) |
| <1> | Latched Switch Minor Alarms 2 | Bit 0 = CDM Error |
| | | Bit 1 = Reserved (RCS10 only) |
| | | Bit 2 = Reserved (RCS10 only) |
| | | Bit 3 = Reserved (RCS10 only) |
| | | Bit 4 = Backup 1 Test Fault |
| | | Bit 5 = Backup 2 Test Fault |
| | | Bit 6 = Reserved (RCS10 only) |
| | | Bit 7 = Spare |
| | | (0 = no alarm, 1 = alarm) |
| <1> | Backup 1 Mod Hot Standby Channel | Channel number (1 to 9) (0 = No hot standby for backup 1 mod) |
| <1> | Backup 1 Demod Hot Standby Channel | Channel number (1 to 9) (0 = No hot standby for backup 1 Demod) |
| <1> | Backup 2 Mod Hot Standby Channel | Channel number (1 to 8) (0 = No hot standby for backup 2 mod, or channel 9 not configured as backup) |

<1>     Backup 2 Demod Hot     Channel number (1 to 8) (0 = No hot standby for backup 2 Demod, or
        Standby Channel        Channel 9 not configured as backup


## A.3.3 Opcode <2003h>  Query RCS20 Modem Addresses

**Query Response Data Field (11 bytes)**

<1>     Number of Channels     10 for RCS20

<1>     Modem Address 0        Modem Remote Address for channel 0 (BU 1)

<1>     Modem Address 1        Modem Address 1 (Modem Remote Address for channel 1 (Prime 1)

<1>     Modem Address 2        Modem Address 2 (Modem Remote Address for channel 2 (Prime 2)

<1>     Modem Address 3        Modem Address 3 (Modem Remote Address for channel 3 (Prime 3)

<1>     Modem Address 4        Modem Address 4 (Modem Remote Address for channel 4 (Prime 4)

<1>     Modem Address 5        Modem Address 5 (Modem Remote Address for channel 5 (Prime 5)

<1>     Modem Address 6        Modem Address 6 (Modem Remote Address for channel 6 (Prime 6)

<1>     Modem Address 7        Modem Address 7 (Modem Remote Address for channel 7 (Prime 7)

<1>     Modem Address 8        Modem Address 8 (Modem Remote Address for channel 8 (Prime 8)

<1>     Modem Address 9        Modem Address 9 (Modem Remote Address for channel 9 (Prime 9 /
                               BU 2)


## A.3.4 Opcode <2004h>  Query RCS20 Backup Mode

**Query Response Data Field (3 bytes)**

<1>     Maximum Number of      2 for RCS20
        Backup Channels

<1>     Backup 1 (Channel 0)   0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive
        Backup Mode

<1>     Backup 2 (Channel 9)   0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive
        Backup Mode           (Ignore if Channel 9 is not configured as backup)


## A.3.5 Opcode <2005h>  Query RCS20 Expansion Module Information

**Query Response Data Field (7 bytes)**

<1>     Number of Expansion    6 for RCS20
        Slots

<1>      Slot 0 Expansion        255 decimal = no expansion card present, 0 = RCS20 Interface Control
         Type                    Module, 1 = RCS20 Bank Control Module, 2 = RCS20 Ethernet Interface
                                 Module, 3 = RCS20 Reference Distribution Module

<1>      Slot 1 Expansion        255 decimal = no expansion card present, 0 = RCS20 Interface Control
         Type                    Module, 1 = RCS20 Bank Control Module, 2 = RCS20 Ethernet Interface
                                 Module, 3 = RCS20 Reference Distribution Module

<1>      Slot 2 Expansion        255 decimal = no expansion card present, 0 = RCS20 Interface Control
         Type                    Module, 1 = RCS20 Bank Control Module, 2 = RCS20 Ethernet Interface
                                 Module, 3 = RCS20 Reference Distribution Module

<1>      Slot 3 Expansion        255 decimal = no expansion card present, 0 = RCS20 Interface Control
         Type                    Module, 1 = RCS20 Bank Control Module, 2 = RCS20 Ethernet Interface
                                 Module, 3 = RCS20 Reference Distribution Module

<1>      Slot 4 Expansion        255 decimal = no expansion card present, 0 = RCS20 Interface Control
         Type                    Module, 1 = RCS20 Bank Control Module, 2 = RCS20 Ethernet Interface
                                 Module, 3 = RCS20 Reference Distribution Module

<1>      Slot 5 Expansion        255 decimal = no expansion card present, 0 = RCS20 Interface Control
         Type                    Module, 1 = RCS20 Bank Control Module, 2 = RCS20 Ethernet Interface
                                 Module, 3 = RCS20 Reference Distribution Module

## A.3.6  Opcode <2010h> Query RCS20 Reference Distribution Module Configuration

### Command Data Field (1 byte)

<1>      RDM Slot Number         Slot number on the RCU20 for the RDM to be queried

### Query Response Data Field (4 bytes)

<1>      RDM Status              Bit 0 = Ext A Activity

                                 Bit 1 = Ext B Activity

                                 Bit 2 = Internal Ref. Activity

<1>      RDM Fallback            0 = External A Only, 1 = Internal Only, 2 = Ext A → Int., 3 = Int. → Ext
         Selection               A, 4 = Ext A → Ext B, 5 = Ext A → Ext B → Int., 6 = Int. → Ext A →
                                 Ext B

<1>      RDM Internal            0 = 10 MHz, 1 = 5 MHz, 2 = 2.5 MHz, 3 = 1.25 MHz
         Reference Frequency

<1>      RDM Currently           0 = External A, 1 = External B, 2 = Internal
         Selected Source

## A.3.7  Opcode <2200h>  Relay Command or Query to Modem

**Command Data Field (n+1 bytes):**

<1>        Channel Number          Channel number for the modem for which the message is to be
                                   relayed (0 to 9 for the RCS20)

<n>        RLLP Packet from        Complete, addressed RLLP message block with (variable number of
           Modem                   bytes) sync byte, source address, destination address, Opcode, byte
                                   count, data field and checksum) (Contents of Response Packet Data
                                   Field: Dependent upon message relayed to modem.


## A.3.8  Opcode <2202h>  Set RCS20 Configuration

**Command Data Field:**

<2>        Nonvolatile Bytes       Number of nonvolatile RCS20 configuration memory bytes, including
                                   these 2 bytes (221 decimal for RCS20)

<1>        Number of Channels      Maximum number of prime and backup channels available to the
                                   RCS20 switch. (10 decimal for RCS20 as of Release 1.0)

<1>        Nonvolatile Bytes per   Number of nonvolatile memory bytes per channel. This number may
           Channel                 vary with the release number. (10 bytes for RCS20 as of release 1.0
                                   and 13 bytes as of release 4.0)

                                   **Remote M&C developers must make use of this value to find out how
                                   many bytes per channel are being transmitted.

<1>        *Channel 0              Bit 0 = Modulator present
           Configuration          Bit 1 = Demodulator present
                                   (0 = not present, 1 = present)

<2>        *Channel 0 Mod          0h - BB7h in tenths of a second; decimal point implied
           Backup Delay

<2>        *Channel 0 Demod        0h - BB7h in tenths of a second; decimal point implied
           Backup Delay

<1>        *Channel 0 Mod          Bit 0 = Backup 1 assigned to this modulator
           Backup Configuration    Bit 1 = Backup 2 assigned to this modulator
                                   (0 = not assigned, 1 = assigned)

| | | |
|---|---|---|
| <1> | *Channel 0 Demod Backup Configuration | Bit 0 = Backup 1 assigned to this demodulator |
| | | Bit 1 = Backup 2 assigned to this demodulator |
| | | (0 = not assigned, 1 = assigned) |
| <1> | *Channel 0 Mod Priority | Channel 0 Modulator backup priority (0-9) |
| <1> | *Channel 0 Demod Priority | Channel 0 Demodulator backup priority (0-9) |
| <1> | *Channel 0 Switch Style | 0 = Switch Mod and Demod separately, 1 = Switch Mod and Demod together |
| <2> | *Channel 0 Demod Acquisition Delay | 0h-BB7h in tenths of a second; decimal point implied. For example, a value of 100 means 10.0 sec. |
| <1> | *Service Mode | 0 = Normal, 1 = Service |

These 10 bytes (13 bytes as of release 4.0) repeat for channels 1 – 9 (uses 90 additional bytes) (uses 117 additional bytes as of release 4.0).

The Backup Delays and Demod Acquisition Delay applies only to channels 1 - 9 (the four channel 0 bytes are ignored). If channel 9 is configured as backup 2, then the four channel 0 Backup Delay bytes and the two Demod Acquisition Delay bytes are ignored.

| | | |
|---|---|---|
| <1> | Switch Major Alarm Mask | Bit 0 = RAM/ROM fault |
| | | Bit 1 = No Backup for Faulted Prime |
| | | Bit 2 = Error During Backup |
| | | Bit 3 = Backup 1 Mod Error |
| | | Bit 4 = Backup 1 Demod Error |
| | | Bit 5 = Backup 2 Mod Error |
| | | Bit 6 = Backup 2 Demod Error |
| | | Bit 7 = Spare |
| | | (0 = mask, 1 = allow) |

| <1> | Switch Minor Alarm 1 Mask | Bit 0 = Power Supply #1 Present |
|---|---|---|
| | | Bit 1 = Power Supply #1 Voltage |
| | | Bit 2 = Power Supply #2 Present |
| | | Bit 3 = Power Supply #2 Voltage |
| | | Bit 4 = Communications Error |
| | | Bit 5 = Faulted Prime Modem |
| | | Bit 6 = Faulted Backup Modem |
| | | Bit 7 = Modem Configuration Change |
| | | (0 = mask, 1 = allow) |
| <1> | Switch Minor Alarm 2 Mask | Bit 0 = CDM Error |
| | | Bit 1 = Reserved (RCS10 only) |
| | | Bit 2 = Reserved (RCS10 only) |
| | | Bit 3 = Reserved (RCS10 only) |
| | | Bit 4 = Backup 1 Test Fault |
| | | Bit 5 = Backup 2 Test Fault |
| | | Bit 6 = Reserved (RCS10 only) |
| | | Bit 7 = Spare |
| | | (0 = Mask, 1 = Allow) |
| <1> | Maximum Number of Backup Channels | 2 for RCS20 |
| <1> | Nonvolatile bytes per Backup Channel | 4 for RCS20 |
| <1> | Backup 1 (Channel 0) Configuration | 0 = Backup modem |
| <1> | Backup 1 (Channel 0) Backup Mode | 0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive |
| <1> | Backup 1 (Channel 0) Force Manual Modulator Backup | Channel number for manual backup (1 to 9) (ignored if in automatic mode) |
| <1> | Backup 1 (Channel 0) Force Manual Demodulator Backup | Channel number for manual backup (1 to 9) (ignored if in automatic mode) |
| <1> | Backup 2 (Channel 9) Configuration | 0 = Backup modem, 1 = Preempt able prime modem, 2 = Prime Modem |

| <1> | Backup 2 (Channel 9) Backup Mode | 0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive |
|---|---|---|
| <1> | Backup 2 (Channel 9) Force Manual Modulator Backup | Channel number for manual backup (1 to 8) (ignored if in automatic mode or if channel 9 is configured as prime) |
| <1> | Backup 2 (Channel 9) Force Manual Demodulator Backup | Channel number for manual backup (1 to 8) (ignored if in automatic mode or if channel 9 is configured as prime) |
| <4> | Reserved | (Reserved for RCS10, set to zero) |
| <4> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Reserved | (Reserved for RCS10, set to zero) |
| <1> | Learned Modem | 0 = Modem 0, 1 = Modem 1, 2 = Modem 2, 3 = Modem 3, 4 = Modem 4, 5 = Modem 5, 6 = Modem 6, 7 = Modem 7, 8 = Modem 8, 9 = Modem 9, 10 = All Modems |
| <1> | Test Modem | 0 = Modem 1, 1 = Modem 2, 2 = Modem 3, 3 = Modem 4, 4 = Modem 5, 5 = Modem 6, 6 = Modem 7, 7 = Modem 8, 8 = Modem 9, 9 = All Modems, , 10 = None |



This byte should be forced to 10 if no tests are desired, failure to do so may result in momentary loss of link on selected modem(s).

| <1> | Additional Bytes per Channel | 6 bytes as of release 4.0 |
|---|---|---|
| <1> | *Channel 0 Alarm 2 Mask | Bit 0 = Mod learned<br>Bit 1 = Demod learned<br>Bit 2 = Mod configuration changed<br>Bit 3 = Demod configuration changed<br>Bits 4 through 7 = Spares<br>(0 =Mask, 1 = Allow) |
| <1> | *Channel 0 Alarm 3 Mask | Bits 0 and 1 = Mod Backup 1 Test Status Mask<br>Bits 2 and 3 = Demod Backup 1 Test Status Mask<br>Bits 4 and 5 = Mod Backup 2 Test Status Mask<br>Bits 6 and 7 = Demod Backup 2 Test Status Mask<br>(0 = Mask, 1 = Allow) |

| <1> | *Channel 0 Backup1 IFS20L Demod Port Assignment | 0 = A, 1 = B, 2 = C, 3 = D |
| --- | --- | --- |
| <1> | *Channel 0 Backup2 IFS20L Demod Port Assignment | 0 = E, 1 = F, 2 = G, 3 = H |
| <2> | *Spares for Channel 0 | Spare Bytes |



These 6 bytes will repeat for channels 1 through 9 (54 additional bytes used).

## A.3.9  Opcode <2204h>  Set RCS20 Backup Mode

**Command Data Field (3 bytes)**

| <1> | Maximum Number of Backup Channels | 2 for RCS20 |
| --- | --- | --- |
| <1> | Backup 1 (Channel 0) Backup Mode | 0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive |
| <1> | Backup 2 (Channel 9) Backup Mode | 0 = Manual, 1 = Automatic non-Revertive, 2 = Automatic Revertive **(will be ignored if Channel 9 is not configured as backup)** |

## A.3.10        Opcode <2205h>  Clear RCS20 Latched Alarms

There is no data field for this command.

## A.3.11        Opcode <2206h>  Force RCS20 Manual Backup

**Command Data Field (3 bytes)**

| <1> | Maximum Number of Backup Channels | 2 for RCS20 |
| --- | --- | --- |
| <1> | Backup 1 (Channel 0) Channel to Backup | 1 to 8 (if Channel 9 configured as backup) (use 0 to un-back) 1 to 9 (if Channel 9 not configured as backup) (use 0 to un-back) Bits 0-3 = Modulator Bits 4-7 = Demodulator |
| <1> | Backup 2 (Channel 9) Channel to Backup | **(1 to 8) (use 0 to un-back)** Bits 0-3 = Modulator |

Bits 4-7 = Demodulator

Command will return an error if Backup 1 and Backup 2 are forced to backup the
same channel.

Set channel = 255 decimal if no forced backup is desired for either backup channel.

Command will return an error if trying to force a backup for a backup channel not
configured in manual backup mode.

## A.3.12      Opcode <2210h> Set RCS20 Frequency Distribution Module
## Configuration

### Command Data Field (3 bytes)

| | | |
|---|---|---|
| <1> | RDM Slot Number | Slot number on the RCU20 for the RDM to be configured. |
| <1> | RDM Fallback Mode | 0 = External A Only, 1 = Internal Only, 2 = Ext A → Int., 3 = Int. → Ext A, 4 = Ext A → Ext B, 5 = Ext A → Ext B → Int., 6 = Int. → Ext A → Ext B) |
| <1> | RDM Internal Reference Frequency | 0 = 10 MHz, 1 = 5 MHz, 2 = 2.5 MHz, 3 = 1.25 MHz |

## A.3.13      Opcode <2216h>  Learn Modem Configuration

### Command Data Field (1 byte)

| | | |
|---|---|---|
| <1> | Modem Number | 0 = Modem 0, 1 = Modem 1, 2 = Modem 2, 3 = Modem 3, 4 = Modem 4, 5 = Modem 5, 6 = Modem 6, 7 = Modem 7, 8 = Modem 8, 9 = Modem 9 |

## A.3.14      Opcode <2217h>  Learn All Modem's Configurations

There is no data field for this Opcode.

In order to learn a modem's configuration, a modem must be a backup modem or a prime
modem that has been assigned a backup. The modem must be present in the chassis.

## A.3.15   Opcode <2218h>  Copy Modem Configuration

### Command Data Field (2 bytes)

<1>       From Modem       0 = Modem 0, 1 = Modem 1, 2 = Modem 2, 3 = Modem 3, 4 = Modem 4, 5 = Modem 5, 6 = Modem 6, 7 = Modem 7, 8 = Modem 8, 9 = Modem 9. Modem configuration *must be* learned.

<1>       To Modem       0 = Backup 1, 1 = Modem 1, 2 = Modem 2, 3 = Modem 3, 4 = Modem 4, 5 = Modem 5, 6 = Modem 6, 7 = Modem 7, 8 = Modem 8, 9 = Modem 9, 10 = All Modems

The 'From' and 'To' modems must be present in the chassis and not equal to each other. You can not copy a modem's configuration onto itself. The Mod configuration will be copied and if successful, the Demod configuration will be copied. If any errors occur, appropriate error Opcodes will be returned.

## A.3.16   Opcode <2219h>* Backup Test Modem Configuration

### Command Data Field (1 byte)

<1>       Modem Number       1 to 8 if channel 9 is configured as backup

1 to 9 if channel 9 is not configured as backup

## A.3.17   Opcode <221Ah>* Backup Test All Modem's Configurations

There is no data field for this command.

In order to backup test a modem configuration, a modem must be a prime modem that has been assigned a backup. The prime modem's configuration must be learned and its assigned backup present in the chassis.

## A.3.18   Opcode <2403h>  Query RCS20 Device Identification

### Query Response Data Field (1 Byte)

<1>       Device Identification       24 decimal for RCS20

## A.3.19       Opcode <2404h>  Query RCS20 Switch Control Mode

**Query Response Data Field (1 Byte)**

<1>      Control Mode            0 = Front Panel, 1 = Terminal Mode, 2 = Remote Port

## A.3.20       Opcode: <240Eh> Query Time

**Query Response Data Field (3 Bytes)**

<1>      Hour                    0 - 23

<1>      Minute                  0 - 59

<1>      Second                  0 - 59

## A.3.21       Opcode: <240Fh> Query Date

**Query Response Data Field (3 Bytes)**

<1>      Year                    0 – 99

<1>      Month                   0 - 11

<1>      Day                     0 - 30

## A.3.22       Opcode: <2410h> Query Time and Date

**Query Response Data Field (6 Bytes)**

<1>      Year                    0 – 99

<1>      Month                   0 - 11

<1>      Day                     0 - 30

<1>      Hour                    0 - 23

<1>      Minute                  0 - 59

<1>      Second                  0 - 59

## A.3.23       Opcode <2600h>  Set RCS20 Switch Control Mode

**Command Data Field (1 byte):**

<1>      Control Mode            0 = Front Panel, 1 = Terminal, 2 = Remote Port (Computer RLLP)

## A.3.24       Opcode: <2C04h> Command Set Time

**Command Data Field (3 bytes):**

| | | |
|---|---|---|
| <1> | Hour | 0 - 23 |
| <1> | Minute | 0 - 59 |
| <1> | Second | 0 - 59 |

## A.3.25       Opcode: <2C05h> Command Set Date

**Command Data Field (3 bytes):**

| | | |
|---|---|---|
| <1> | Year | 0 – 99 |
| <1> | Month | 0 - 11 |
| <1> | Day | 0 - 30 |

## A.3.26       Opcode: <2C06h> Command Set Date and Time

**Command Data Field (6 bytes):**

| | | |
|---|---|---|
| <1> | Year | 0 – 99 |
| <1> | Month | 0 - 11 |
| <1> | Day | 0 - 30 |
| <1> | Hour | 0 - 23 |
| <1> | Minute | 0 - 59 |
| <1> | Second | 0 - 59 |

BLANK PAGE

# Appendix B.  System Cabling Configuration

## B.1    Overview

This appendix describes the cabling configurations between the RCS20 and its various companion products. The figures provided in this appendix illustrate the proper placement of the cables.

> ⚠️ **WARNINGS**
>
> 1. If either AC line cord is connected to the RCS20, dangerous AC voltages are present within the Switch and the cooling fan is operational.
>
> 2. Do not remove the top cover of the Switch unless replacement of one of the power supplies is necessary. Follow the instructions in Chapter 4.
>
> 3. DC voltage is present on the back plane. Take care when Installing or removing a plug-in module. AC power is not present on the back plane.
>
> 4. The IFS20 and DDS20 receive DC power through the RCS20 interconnection cable. To make sure that no DC power is present in the back plane modules, remove both of the Switch's AC line cords or the RCS20 interconnection cable.

## B.2    RCS20 Interconnects

Figure B-1 shows a cable chart for the DMD20-50 units using SCSI interface with DDS20 and IFS 70/140. Figure B-2 shows an RCS20 interconnect with DDS-20 units and IFS-20 70/140.

| DMD20 AND 50 MODEMS USING SCSI INTERFACE WITH DDS20 AND 70/140 IFS | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J13 B/U 1 MOD | J11 B/U 2 MOD | J14 MOD 1 | J15 MOD 2 | J16 MOD 3 | J17 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J23 B/U 1 DMD | J22 B/U 2 DMD | J34 DMD 1 | J35 DMD 2 | J36 DMD 3 | J37 DMD 4 | J38 DMD 5 | J39 DMD 6 | J40 DMD 7 | J41 DMD 8 | J42 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DDS20 | | | | | | | | | | | IFS20 70/140 | | | | | | | | | | | | | | | | | | | | | BANK I/O |
| MODEM B/U #1 | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | | | | J20 |
| MODEM B/U #2 | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | | | J20 |
| MODEM #1 | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | | J20 |
| MODEM #2 | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | J20 |
| MODEM #3 | | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | J20 |
| MODEM #4 | | | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | J20 |
| MODEM #5 | | | | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | J20 |
| MODEM #6 | | | | | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | J20 |
| MODEM #7 | | | | | | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | J20 |
| MODEM #8 | | | | | | | | | | J5 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | J20 |
| CS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3429-6 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3429-6 | CA/3482 |

Figure B-1. Modems using SCSI Interface with DDS20 and 70/140 Cable Chart
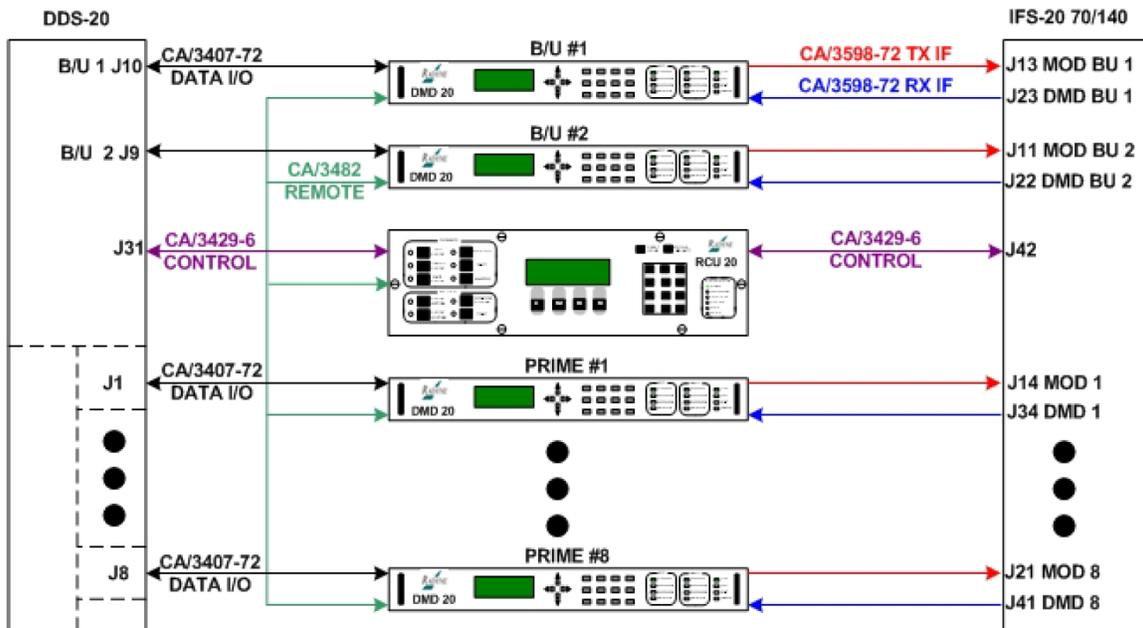


Figure B-2. RCS20 interconnect with DDS20 and IFS-20 70/140

Figure B-3 shows a cable chart for the DMD20-50 units using EIA530 Interface with DDS20 and 70/140 IFS. Figure B-4 shows an RCS20 interconnect with DDS-20 units and IFS-20 70/140.

| DMD20 AND 50 MODEMS USING EIA530 INTERFACE WITH DDS20 AND 70/140 IFS | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J13 B/U 1 MOD | J11 B/U 2 MOD | J14 MOD 1 | J15 MOD 2 | J16 MOD 3 | J17 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J23 B/U 1 DMD | J22 B/U 2 DMD | J34 DMD 1 | J35 DMD 2 | J36 DMD 3 | J37 DMD 4 | J38 DMD 5 | J39 DMD 6 | J40 DMD 7 | J41 DMD 8 | J42 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | DDS20 | | | | | | | | | | | | IFS20 70/140 | | | | | | | | | | | | | | | BANK I/O |
| MODEM B/U #1 | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | | | | J20 |
| MODEM B/U #2 | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | | | J20 |
| MODEM #1 | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | | J20 |
| MODEM #2 | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | | J20 |
| MODEM #3 | | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | | J20 |
| MODEM #4 | | | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | | J20 |
| MODEM #5 | | | | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | | J20 |
| MODEM #6 | | | | | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | | J20 |
| MODEM #7 | | | | | | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | | J20 |
| MODEM #8 | | | | | | | | | | J19 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | J20 |
| CS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/3429-6 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3429-6 | CA/3482 |

Figure B-3. Modems using EIA530 Interface w/DDS20 and 70/140 Cable Chart
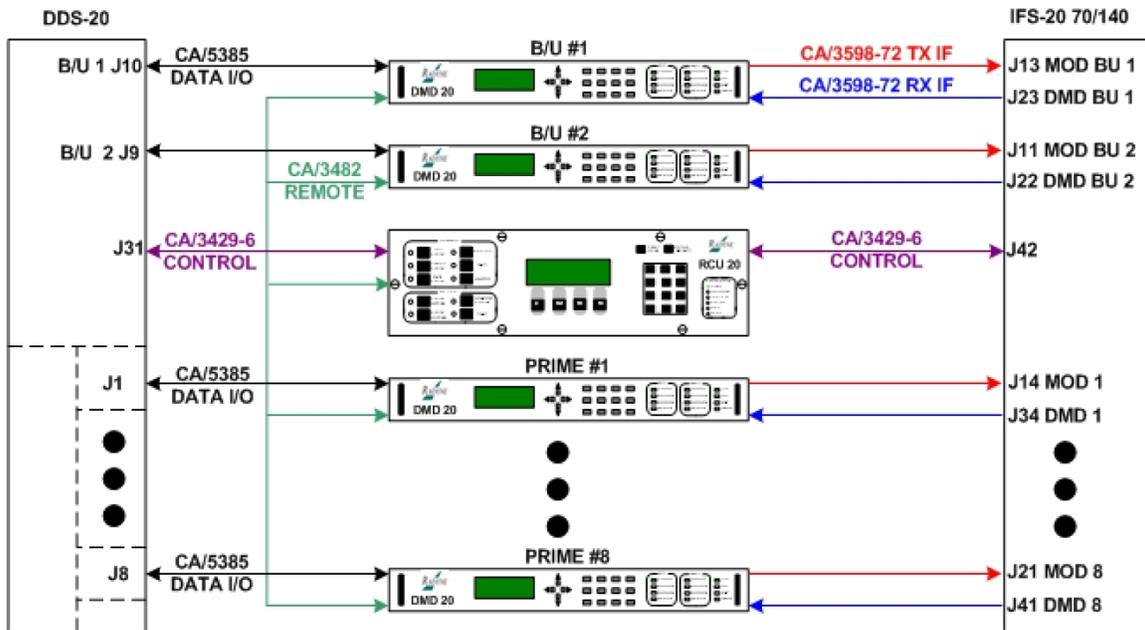


Figure B-4. RCS20 interconnect with DDS20 and IFS-20 70/140

Figure B-5 shows a cable chart for the DMD20-50 units using Universal SCSI Interface with DDS20 and IFS20 L-Band TX. Figure B-6 shows an RCS20 interconnect with DDS-20 units and IFS-20 L-Band TX.

| DMD20 AND 50 MODEMS USING UNIVERSAL SCSI INTERFACE WITH DDS20 AND IFS20 L-BAND TX | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J11 COMB RX B/U 1 | J10 COMB RX B/U 2 | J22 B/U MOD 1 | J17 B/U MOD2/MOD9 | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J12 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **DDS20** | | | | | | | | **IFS20 L-BAND TX** | | | | | | | | | | | **BANK I/O** |
| MODEM B/U #1 | J5 | | | | | | | | | | | | | J12 | | | | | | | | | | | J20 |
| MODEM B/U #2 | | J5 | | | | | | | | | | | | | J12 | | | | | | | | | | J20 |
| MODEM #1 | | | J5 | | | | | | | | | | | | | J12 | | | | | | | | | J20 |
| MODEM #2 | | | | J5 | | | | | | | | | | | | | J12 | | | | | | | | J20 |
| MODEM #3 | | | | | J5 | | | | | | | | | | | | | J12 | | | | | | | J20 |
| MODEM #4 | | | | | | J5 | | | | | | | | | | | | | J12 | | | | | | J20 |
| MODEM #5 | | | | | | | J5 | | | | | | | | | | | | | J12 | | | | | J20 |
| MODEM #6 | | | | | | | | J5 | | | | | | | | | | | | | J12 | | | | J20 |
| MODEM #7 | | | | | | | | | J5 | | | | | | | | | | | | | J12 | | | J20 |
| MODEM #8 | | | | | | | | | | J5 | | | | | | | | | | | | | J12 | | J20 |
| **RCS20 BANK CTRL-I/O** | | | | | | | | | | | J3 | | | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3429-6 | CA/3482 |

**Figure B-5. Modems using Universal SCSI Interface with DDS20 and IFS20 L-Band TX Cable Chart**
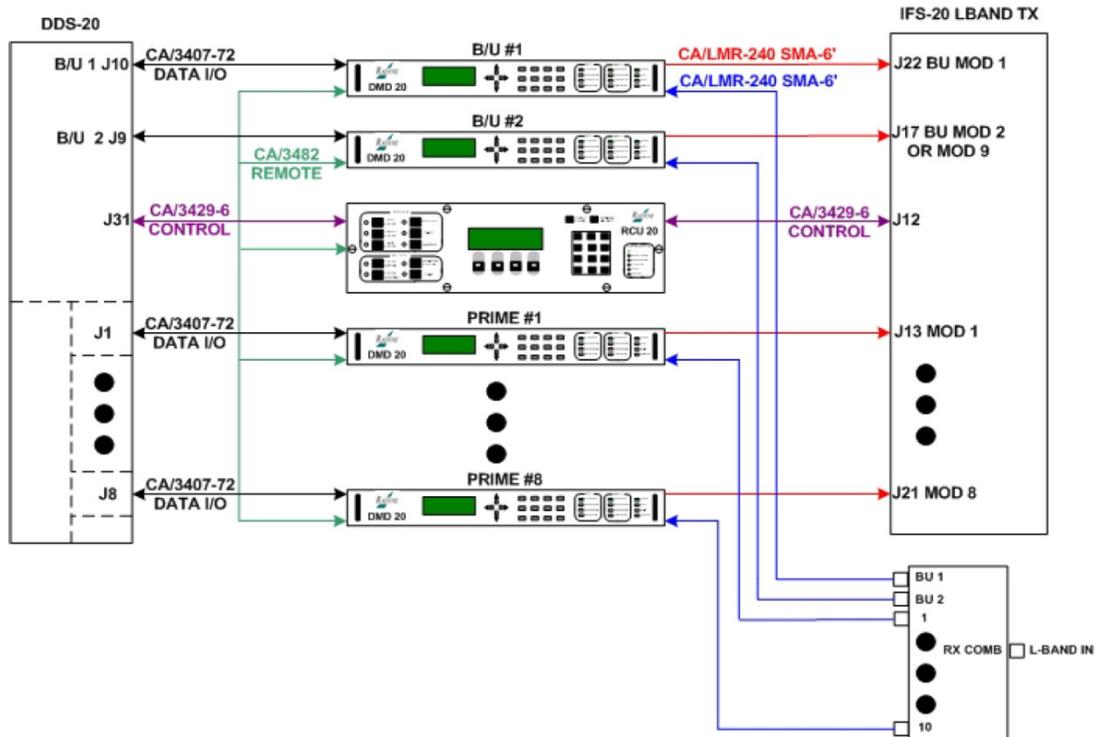


**Figure B-6. RCS20 Interconnect with DDS20 Ethernet and ISF20 L-Band TX**

Figure B-7 shows a cable chart for the DMD20-50 units using EIA530 Interface with DDS20 and IFS20 L-Band TX. Figure B-8 shows an RCS20 interconnect with DDS-20 units and IFS20 L-Band TX.

| DMD20 AND 50 MODEMS USING EIA530 INTERFACE WITH DDS20 AND IFS20 L-BAND TX | DDS20 | | | | | | | | | | | IFS20 L-BAND TX | | | | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J11 RX COMB B/U 1 | J10 RX COMB B/U 2 | J22 B/U MOD 1 | J17 B/U MOD 2 / MOD9 | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J12 TO RCU20 | J1 MODEM REMOTE |
| MODEM B/U #1 | J19 | | | | | | | | | | | | | J12 | | | | | | | | | | | | J20 |
| MODEM B/U #2 | | J19 | | | | | | | | | | | | | J12 | | | | | | | | | | | J20 |
| MODEM #1 | | | J19 | | | | | | | | | | | | | J12 | | | | | | | | | | J20 |
| MODEM #2 | | | | J19 | | | | | | | | | | | | | J12 | | | | | | | | | J20 |
| MODEM #3 | | | | | J19 | | | | | | | | | | | | | J12 | | | | | | | | J20 |
| MODEM #4 | | | | | | J19 | | | | | | | | | | | | | J12 | | | | | | | J20 |
| MODEM #5 | | | | | | | J19 | | | | | | | | | | | | | J12 | | | | | | J20 |
| MODEM #6 | | | | | | | | J19 | | | | | | | | | | | | | J12 | | | | | J20 |
| MODEM #7 | | | | | | | | | J19 | | | | | | | | | | | | | J12 | | | | J20 |
| MODEM #8 | | | | | | | | | | J19 | | | | | | | | | | | | | J12 | | | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA5385 | CA5385 | CA5385 | CA5385 | CA5385 | CA5385 | CA5385 | CA5385 | CA5385 | CA5385 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3429-6 | CA/3482 |

**Figure B-7. Modems using EIA530 Interface with DDS20 and IFS20 L-Band TX Cable Chart**
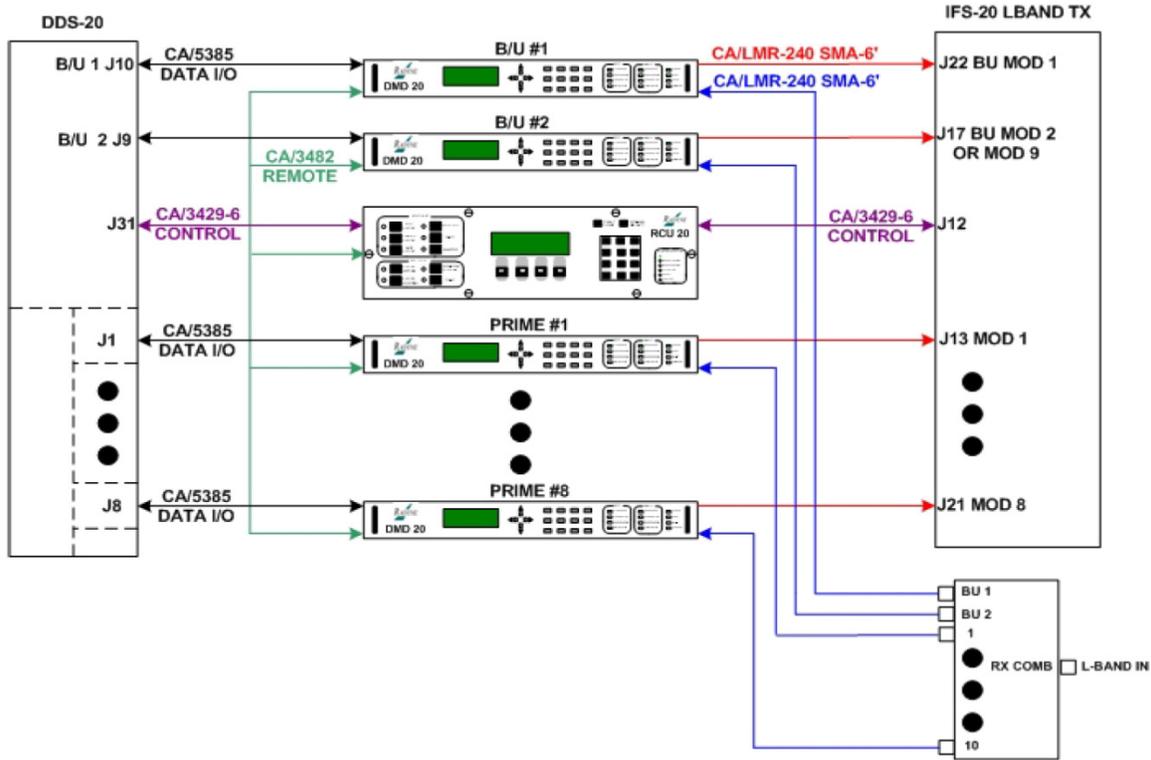


**Figure B-8. RCS20 Interconnect with DDS20 and IFS20 L-Band TX**

Figure B-9 shows a cable chart for the DMD20-50 units using SCSI interface with DDS20 and IFS20 L-Band TX/RX. Figure B-10 shows an RCS20 interconnect with DDS-20 units and IFS20 L-Band TX/RX.

| DMD20 AND 50 MODEMS USING SCSI INTERFACE WITH DDS20 AND IFS20 L-BAND TX AND RX | DDS20 J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | IFS20 J11 RX COMB B/U 1 | J10 RX COMB B/U 2 | J22 B/U MOD 1 | J17 B/U MOD2 / MOD9 | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J12 TO RCU20 | BANK I/O J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MODEM B/U #1 | J5 | | | | | | | | | | | J14 | | J12 | | | | | | | | | | | J20 |
| MODEM B/U #2 | | J5 | | | | | | | | | | | J14 | | J12 | | | | | | | | | | J20 |
| MODEM #1 | | | J5 | | | | | | | | | | | | | J12 | | | | | | | | | J20 |
| MODEM #2 | | | | J5 | | | | | | | | | | | | | J12 | | | | | | | | J20 |
| MODEM #3 | | | | | J5 | | | | | | | | | | | | | J12 | | | | | | | J20 |
| MODEM #4 | | | | | | J5 | | | | | | | | | | | | | J12 | | | | | | J20 |
| MODEM #5 | | | | | | | J5 | | | | | | | | | | | | | J12 | | | | | J20 |
| MODEM #6 | | | | | | | | J5 | | | | | | | | | | | | | J12 | | | | J20 |
| MODEM #7 | | | | | | | | | J5 | | | | | | | | | | | | | J12 | | | J20 |
| MODEM #8 | | | | | | | | | | J5 | | | | | | | | | | | | | J12 | | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3429-6 | CA/3482 |

**Figure B-9. Modems using SCSI Interface with DDS20 & IFS20 L-Band TX/RX Cable Chart**
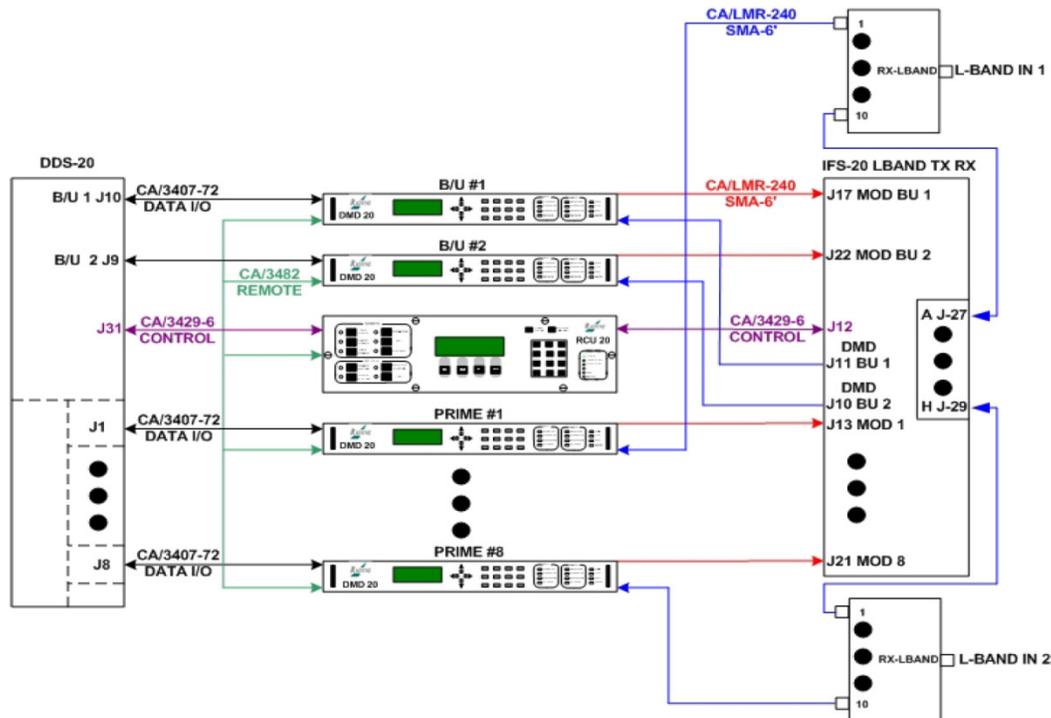


**Figure B-10. RCS20 Interconnect with DDS20 and IFS20 L-Band TX/RX**

Figure B-11 shows a cable chart for the DMD20-50 units using EIA530 interface with DDS20 and IFS20 L-Band TX/RX. Figure B-12 shows an RCS20 interconnect with DDS-20 units and IFS20 L-Band TX/RX.

| DMD20 AND 50 MODEMS USING EIA530 INTERFACE WITH DDS20 AND IFS20 L-BAND TX AND RX | DDS20 | | | | | | | | | | | IFS20 L-BAND TX-RX | | | | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J11 RX COMB B/U 1 | J10 RX COMB B/U 2 | J22 B/U MOD 1 | J17 B/U MOD2 / MOD9 | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J12 TO RCU20 | J1 MODEM REMOTE |
| MODEM B/U #1 | J19 | | | | | | | | | | | J14 | | J12 | | | | | | | | | | | J20 |
| MODEM B/U #2 | | J19 | | | | | | | | | | | J14 | | J12 | | | | | | | | | | J20 |
| MODEM #1 | | | J19 | | | | | | | | | | | | | J12 | | | | | | | | | J20 |
| MODEM #2 | | | | J19 | | | | | | | | | | | | | J12 | | | | | | | | J20 |
| MODEM #3 | | | | | J19 | | | | | | | | | | | | | J12 | | | | | | | J20 |
| MODEM #4 | | | | | | J19 | | | | | | | | | | | | | J12 | | | | | | J20 |
| MODEM #5 | | | | | | | J19 | | | | | | | | | | | | | J12 | | | | | J20 |
| MODEM #6 | | | | | | | | J19 | | | | | | | | | | | | | J12 | | | | J20 |
| MODEM #7 | | | | | | | | | J19 | | | | | | | | | | | | | J12 | | | J20 |
| MODEM #8 | | | | | | | | | | J19 | | | | | | | | | | | | | J12 | | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3429-6 | CA/3482 |

**Figure B-11. Modems using EIA530 Interface with DDS20 and IFS20 L-Band TX/RX Cable Chart**
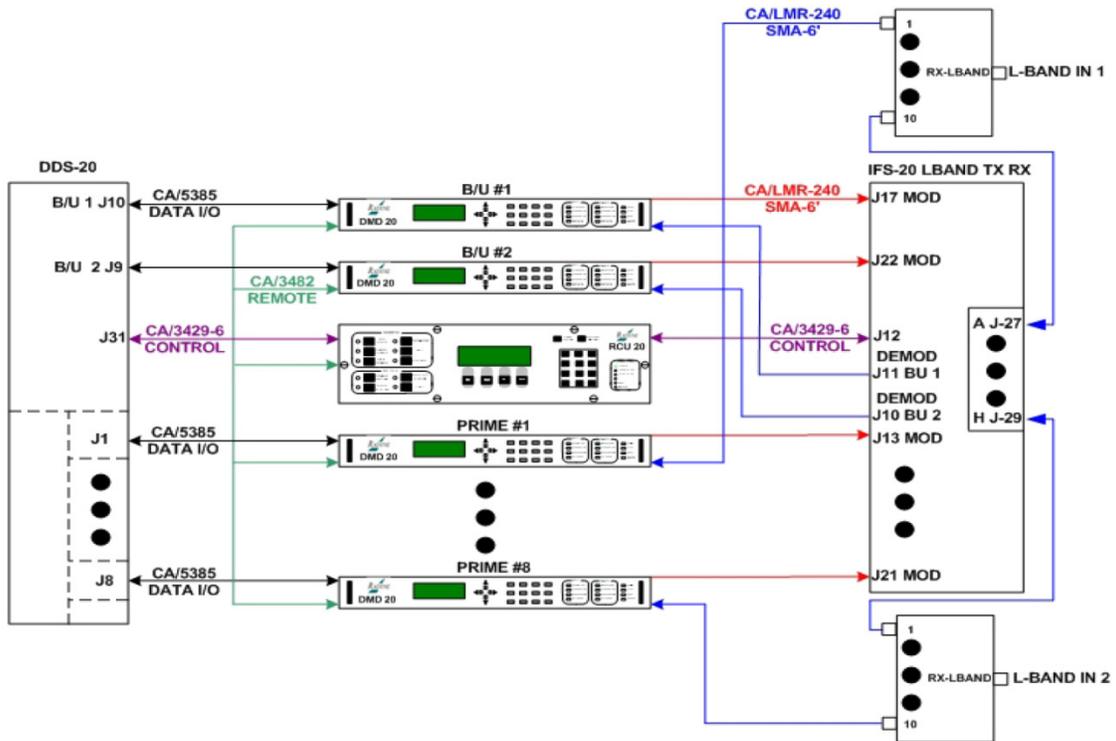


**Figure B-12. RCS20 Interconnect with DDS20 and IFS20 L-Band TX/RX**

(See Appendix C for L-Band Switch Block Diagram)

Figure B-13 shows a cable chart for the DMD20-50 L-Band units **using SCSI interface with** DDS20 TX-Combiner and RX Divider. Figure B-14 shows an RCS20 interconnect with DDS-20 units and TX/RX.

| DMD20 AND 50 MODEMS USING SCSI INTERFACE WITH DDS20 TX-COMBINER AND RX-DIVIDER | DDS20 | | | | | | | | | | | TX- COMBINER | | | | | | | | | | RX- DIVIDER | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J1 TX COMB B/U 1 | J2 TX COMB B/U 2 | J3 TX COMB 1 | J4 TX COMB 2 | J5 TX COMB 3 | J6 TX COMB 4 | J7 TX COMB 5 | J8 TX COMB 6 | J9 TX COMB 7 | J10 TX COMB 8 | J1 RX DIV B/U 1 | J2 RX DIV B/U 2 | J3 RX DIV 1 | J4 RX DIV 2 | J5 RX DIV 3 | J6 RX DIV 4 | J7 RX DIV 5 | J8 RX DIV 6 | J9 RX DIV 7 | J10 RX DIV 8 | J1 MODEM REMOTE |
| MODEM B/U #1 | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | | | | J20 |
| MODEM B/U #2 | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | | | J20 |
| MODEM #1 | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | | J20 |
| MODEM #2 | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | J20 |
| MODEM #3 | | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | J20 |
| MODEM #4 | | | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | J20 |
| MODEM #5 | | | | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | J20 |
| MODEM #6 | | | | | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | J20 |
| MODEM #7 | | | | | | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | J20 |
| MODEM #8 | | | | | | | | | | J5 | | | | | | | | | | | J12 | | | | | | | | | | J14 | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | | | | | | | | | | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3407-72 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3482 |

**Figure B-13. Modems using SCSI Interface with DDS20 TX-Combiner and RX-Divider Cable Chart**
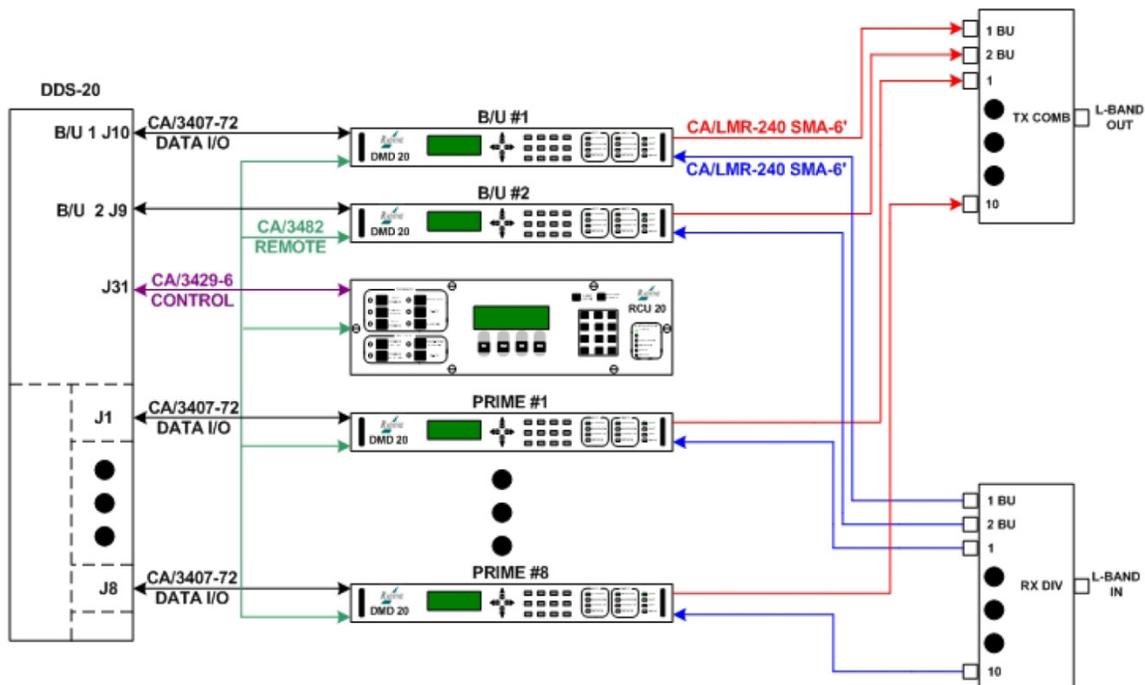


**Figure B-14. RCS20 Interconnect with DDS20 and TX-Combiner & RX-Divider**

Figure B-15 shows a cable chart for the DMD20-50 L-Band units using EIA530 interface with DDS20 TX-Combiner and RX Divider. Figure B-16 shows an RCS20 interconnect with DDS-20 units and TX/RX.

| DMD20 AND 50 MODEMS USING EIA530 INTERFACE WITH DDS20 TX-COMBINER AND RX-DIVIDER | J10 B/U 1 MODEM | J9 B/U 2 MODEM | J1 MODEM 1 | J2 MODEM 2 | J3 MODEM 3 | J4 MODEM 4 | J5 MODEM 5 | J6 MODEM 6 | J7 MODEM 7 | J8 MODEM 8 | J31 TO RCU20 | J1 TX COMB B/U 1 | J2 TX COMB B/U 2 | J3 TX COMB 1 | J4 TX COMB 2 | J5 TX COMB 3 | J6 TX COMB 4 | J7 TX COMB 5 | J8 TX COMB 6 | J9 TX COMB 7 | J10 TX COMB 8 | J1 RX DIV B/U 1 | J2 RX DIV B/U 2 | J3 RX DIV 1 | J4 RX DIV 2 | J5 RX DIV 3 | J6 RX DIV 4 | J7 RX DIV 5 | J8 RX DIV 6 | J9 RX DIV 7 | J10 RX DIV 8 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DDS20 | | | | | | | | | | | TX- COMBINER | | | | | | | | | | RX- DIVIDER | | | | | | | | | | BANK I/O |
| MODEM B/U #1 | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | | | | J20 |
| MODEM B/U #2 | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | | | J20 |
| MODEM #1 | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | | J20 |
| MODEM #2 | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | | J20 |
| MODEM #3 | | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | | J20 |
| MODEM #4 | | | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | | J20 |
| MODEM #5 | | | | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | | J20 |
| MODEM #6 | | | | | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | | J20 |
| MODEM #7 | | | | | | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | | J20 |
| MODEM #8 | | | | | | | | | | J19 | | | | | | | | | | | J12 | | | | | | | | | | J14 | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | J3 | | | | | | | | | | | | | | | | | | | | | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/5385 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3482 |

**Figure B-15. Modems using EIA530 Interface with DDS20 L-Band TX-Combiner and RX-Divider Cable Chart**
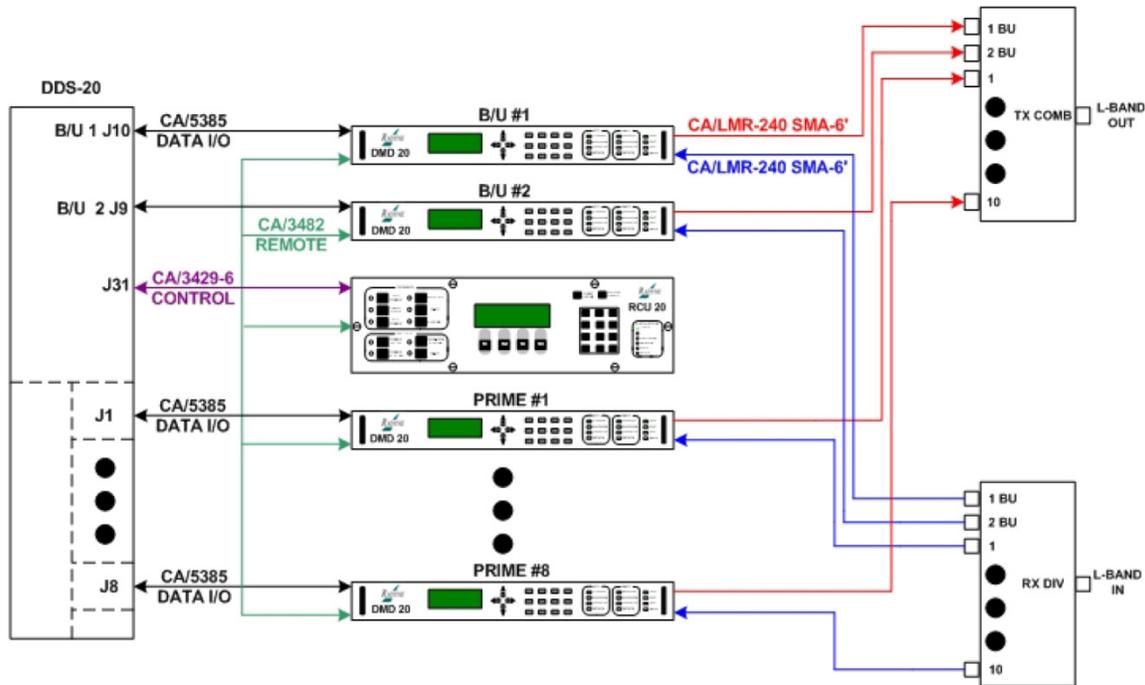
**Figure B-16. RCS20 Interconnect with DDS20 and TX-Combiner & RX-Divider**

(The Rx-Divider and Tx-Combiner are optional items)

Figure B-17 shows a cable chart for the DMD20-50 units using DDS20 Ethernet and IFS20 70/140.

Figure B-18 shows an RCS20 interconnect with DDS-20 Ethernet units and IFS-20 70/140.

| DMD20 AND 50 MODEMS USING DDS20 ETHERNET AND IFS20 70/140 | DDS20 ETHERNET SWITCH | | | | | | | | | | | | IFS20 70/140 | | | | | | | | | | | | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J19 B/U DATA OUT | J18 CH1 DATA OUT | J17 CH2 DATA OUT | J16 CH3 DATA OUT | J15 CH4 DATA OUT | J14 CH5 DATA OUT | J13 CH6 DATA OUT | J12 CH7 DATA OUT | J11 CH8 DATA OUT | J10 CH9 DATA OUT | J20 MOD FAULT MON | J21 RCU20 | J42 RCU20 | J13 MOD B/U 1 | J14 MOD 1 | J15 MOD 2 | J16 MOD 3 | J17 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J11 MOD B/U 2 | J23 DMD B/U 1 | J34 DMD 1 | J35 DMD 2 | J36 DMD 3 | J37 DMD 4 | J38 DMD 5 | J39 DMD 6 | J40 DMD 7 | J41 DMD 8 | J22 DMD B/U 2 | J1 MODEM REMOTE |
| MODEM B/U #1 | JS1 | | | | | | | | | | J15 | | | J11 | | | | | | | | | | J13 | | | | | | | | | | J20 |
| MODEM #1 | | JS1 | | | | | | | | | J15 | | | | J11 | | | | | | | | | | J13 | | | | | | | | | J20 |
| MODEM #2 | | | JS1 | | | | | | | | J15 | | | | | J11 | | | | | | | | | | J13 | | | | | | | | J20 |
| MODEM #3 | | | | JS1 | | | | | | | J15 | | | | | | J11 | | | | | | | | | | J13 | | | | | | | J20 |
| MODEM #4 | | | | | JS1 | | | | | | J15 | | | | | | | J11 | | | | | | | | | | J13 | | | | | | J20 |
| MODEM #5 | | | | | | JS1 | | | | | J15 | | | | | | | | J11 | | | | | | | | | | J13 | | | | | J20 |
| MODEM #6 | | | | | | | JS1 | | | | J15 | | | | | | | | | J11 | | | | | | | | | | J13 | | | | J20 |
| MODEM #7 | | | | | | | | JS1 | | | J15 | | | | | | | | | | J11 | | | | | | | | | | J13 | | | J20 |
| MODEM #8 | | | | | | | | | JS1 | | J15 | | | | | | | | | | | J11 | | | | | | | | | | J13 | | J20 |
| MODEM #9 | | | | | | | | | | JS1 | J15 | | | | | | | | | | | | J11 | | | | | | | | | | J13 | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | J2 | | | | | | | | | | | | | | | | | | | | | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/5386 | CA/3429-6 | CA/3429-6 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3482 |

Figure B-17. Modems using DDS20 Ethernet and IFS20 70/140Cable Chart
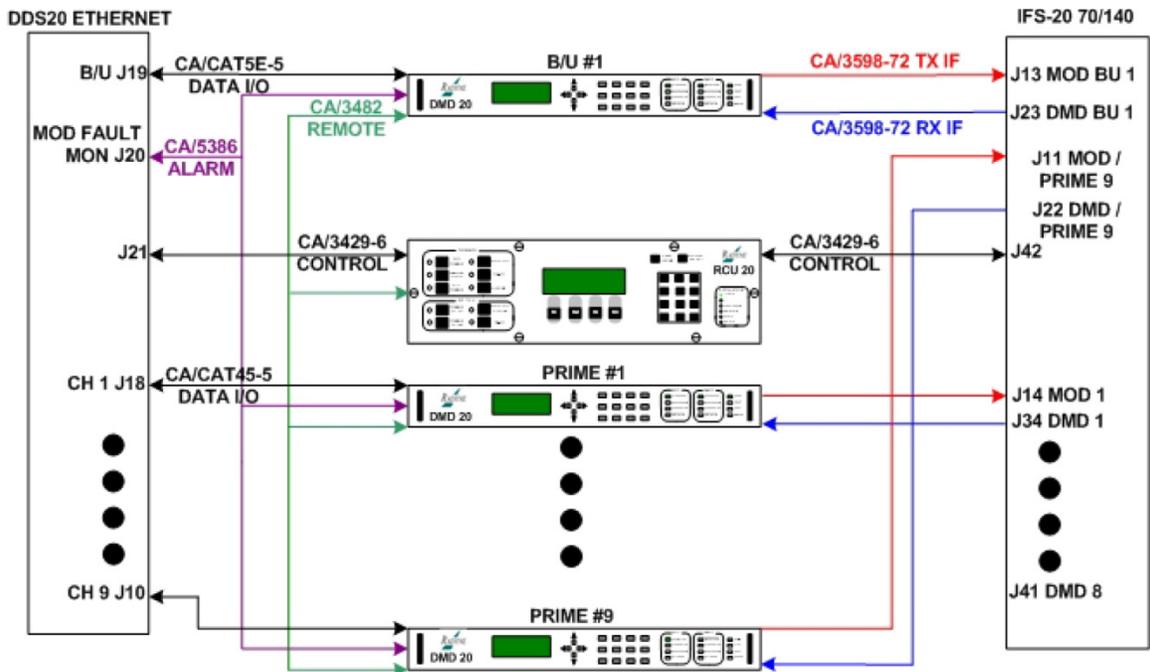


Figure B-18. RCS20 Interconnect with DDS20 Ethernet and IFS20 70/140

Figure B-19 shows a cable chart for the DMD20-50 units using DDS20 Ethernet and IFS20 L-Band.

Figure B-20 shows an RCS20 interconnect with DDS-20 Ethernet units and IFS-20 L-Band TX.

| DMD20 AND 50 MODEMS USING DDS20 ETHERNET AND IFS20-LBAND TX | DDS20 ETHERNET SWITCH | | | | | | | | | | | | IFS20 L-BAND TX | | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J19 B/U DATA OUT | J18 CH1 DATA OUT | J17 CH2 DATA OUT | J16 CH3 DATA OUT | J15 CH4 DATA OUT | J14 CH5 DATA OUT | J13 CH6 DATA OUT | J12 CH7 DATA OUT | J11 CH8 DATA OUT | J10 CH9 DATA OUT | J20 MOD FAULT MON | J21 RCU20 | J12 RCU20 | J22 MOD B/U 1 | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J17 MOD BU 2 / PRIME | J1 MODEM REMOTE |
| MODEM B/U #1 | JS1 | | | | | | | | | | J15 | | | J12 | | | | | | | | | | J20 |
| MODEM #1 | | JS1 | | | | | | | | | J15 | | | | J12 | | | | | | | | | J20 |
| MODEM #2 | | | JS1 | | | | | | | | J15 | | | | | J12 | | | | | | | | J20 |
| MODEM #3 | | | | JS1 | | | | | | | J15 | | | | | | J12 | | | | | | | J20 |
| MODEM #4 | | | | | JS1 | | | | | | J15 | | | | | | | J12 | | | | | | J20 |
| MODEM #5 | | | | | | JS1 | | | | | J15 | | | | | | | | J12 | | | | | J20 |
| MODEM #6 | | | | | | | JS1 | | | | J15 | | | | | | | | | J12 | | | | J20 |
| MODEM #7 | | | | | | | | JS1 | | | J15 | | | | | | | | | | J12 | | | J20 |
| MODEM #8 | | | | | | | | | JS1 | | J15 | | | | | | | | | | | J12 | | J20 |
| MODEM #9 | | | | | | | | | | JS1 | J15 | | | | | | | | | | | | J12 | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | J2 | | | | | | | | | | | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/5386 | CA/3429-6 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3482 |

**Figure B-19. Modems using DDS20 Ethernet and IFS20 L-Band Cable Chart**
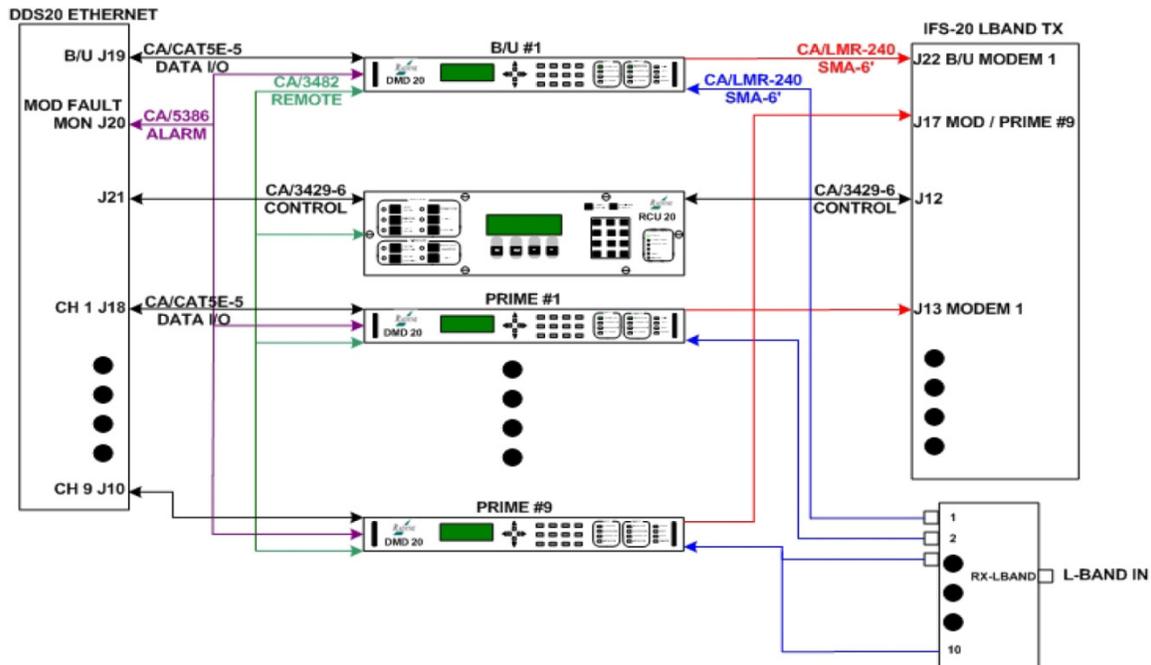


**Figure B-20. RCS20 Interconnect with DDS20 Ethernet and IFS20 L-Band TX**

Figure B-21 shows a cable chart for the DMD20-50 units, in a 1:9 configuration, using DDS20 Ethernet and IFS20 L-Band TX/RX. Figure B-22 shows an RCS20 interconnect with DDS-20 Ethernet units and IFS-20 L-Band TX/RX.

| DMD20 AND 50 MODEMS USING DDS20 ETHERNET AND IFS-LBAND TX AND RX | DDS20 ETHERNET SWITCH ||||||||||| | IFS20 L-BAND TX-RX ||||||||||||| | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J19 B/U DATA OUT | J18 CH1 DATA OUT | J17 CH2 DATA OUT | J16 CH3 DATA OUT | J15 CH4 DATA OUT | J14 CH5 DATA OUT | J13 CH6 DATA OUT | J12 CH7 DATA OUT | J11 CH8 DATA OUT | J10 CH9 DATA OUT | J20 MOD FAULT MON | J21 RCU20 | J12 RCU20 | J22 MOD B/U 1 | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J17 BU MOD 2 /PRIME 9 | J11 DMD B/U 1 | J10 DMD BU 2 /PRIME 9 | J1 MODEM REMOTE |
| MODEM B/U #1 | JS1 | | | | | | | | | | J15 | | | J11 | | | | | | | | | | | J13 | J20 |
| MODEM #1 | | JS1 | | | | | | | | | J15 | | | | J11 | | | | | | | | | | | J20 |
| MODEM #2 | | | JS1 | | | | | | | | J15 | | | | | J11 | | | | | | | | | | J20 |
| MODEM #3 | | | | JS1 | | | | | | | J15 | | | | | | J11 | | | | | | | | | J20 |
| MODEM #4 | | | | | JS1 | | | | | | J15 | | | | | | | J11 | | | | | | | | J20 |
| MODEM #5 | | | | | | JS1 | | | | | J15 | | | | | | | | J11 | | | | | | | J20 |
| MODEM #6 | | | | | | | JS1 | | | | J15 | | | | | | | | | J11 | | | | | | J20 |
| MODEM #7 | | | | | | | | JS1 | | | J15 | | | | | | | | | | J11 | | | | | J20 |
| MODEM #8 | | | | | | | | | JS1 | | J15 | | | | | | | | | | | J11 | | | | J20 |
| MODEM #9 | | | | | | | | | | JS1 | J15 | | | | | | | | | | | | J11 | | J13 | J20 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | J2 | | | | | | | | | | | | | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/CAT5E-5 | CA/5386 | CA/3429-6 | CA/3429-6 | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/3482 |

**Figure B-21. Modems using DDS20 Ethernet and IFS20 L-Band TX/RX Cable Chart**
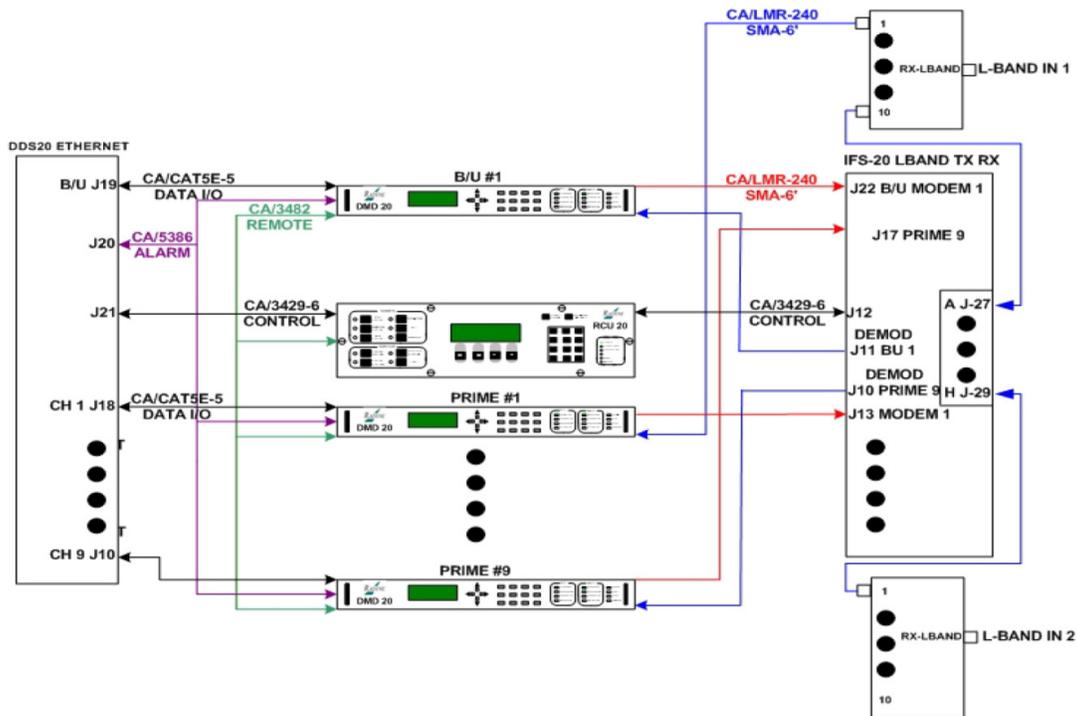


**Figure B-22. RCS20 Interconnect with DDS20 Ethernet and IFS20 L-Band TX/RX**

(See Appendix C for L-Band Switch Block Diagram)

Figure B-23 shows a cable chart for the DMD20-50 units to TX-Combiner and RX-Divider.

| DMD20 AND 50 MODEMS LBAND TO TX COMBINER AND RX DIVIDER | TX- COMBINER | | | | | | | | | | RX- DIVIDER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J1 B/U 1 MODEM | J2 B/U 2 MODEM | J3 MODEM 1 | J4 MODEM 2 | J5 MODEM 3 | J6 MODEM 4 | J7 MODEM 5 | J8 MODEM 6 | J9 MODEM 7 | J10 MODEM 8 | J1 B/U 1 MODEM | J2 B/U 2 MODEM | J3 MODEM 1 | J4 MODEM 2 | J5 MODEM 3 | J6 MODEM 4 | J7 MODEM 5 | J8 MODEM 6 | J9 MODEM 7 | J10 MODEM 8 |
| MODEM B/U #1 | J12 | | | | | | | | | | J14 | | | | | | | | | |
| MODEM B/U #2 | | J12 | | | | | | | | | | J14 | | | | | | | | |
| MODEM #1 | | | J12 | | | | | | | | | | J14 | | | | | | | |
| MODEM #2 | | | | J12 | | | | | | | | | | J14 | | | | | | |
| MODEM #3 | | | | | J12 | | | | | | | | | | J14 | | | | | |
| MODEM #4 | | | | | | J12 | | | | | | | | | | J14 | | | | |
| MODEM #5 | | | | | | | J12 | | | | | | | | | | J14 | | | |
| MODEM #6 | | | | | | | | J12 | | | | | | | | | | J14 | | |
| MODEM #7 | | | | | | | | | J12 | | | | | | | | | | J14 | |
| MODEM #8 | | | | | | | | | | J12 | | | | | | | | | | J14 |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' | CA/LMR240SMA6' |

**Figure B-23. RCS20 Interconnect with DMD20-50 Units to TX-Combiner and RX-Divider**

Figure B-24 shows a cable chart for the DM240 PIIC 70/140 Modulators using DDS20-ASI-M and IFS20 70/140. Figure B-25 shows an RCS20 interconnect with DDS20-ASI-M and IFS20 70/140.

| DM240 PIIC IFS20 70/140 MODULATORS | DDS20-ASI-M | | | | | | | | | | | | *FS20 70/140 | | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J15 BU1 DATA OUT | J19 CH1 DATA OUT | J18 CH2 DATA OUT | J17 CH3 DATA OUT | J16 CH4 DATA OUT | J13 CH5 DATA OUT | J12 CH6 DATA OUT | J11 CH2 DATA OUT | J10 CH1 DATA OUT | J14 CH9/BU2 DATA | J21 MOD FAULT MON | J20 RCU20 | J13 B/U 1 MOD | J11 B/U 2 MOD | J14 MOD 1 | J15 MOD 2 | J16 MOD 3 | J17 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J42 TO RCU20 | J1 MODEM REMOTE |
| BACK UP #1 | J1 | | | | | | | | | | J6 | | J8 | | | | | | | | | | | J4 |
| MODULATOR #1 | | J1 | | | | | | | | | J6 | | | J8 | | | | | | | | | | J4 |
| MODULATOR #2 | | | J1 | | | | | | | | J6 | | | | J8 | | | | | | | | | J4 |
| MODULATOR #3 | | | | J1 | | | | | | | J6 | | | | | J8 | | | | | | | | J4 |
| MODULATOR #4 | | | | | J1 | | | | | | J6 | | | | | | J8 | | | | | | | J4 |
| MODULATOR #5 | | | | | | J1 | | | | | J6 | | | | | | | J8 | | | | | | J4 |
| MODULATOR #6 | | | | | | | J1 | | | | J6 | | | | | | | | J8 | | | | | J4 |
| MODULATOR #7 | | | | | | | | J1 | | | J6 | | | | | | | | | J8 | | | | J4 |
| MODULATOR #8 | | | | | | | | | J1 | | J6 | | | | | | | | | | J8 | | | J4 |
| BACK UP #2 | | | | | | | | | | J1 | J6 | | | | | | | | | | | J8 | | J4 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/4510 | CA/3429-6 | | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3429-6 | CA/3482 |

**Figure B-24. Modems using DM240 PIIC 70/140 Modulators Cable Chart**
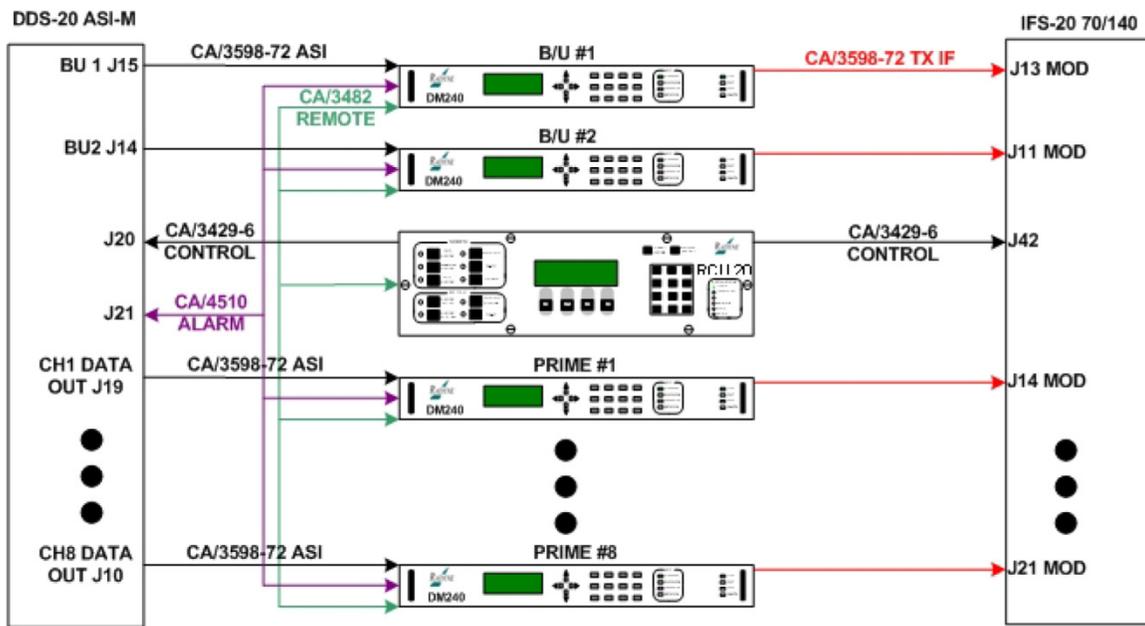


**Figure B-25. RCS20 Interconnect with DDS20-ASI-M and IFS20 70/140**

Figure B-26 shows a cable chart for the DM240 PIIC L-Band Modulators using DDS20-ASI-M and IFS20 L-Band. Figure B-27 shows an RCS20 interconnect with DDS20-ASI-M and IFS20 L-Band.

| DM240 PIIC IFS20 70/140 L-BAND DEMODULATORS | J15 BU1 DATA OUT | J19 CH1 DATA OUT | J18 CH2 DATA OUT | J17 CH3 DATA OUT | J16 CH4 DATA OUT | J13 CH5 DATA OUT | J12 CH6 DATA OUT | J11 CH2 DATA OUT | J10 CH1 DATA OUT | J14 BU2 DATA | J21 MOD FAULT MON | J20 RCU20 | J22 B/U 1 MOD | J17 B/U 2 MOD | J13 DMD 1 | J14 DMD 2 | J15 DMD 3 | J16 DMD 4 | J18 DMD 5 | J19 DMD 6 | J20 DMD 7 | J21 DMD 8 | J12 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DDS20-ASI-M | | | | | | | | | | | | IFS20 70/140 L-Band | | | | | | | | | | | BANK I/O |
| BACK UP #1 | J1 | | | | | | | | | | J6 | | J9 | | | | | | | | | | | J4 |
| MODULATOR #1 | | J1 | | | | | | | | | J6 | | | J9 | | | | | | | | | | J4 |
| MODULATOR #2 | | | J1 | | | | | | | | J6 | | | | J9 | | | | | | | | | J4 |
| MODULATOR #3 | | | | J1 | | | | | | | J6 | | | | | J9 | | | | | | | | J4 |
| MODULATOR #4 | | | | | J1 | | | | | | J6 | | | | | | J9 | | | | | | | J4 |
| MODULATOR #5 | | | | | | J1 | | | | | J6 | | | | | | | J9 | | | | | | J4 |
| MODULATOR #6 | | | | | | | J1 | | | | J6 | | | | | | | | J9 | | | | | J4 |
| MODULATOR #7 | | | | | | | | J1 | | | J6 | | | | | | | | | J9 | | | | J4 |
| MODULATOR #8 | | | | | | | | | J1 | | J6 | | | | | | | | | | J9 | | | J4 |
| BACK UP #2 | | | | | | | | | | J1 | J6 | | | | | | | | | | | J9 | | J4 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/4510 | CA/3429-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/3429-6 | CA/3482 |

**Figure B-26. Modems using DM240 PIIC L-Band Modulators Cable Chart**
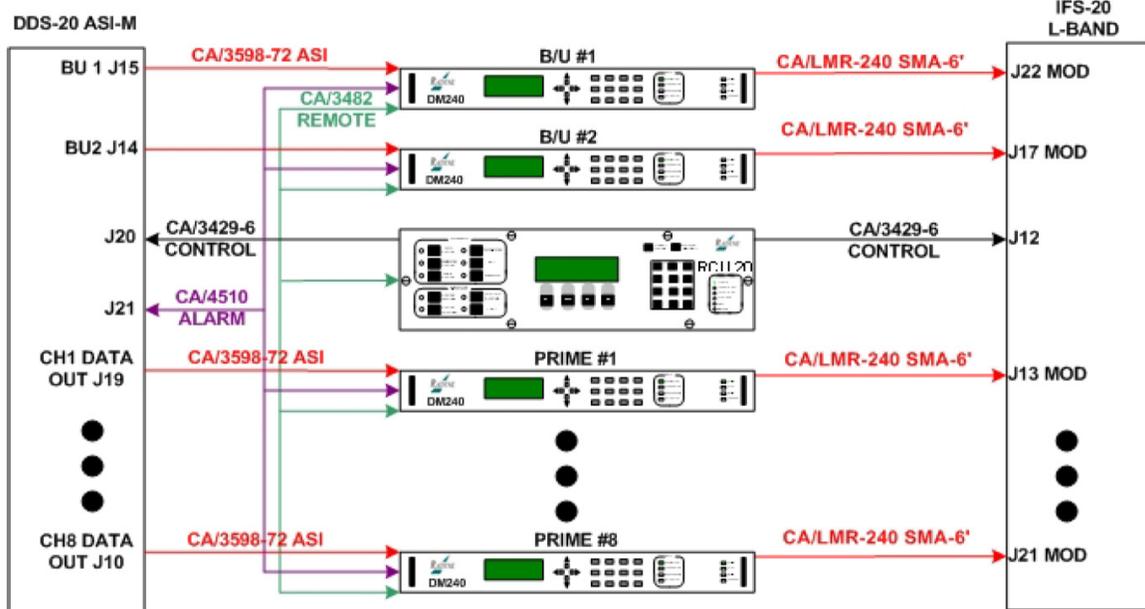


**Figure B-27. RCS20 Interconnect with DDS20-ASI-M and IFS20 L-Band**

Figure B-28 shows a cable chart for the DD240 XR 70/140 Demodulators using DDS20-ASI-D. Figure B-29 shows an RCS20 interconnect with DDS20-ASI-D.

| DD240 IFS20 70/140 DEMODULATORS | DDS20-ASI-D | | | | | | | | | | | | IFS20 70/140 | | | | | | | | | | | BANK I/O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J15 BU1 DATA OUT | J19 CH1 DATA OUT | J18 CH2 DATA OUT | J17 CH3 DATA OUT | J16 CH4 DATA OUT | J13 CH5 DATA OUT | J12 CH6 DATA OUT | J11 CH2 DATA OUT | J10 CH1 DATA OUT | J14 BU2 DATA | J20 MOD FAULT MON | J21 RCU20 | J23 DMD BU 1 / PRIME 9 | J22 DMD BU 2 / PRIME 9 | J34 DMD 1 | J35 DMD 2 | J36 DMD 3 | J37 DMD 4 | J38 DMD 5 | J39 DMD 6 | J40 DMD 7 | J41 DMD 8 | J42 TO RCU20 | J1 MODEM REMOTE |
| BACK UP #1 | J1 | | | | | | | | | | J3 | | J7 | | | | | | | | | | | J4 |
| DEMODULATOR #1 | | J1 | | | | | | | | | J3 | | | J7 | | | | | | | | | | J4 |
| DEMODULATOR #2 | | | J1 | | | | | | | | J3 | | | | J7 | | | | | | | | | J4 |
| DEMODULATOR #3 | | | | J1 | | | | | | | J3 | | | | | J7 | | | | | | | | J4 |
| DEMODULATOR #4 | | | | | J1 | | | | | | J3 | | | | | | J7 | | | | | | | J4 |
| DEMODULATOR #5 | | | | | | J1 | | | | | J3 | | | | | | | J7 | | | | | | J4 |
| DEMODULATOR #6 | | | | | | | J1 | | | | J3 | | | | | | | | J7 | | | | | J4 |
| DEMODULATOR #7 | | | | | | | | J1 | | | J3 | | | | | | | | | J7 | | | | J4 |
| DEMODULATOR #8 | | | | | | | | | J1 | | J3 | | | | | | | | | | J7 | | | J4 |
| BACK UP #2 | | | | | | | | | | J1 | J3 | | | J7 | | | | | | | | | | J4 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | | | | | | | | | | | J2 | |
| CABLE SUPLLIED WITH RCU20 AS CONFIGURED | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/4510 | CA/3429-6 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3429-6 | CA/3482 |

Figure B-28. Modems using DD240 XR 70/140 Demodulator Cable Chart
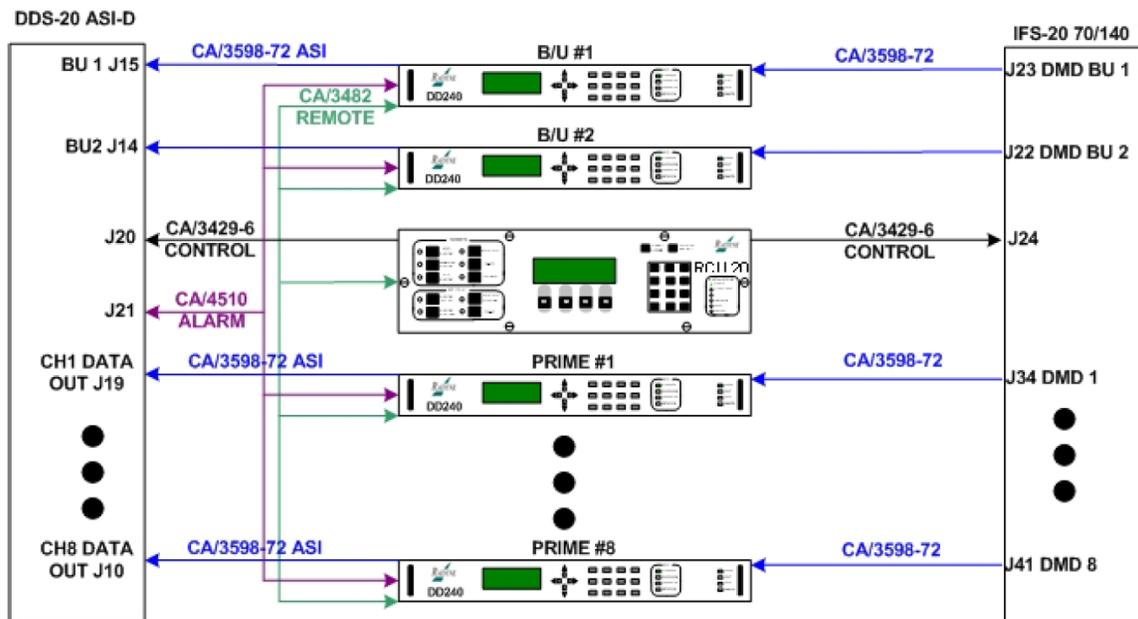


Figure B-29. RCS20 Interconnect with DDS20-ASI-D and IFS20 70/140

Figure B-30 shows a cable chart for the DD240XR L-Band Demodulators using DDS20-ASI-D and IFS20 L-Band RX. Figure B-31 shows an RCS20 interconnect with DDS20-ASI-D.

| DD240XR 70/140 OR L-BAND MODULATORS | J5 BU1 DATA OUT | J9 CH1 DATA OUT | J8 CH2 DATA OUT | J7 CH3 DATA OUT | J6 CH4 DATA OUT | J3 CH5 DATA OUT | J2 CH6 DATA OUT | J1 CH2 DATA OUT | J0 CH1 DATA OUT | J14 BU2 DATA | J14 MOD FAULT MON | J21 RCU20 | J13 B/U 1 MOD | J11 B/U 2 MOD | J42 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | DDS20-ASI-G.703-M | | | | | | | IFS20 L-BAND TX | | | BANK I/O |
| BACK UP #1 | J1 | | | | | | | | | | J3 | | J11 | | | J4 |
| MODULATOR #1 | | J1 | | | | | | | | | J3 | | | J11 | | J4 |
| MODULATOR #2 | | | J1 | | | | | | | | J3 | | | | | J4 |
| MODULATOR #3 | | | | J1 | | | | | | | J3 | | | | | J4 |
| MODULATOR #4 | | | | | J1 | | | | | | J3 | | | | | J4 |
| MODULATOR #5 | | | | | | J1 | | | | | J3 | | | | | J4 |
| MODULATOR #6 | | | | | | | J1 | | | | J3 | | | | | J4 |
| MODULATOR #7 | | | | | | | | J1 | | | J3 | | | | | J4 |
| MODULATOR #8 | | | | | | | | | J1 | | J3 | | | | | J4 |
| BACK UP #2 | | | | | | | | | | J1 | J3 | | | | | J4 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/4510 | CA/3429-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/3429-6 | CA/3482 |

**Figure B-30. Modems using DD240XR L-Band Demodulator Cable Chart**
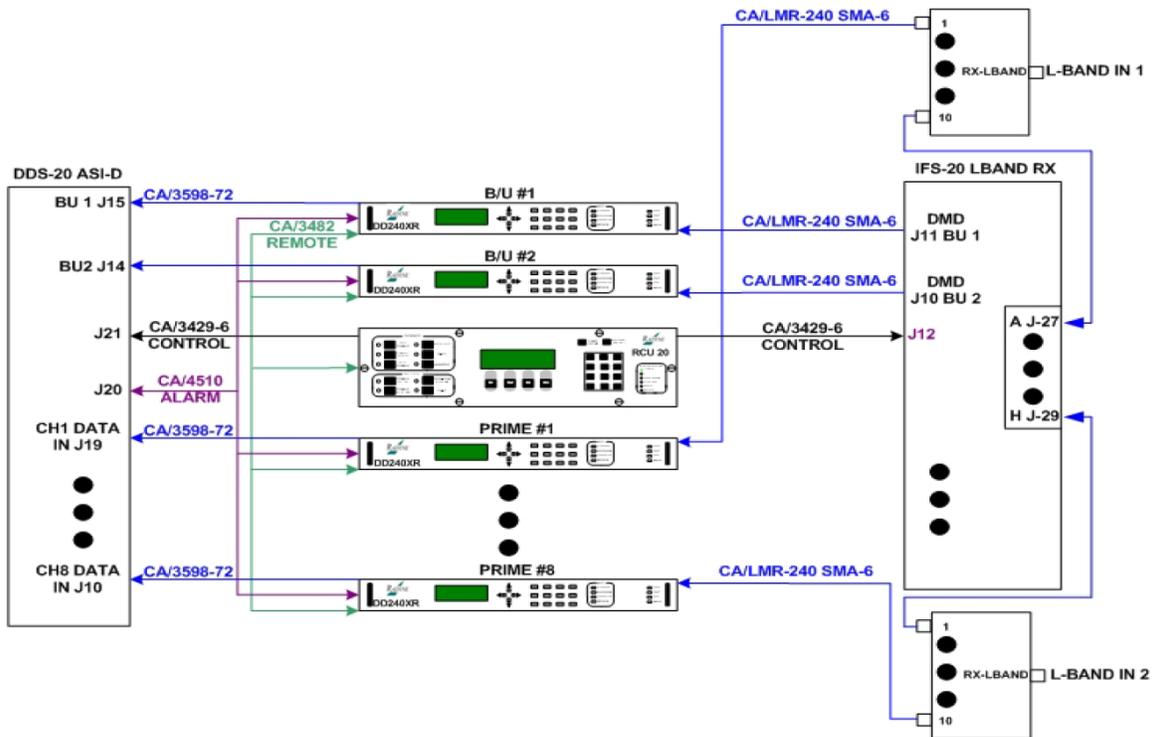


**Figure B-31. RCS20 Interconnect with DDS20-ASI-M and IFS20 L-Band TX**

Figure B-32 illustrates a cable chart for the DM240XR L-Band Modulators using DDS20-GIGE-M and IFS20 L-Band. Figure B-33 illustrates an RCS20 interconnect with DDS20-GIGE-M and IFS20 L-Band.

| DM240XR IFS20 L-BAND IF MODULATORS | J19 BU1 DATA OUT | J18 CH1 DATA OUT | J17 CH2 DATA OUT | J16 CH3 DATA OUT | J15 CH4 DATA OUT | J14 CH5 DATA OUT | J13 CH6 DATA OUT | J12 CH7 DATA OUT | J11 CH8 DATA OUT | J10 CH9/BU2 DATA | J20 MOD FAULT MON | J21 RCU20 | J22 B/U 1 MOD | J17 B/U 2 MOD | J13 MOD 1 | J14 MOD 2 | J15 MOD 3 | J16 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J12 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DDS20-GIGE-M | | | | | | | | | | | | *IFS20 L-BAND | | | | | | | | | | | BANK I/O |
| BACK UP #1 | SL1 | | | | | | | | | | J3 | | J11 | | | | | | | | | | | J4 |
| MODULATOR #1 | | SL1 | | | | | | | | | J3 | | | J11 | | | | | | | | | | J4 |
| MODULATOR #2 | | | SL1 | | | | | | | | J3 | | | | J11 | | | | | | | | | J4 |
| MODULATOR #3 | | | | SL1 | | | | | | | J3 | | | | | J11 | | | | | | | | J4 |
| MODULATOR #4 | | | | | SL1 | | | | | | J3 | | | | | | J11 | | | | | | | J4 |
| MODULATOR #5 | | | | | | SL1 | | | | | J3 | | | | | | | J11 | | | | | | J4 |
| MODULATOR #6 | | | | | | | SL1 | | | | J3 | | | | | | | | J11 | | | | | J4 |
| MODULATOR #7 | | | | | | | | SL1 | | | J3 | | | | | | | | | J11 | | | | J4 |
| MODULATOR #8 | | | | | | | | | SL1 | | J3 | | | | | | | | | | J11 | | | J4 |
| BACK UP #2 | | | | | | | | | | SL1 | J3 | | | | | | | | | | | J11 | | J4 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/4510 | | CA/3429-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/LMR-240 SMA-6 | CA/3429-6 | CA/3482 |

Figure B-32. Modems using DM240XR L-Band Modulators Cable Chart
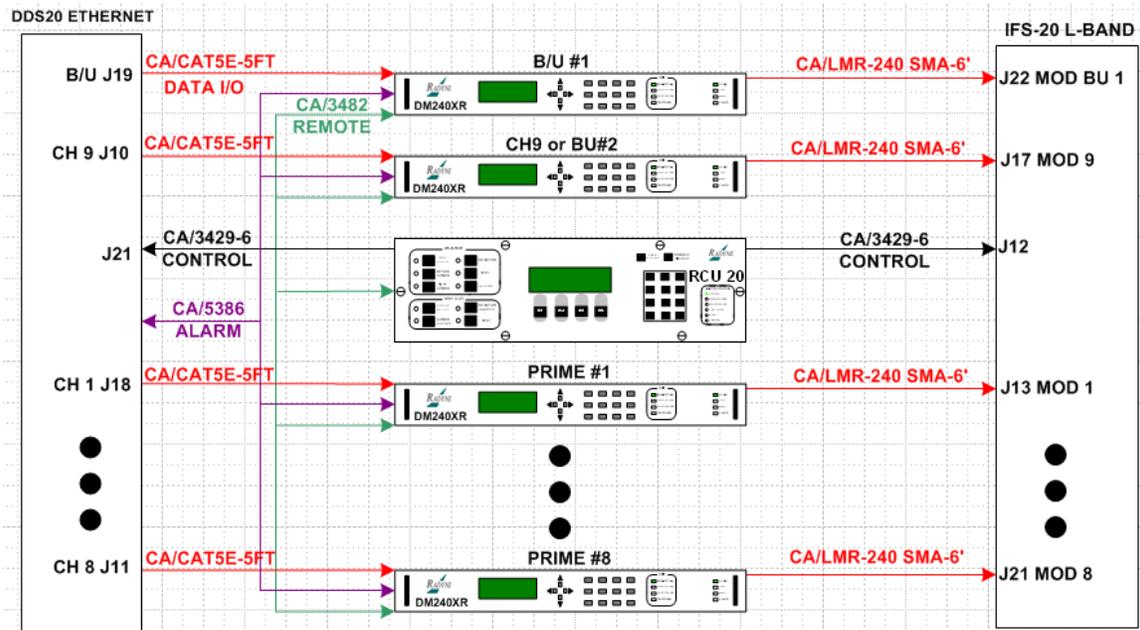


Figure B-33. RCS20 Interconnect with DDS20-GIGE-M and IFS20 L-Band

Figure B-34 illustrates a cable chart for the DM240XR 70/140 Modulators using DDS20-GIGE-M and IFS20 70/140. Figure B-35 illustrates an RCS20 interconnect with DDS20-GIGE-M and IFS20 70/140.

| DM240XR IFS20 70/140 IF MODULATORS | J19 BU1 DATA OUT | J18 CH1 DATA OUT | J17 CH2 DATA OUT | J16 CH3 DATA OUT | J15 CH4 DATA OUT | J14 CH5 DATA OUT | J13 CH6 DATA OUT | J12 CH7 DATA OUT | J11 CH8 DATA OUT | J10 CH9/BU2 DATA | J20 MOD FAULT MON | J21 RCU20 | J13 B/U 1 MOD | J11 B/U 2 MOD | J14 MOD 1 | J15 MOD 2 | J16 MOD 3 | J17 MOD 4 | J18 MOD 5 | J19 MOD 6 | J20 MOD 7 | J21 MOD 8 | J42 TO RCU20 | J1 MODEM REMOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | *IFS20 70/140 | | | | | | | | | | | BANK I/O |
| BACK UP #1 | SL1 | | | | | | | | | | J3 | | J10 | | | | | | | | | | | J4 |
| MODULATOR #1 | | SL1 | | | | | | | | | J3 | | | | J10 | | | | | | | | | J4 |
| MODULATOR #2 | | | SL1 | | | | | | | | J3 | | | | | J10 | | | | | | | | J4 |
| MODULATOR #3 | | | | SL1 | | | | | | | J3 | | | | | | J10 | | | | | | | J4 |
| MODULATOR #4 | | | | | SL1 | | | | | | J3 | | | | | | | J10 | | | | | | J4 |
| MODULATOR #5 | | | | | | SL1 | | | | | J3 | | | | | | | | J10 | | | | | J4 |
| MODULATOR #6 | | | | | | | SL1 | | | | J3 | | | | | | | | | J10 | | | | J4 |
| MODULATOR #7 | | | | | | | | SL1 | | | J3 | | | | | | | | | | J10 | | | J4 |
| MODULATOR #8 | | | | | | | | | SL1 | | J3 | | | | | | | | | | | J10 | | J4 |
| BACK UP #2 | | | | | | | | | | SL1 | J3 | | | J10 | | | | | | | | | | J4 |
| RCS20 BANK CTRL-I/O | | | | | | | | | | | | J3 | | | | | | | | | | | J2 | |
| CABLE SUPPLIED WITH RCU20 AS CONFIGURED | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/CAT5E-5FT | CA/4510 | CA/3429-6 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3598-72 | CA/3429-6 | CA/3482 |

Figure B-34. Modems using DM240XR 70/140 Modulators Cable Chart
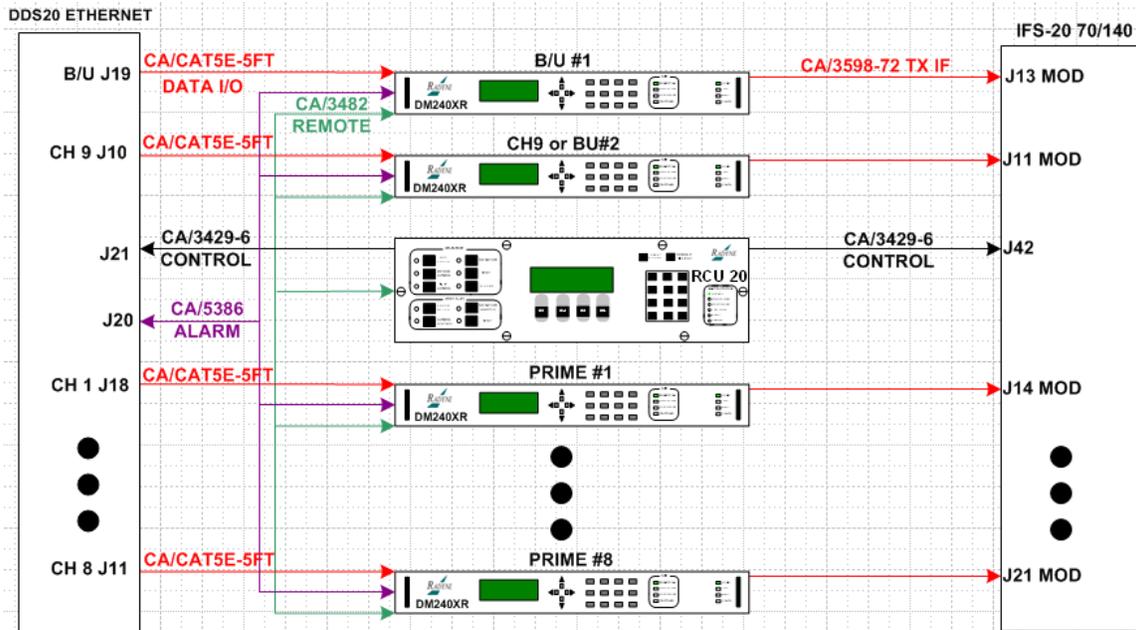


Figure B-35. RCS20 Interconnect with DDS20-GIGE-M and IFS20 70/140

BLANK PAGE

# Appendix C. L-Band Demod Switch Setup and Configuration

The L-Band Demodulator Switch supports various configurations such as multiple antennas and multiple polarities, 4-input or combined 8-input modes.

Figure C-1 depicts the block diagram for an example switch setup in 4-input mode. Connect the cables per Figure C-1 for a single antenna with dual-polarity. Additional hardware may be required by the customer. Combiners and cables are optional.
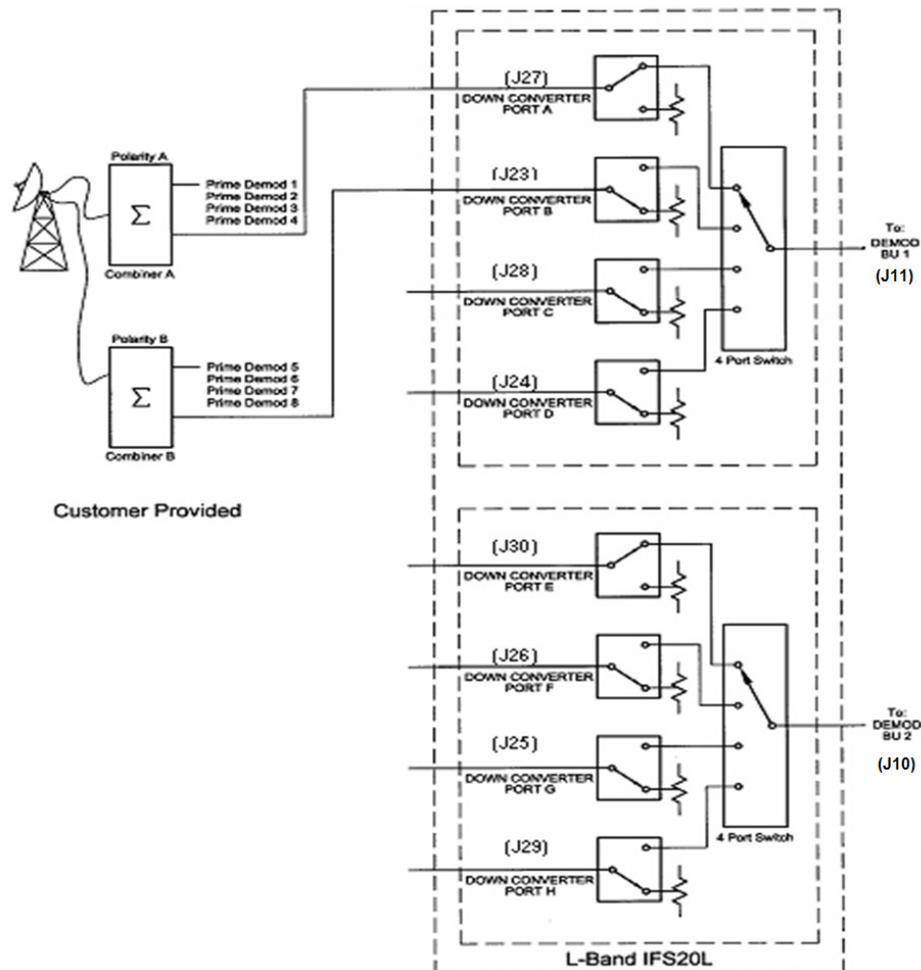


**Figure C-1. RCS20 L-Band Rx 4-Port Switch to Accommodate Polarity**

Figure C-2 depicts a block diagram of the switch setup in combined, 8-input mode.



RCS20 / IFS20L With 8 Independent Demodulator Inputs
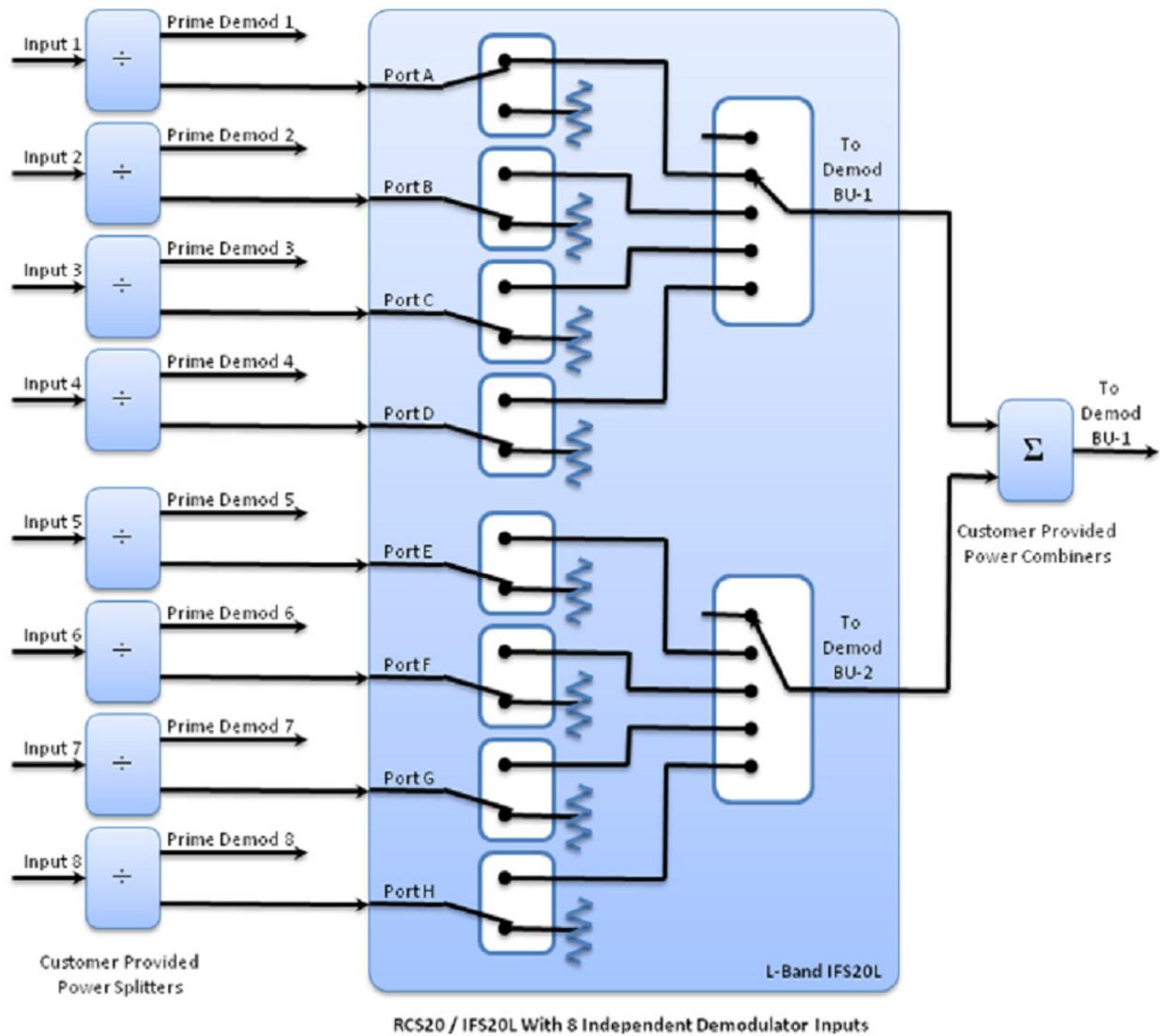
**Figure C-2. RCS20 L-Band Demodulator IFS Combined Configuration**

This configuration is available in the 1:9 configuration and only for the IFS L-Band Demodulator. See the Chapter 4 BANK CONTROL CONFIGURATION section for the software control used to either combine the IFS (8-input) or return the switch to its original, default 4-input configuration.